API Management Pty Ltd

13 July 2010

Anketell Point and Dixon Island Proposed Port Development Area

Level 2 Flora and Vegetation Assessment

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Prepared for

API Management Pty Ltd

Prepared by

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Table of Contents

List of Tables

List of Figures

Executive Summary

Australian Premium Iron Management Pty Ltd (API) is developing the West Pilbara Iron Ore Project (WPIOP) based on channel iron deposits (CID) at Mt Stuart and Red Hill, south of Pannawonica. At the feasibility stage, up to three potential port locations and therefore corresponding rail alignments are under investigation for the haulage and export of ore produced from the mine sites.

This report presents the findings of the botanical component of environmental studies for the proposed Port Development Area at Anketell Point and on Dixon Island.

The field component of the Flora and Vegetation assessment was conducted by AECOM in May and July 2009 with some additional areas ground truthed in May 2010 and specifically deals with flora and vegetation communities, vegetation condition and potential floristic environmental constraints within the project areas.

No species of DRF, listed under the *Wildlife Conservation Act, 1950* or as Threatened under the *EBPC Act, 1999* were recorded within the project area. One Priority Flora species, *Acacia glaucocaesia* (P3) have been recorded by DEC to occur along Cleaverville Road, 4km north of the North West Coastal Highway. The locations of all four populations were revisited by AECOM during 2009.

No Threatened Ecological Communities were identified to occur within the Port Development Area. A search of the DEC Threatened and Priority Ecological Communities Database identified two Priority 1 Ecological Communities, the *Roebourne Plains Gilgai Grassland* and the *Roebourne Chenopod Association* as occurring in close proximity to the project area. Further consultation with DEC in 2010 and further analysis of data collected from the survey area indicates that all of the Horseflat grasslands within the project area are equivalent to a Priority 3 Ecological Community; the *Horseflat Land System of the Roebourne Plains.*. The flora and vegetation assessment has identified the following factors of environmental significance (constraints) associated with the project:

- One Declared Plant (**Prosopis pallida*); listed by the *Department of Agriculture and Food* was recorded
- Two communities are considered to be locally significant due to supporting populations of Priority Flora species. These communities are Thg and AThg2; and
- One community, Hf, is considered regionally significant due to being equivalent to the Priority 3 *Horseflat Land System of the Roebourne Plain* Priority Ecological Community.

1.0 Introduction

1.1 Background

AECOM (formerly Maunsell AECOM) was commissioned by Australian Premium Iron (API) Management Pty to conduct a flora and vegetation assessment of the Anketell Point and Dixon Island Proposed Port Development Area, during May 2009. This assessment forms part of a wider collective of flora and vegetation assessments conducted within proposed infrastructure areas and corridors associated with the development of API's West Pilbara Iron Ore Project (WPIOP).

As part of the Anketell Point and Dixon Island Proposed Port Development Area Flora and Vegetation Assessment the following areas were assessed:

- Anketell Point proposed Port Development Area;
- Terminal Access Corridor to Anketell Point;
- Dixon Island; and
- A previously proposed site option for a camp site on the coast near Anketell Point.

This report presents the findings of the flora and vegetation assessments conducted during 2009 and 2010, for the entire Anketell Point and Dixon Island Port Development Area ('Port Development Area').

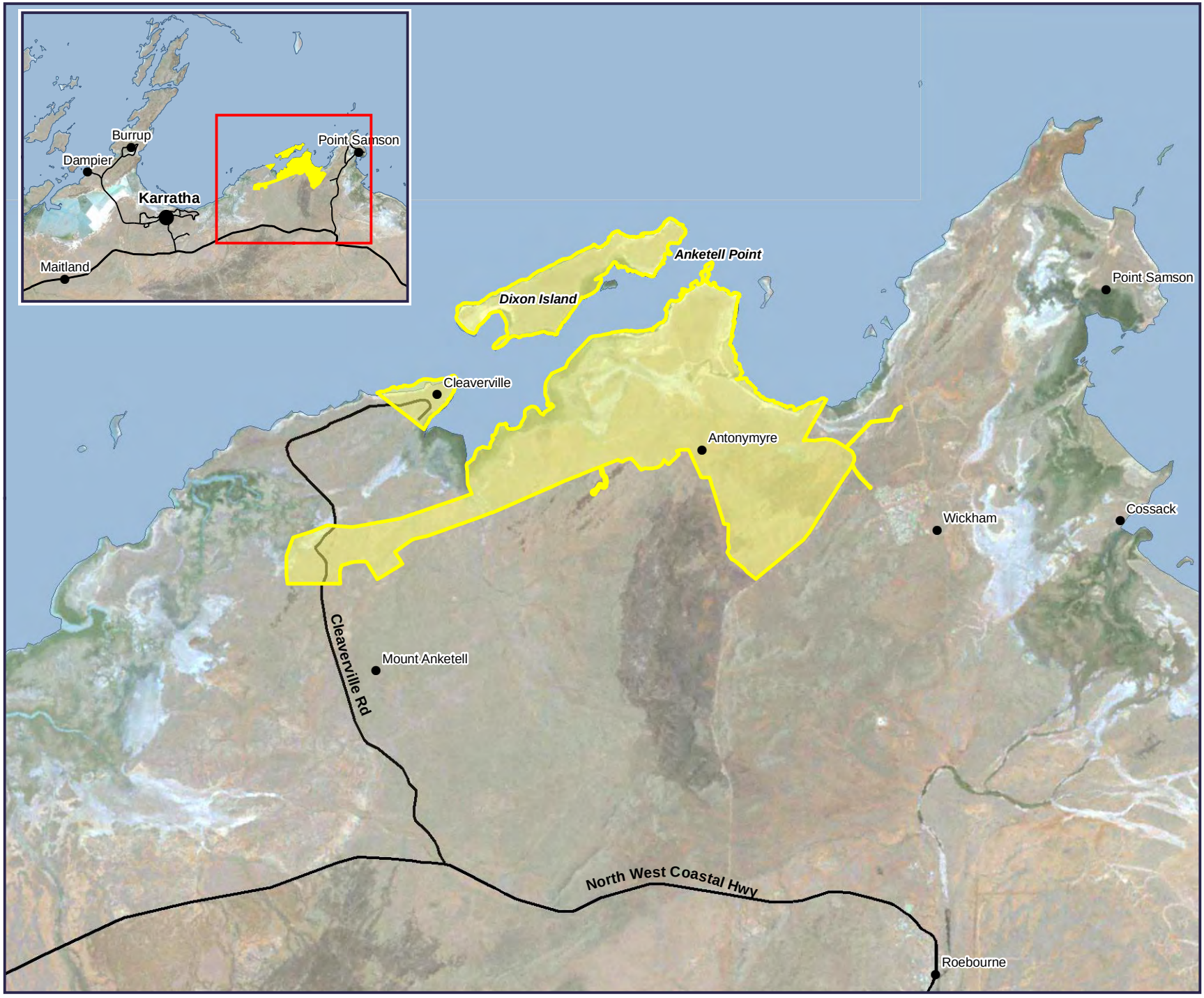
1.2 Location

The Port Development Area is situated within the Shire of Roebourne, approximately 15km directly east of Karratha and 1,535km north of Perth (Shire of Roebourne, 2006).

The western most edge of the Port Development Area is approximately 15km along North West Coastal Highway from the intersection with Karratha Road and continues in an easterly direction for 10km, along the southern side of North West Coastal Highway (**Figure 1**). The extent of the development area continues in a northerly direction following a portion of Cleaverville Road, then spans to the coast in a north easterly direction to Anketell Point and out to Dixon Island.

The consolidated Port Development Area has been broken down into five areas and includes:

- Proposed Anketell Point Port Development Area;
- Quarry Site;
- Power Route area;
- Dixon Island; and
- Proposed Camp Area.



Anketell Point and Dixon Island Port Project Area

Survey Area Locations

Figure 1

0 1 2 3 4

Kilometres

1:125,000

LEGEND

Port Project Area

AECOM

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1.3 Physical Environment

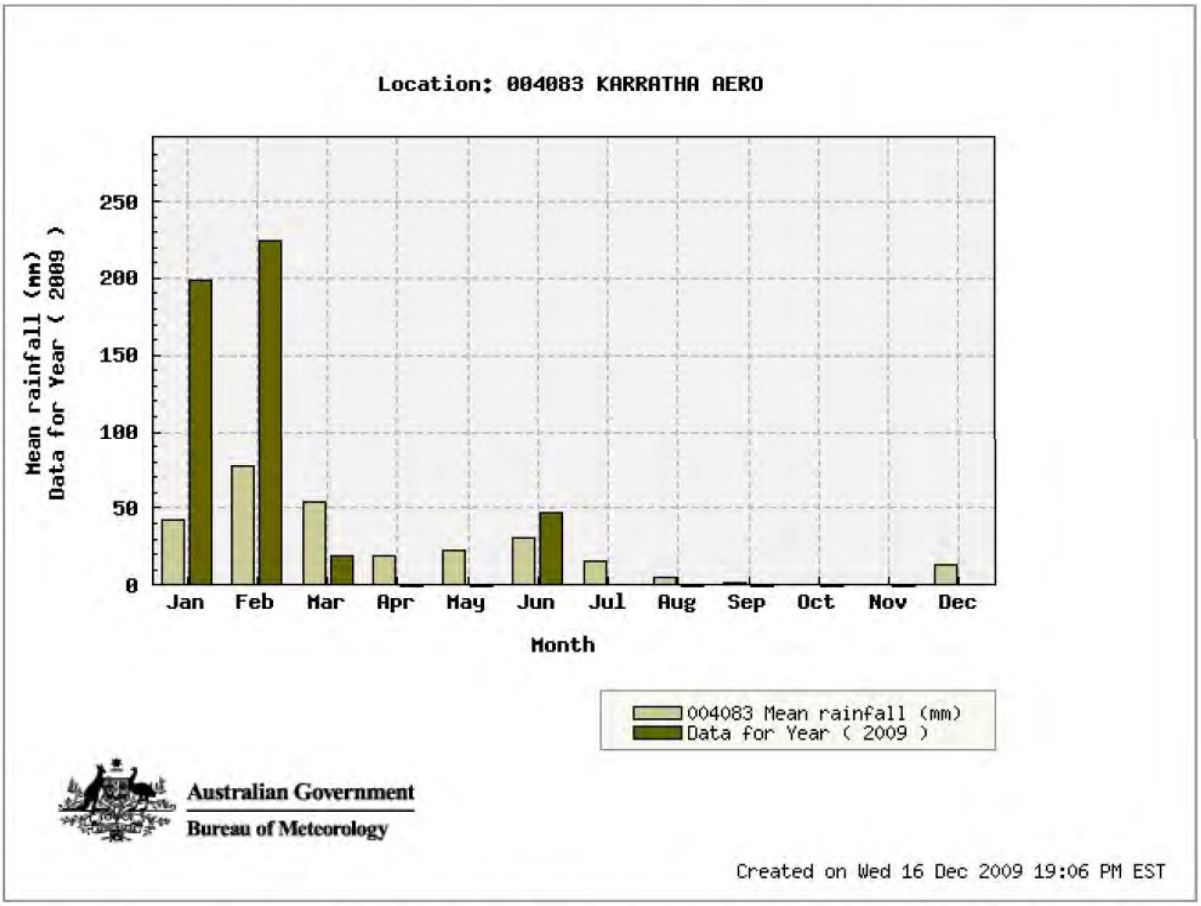
1.3.1 Climate

Karratha is located in the cyclone belt of Western Australia and during the cyclone season the region receives its annual rainfall (Karratha Visitors Centre, 2009). The region experiences both tropical and semi desert climates, with temperatures ranging from 15ºC to 45ºC.

Karratha experiences an average annual rainfall of 279mm per annum, with the lowest average rainfall of 53mm per annum and the highest average rainfall of 855mm per annum (Bureau of Meteorology, 2009). Rainfall data for 2009 to date is presented in **Figures 2a** and **2b**. During January, February and June 2009 higher than average rainfall was experienced for the region.

KARRATHA AERO
Mean rainfall (mm)

Site details
Site name: KARRATHA AERO **Site number:** 004083 **Commenced:** 1971
Latitude: 20.71 °S **Longitude:** 116.77 °E **Elevation:** 7 m **Operational status:** Still Open



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean rainfall (mm)	41.7	77.5	53.9	18.8	22.2	30.3	15.0	5.1	1.0	0.4	0.6	12.6	280.3	36
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Years**
Rainfall (mm) for year 2009	*198.8*	*224.4*	*19.4*	*0.0*	*0.0*	*46.6*	*0.2*	*0.0*	*0.0*	*0.0*	*0.0*			1

Figure 2a Actual rainfall data for Karratha during 2008 compared to mean rainfall (Bureau of Meteorology, 2009)

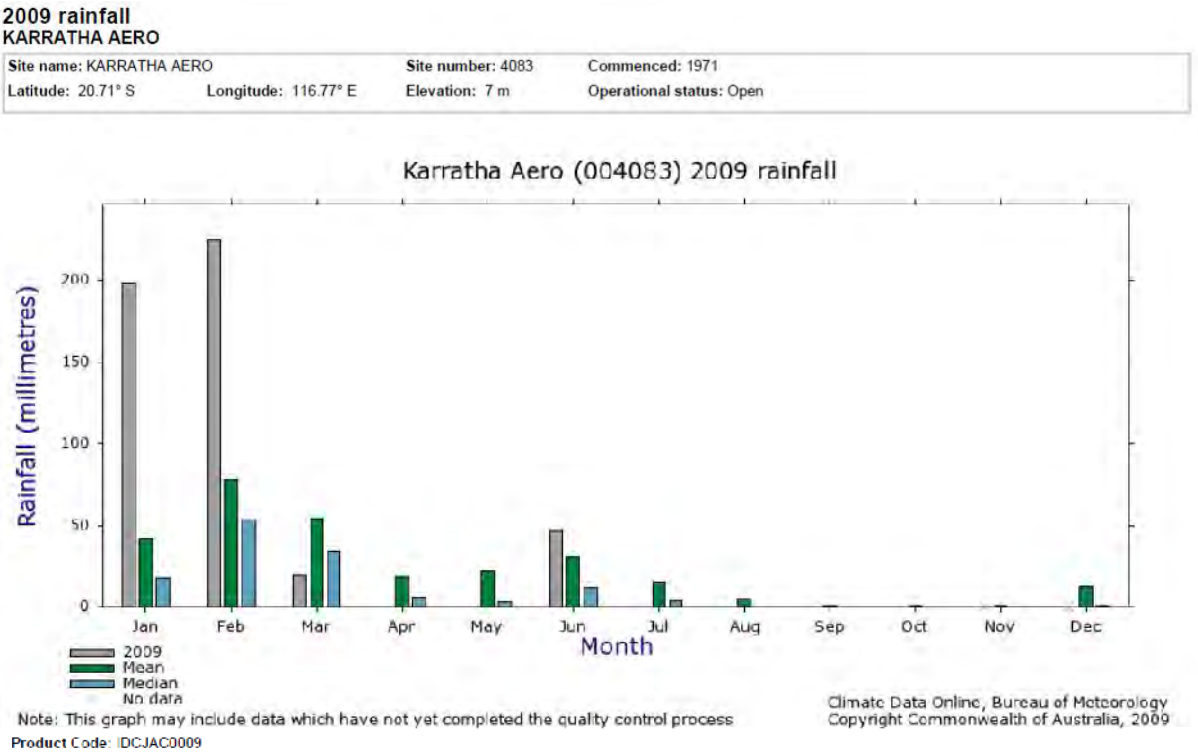


Figure 2b Monthly Rainfall Data for Karratha (Bureau of Meteorology, 2009)

1.3.2 Soils

The Pilbara Region exhibits complex mosaics of soils and geology. The proposed development area traverses a mosaic of differing soil types including, friable loamy soils, brown self mulching cracking clays and shallow coherent porous loamy soils (CSIRO, 1967). Each soil type traversed has not been described in detail due to the large number of differing soil types present within the entire area.

1.3.3 Land System Units

The Port Development Area lies within a region for which the Land Systems have been mapped as part of the rangeland assessment programme (Van Vreeswyk *et al.* 2004). Dixon Island has not been mapped as part of this programme. Six Land System Units are traversed by the Port Development Area (**Figure 3**) and these are described as follows:

Boolgeeda Stony lower slopes and plains found below hill systems, supporting hard and soft spinifex grasslands and mulga shrublands. Predominantly deposition surfaces of very gently inclined stony slopes and plains becoming almost level further downslope.

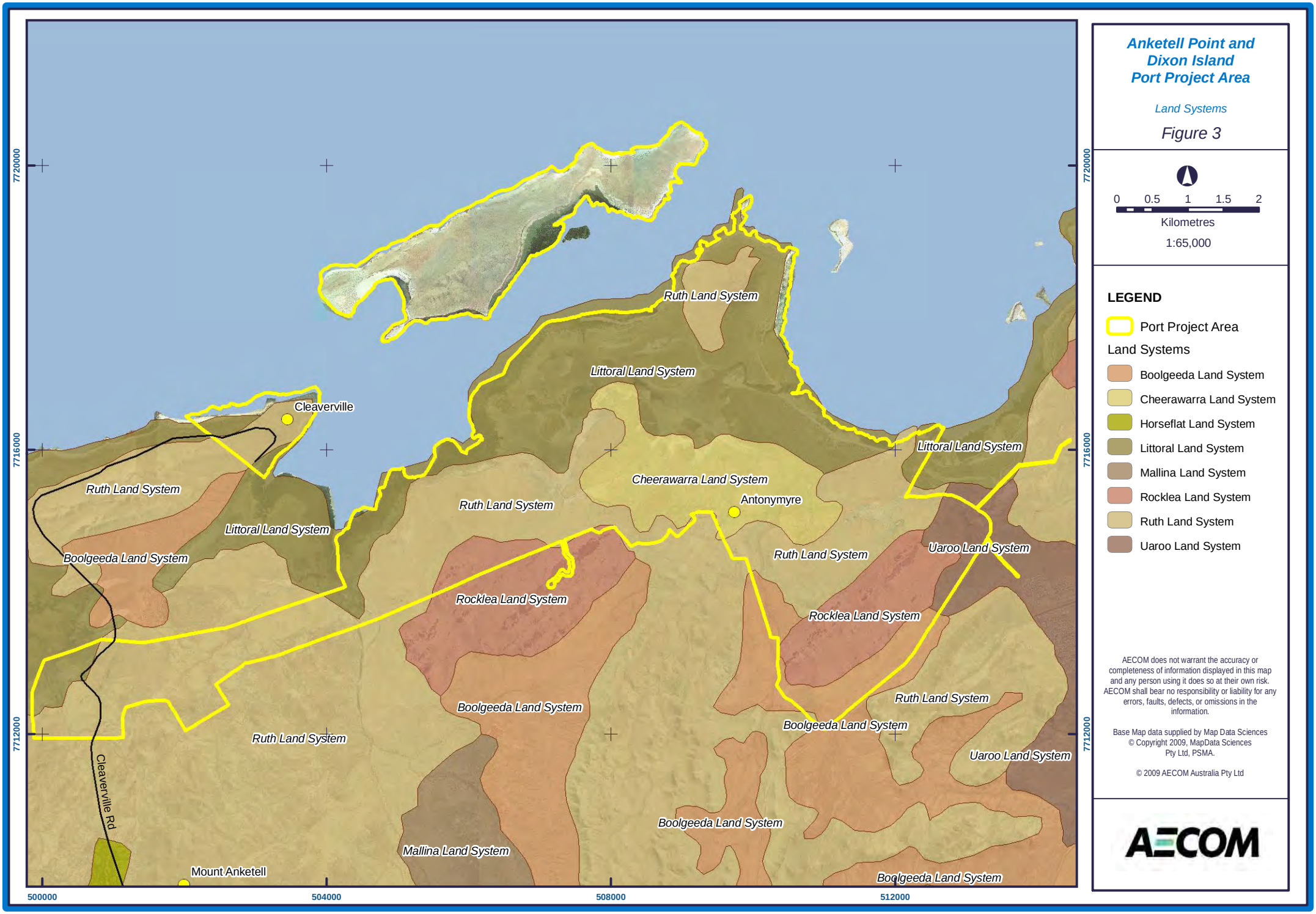
Cheerawarra Sandy coastal plains and saline clay plains supporting soft and hard spinifex grasslands and minor tussock grasslands. Depositional surfaces of gently undulating, sandy surfaced coastal plains and level plains with saline clay soils and bare saline scalds with wind hummocks.

Uaroo Broad sandy plains supporting shrubby hard and soft spinifex grasslands. Depositional surfaces; level sandy plains up to 10km or more in extent with little organised drainage. It consists of pebbly surfaced plains and plains with calcrete at shallow depth. It is broad, mostly unchannelled, tracts receiving more concentrated sheet flow, minor low stony hills and rises. Relief is mostly less than 10m but isolated hills up to 30m.

Littoral Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches. Depositional surfaces of saline coastal flat, and estuarine and littoral surfaces with extensive bare saline tidal flats subject to infrequent tidal inundation, slightly higher samphire flats and alluvial plains, mangrove seaward fringes with dense branching patterns of shallow tidal creeks, minor coastal dunes, limestone ridges, sandy plains and beaches.

Rocklea Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands. Consists of hills, ridges and plateaux remnants on basalt with steep stony slopes, restricted lower slopes, stony interfluves and minor gilgai plains.

Ruth Hills and ridges of volcanic and other rocks supporting hard spinifex and occasionally soft spinifex grasslands. They consist of erosional surfaces of rounded hills and ridges with restricted lower slopes and stony interfluves with moderately to widely spaced drainage patterns.



Anketell Point and Dixon Island Port Project Area

Land Systems

Figure 3

0 0.5 1 1.5 2

Kilometres

1:65,000

LEGEND

- Port Project Area

Land Systems

- Boolgeeda Land System
- Cheerawarra Land System
- Horseflat Land System
- Littoral Land System
- Mallina Land System
- Rocklea Land System
- Ruth Land System
- Uaroo Land System

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1.4 Biological Context

1.4.1 IBRA Regions

There are 85 recognised Interim Biogeographical Regionalisation Areas (IBRA) Regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (Environment Australia, 2000). The entire Port Development Area lies within the Pilbara Biogeographic Region of IBRA (DEWHA, 2009a).

The Pilbara IBRA Region is comprised of four Biogeographical subregions; Chichester, Fortescue Plains, Hamersley and Roebourne Subregions. The proposed Port Development Area is situated within two of these subregions, namely the Chichester and Roebourne Subregions (**Figure 4**), with the majority of the development area lying within the Chichester Subregion.

The Chichester subregion comprises the northern section of the Pilbara Craton consisting of undulating Archaean granite and basalt plains including areas of basaltic ranges (Kendrick and McKenzie, 2001). The plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges (Kendrick and McKenzie, 2001).

Kendrick and Stanley (2001) have broadly described the Roebourne subregion as; Quaternary alluvial and older colluvial coastal and sub-coastal plains with a grass savannah of mixed bunch and hummock grasses and a dwarf shrub steppe of *Acacia stellaticeps* or *Acacia pyrifolia* and *Acacia inaequilatera*. Uplands are dominated by Triodia Hummock Grasslands and the ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* Woodlands. Samphire, *Sporobolus* and mangal occur on marine alluvial flats and river deltas.

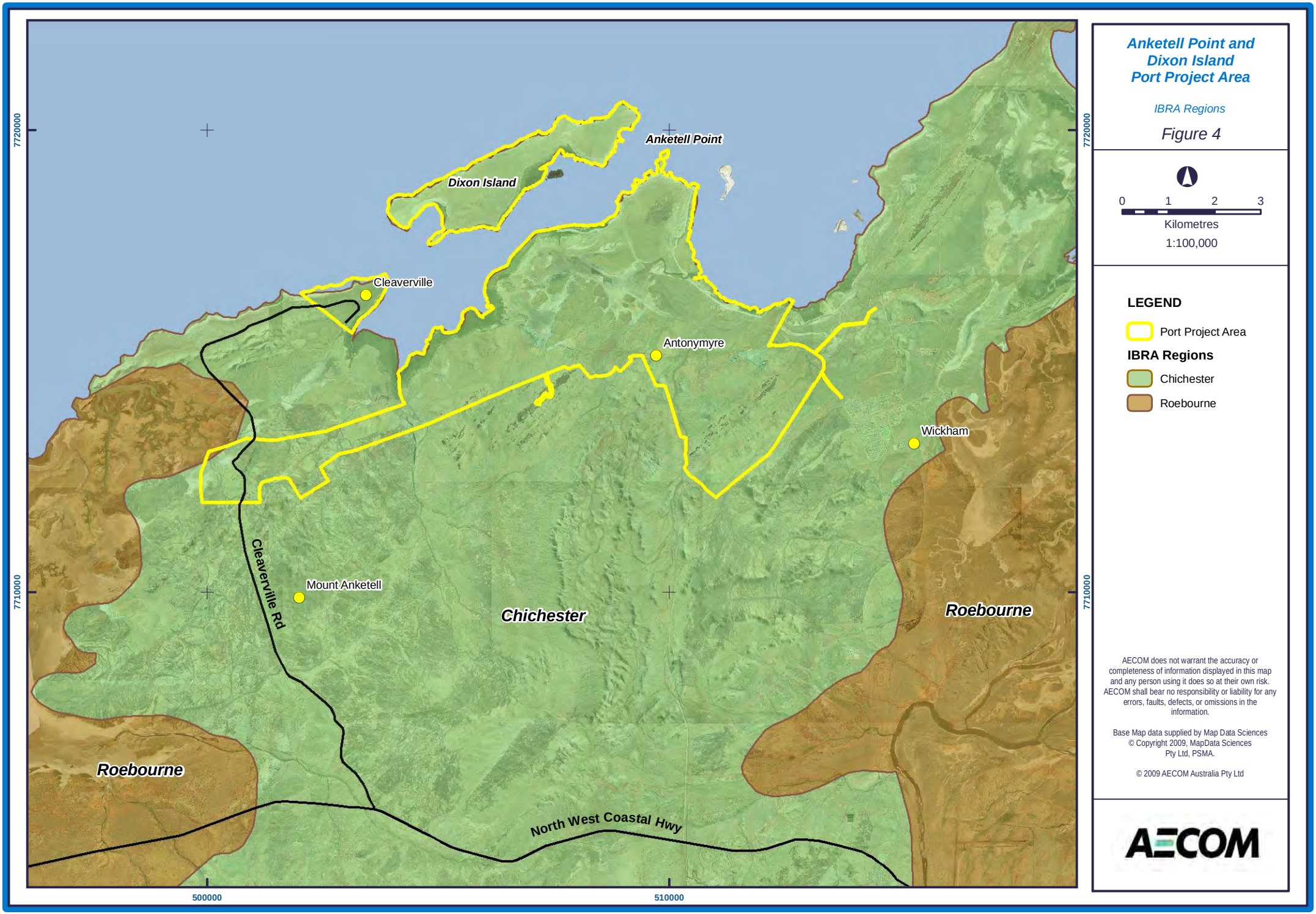
1.4.2 Flora and Vegetation

The Port Development Area is situated within the Fortescue Botanical District of the Pilbara region, which broadly consists of tree and shrub steppe communities with *Eucalyptus* trees, *Acacia* shrubs, *Triodia pungens* and *Triodia wiseana* (Beard, 1990).

Beard's (1975) 1:1,000,000 vegetation series mapping for the Pilbara Region identified three broad terrestrial vegetation types to occur within the project area and they are described in **Table 1**.

Table 1 Beard's (1975) Terrestrial Vegetation Types within the Anketell Point Area

Vegetation Code No.	Beard Code	Category
629	xGc/t_3Hi	Mosaic: Short bunch grassland - savannah / grass plain (Pilbara) / Hummock grasslands, grass steppe; hard spinifex, *Triodia wiseana*
157	T_3Hi	Hummock grasslands, grass steppe; hard spinifex, *Triodia wiseana*
43	Mangrove	Low forest; mangroves (Kimberley) or thicket; mangroves (Pilbara)



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1.4.3 Vegetation Clearing, Extent and Status

Where clearing of native vegetation is proposed to occur, purely from a biodiversity perspective and not taking into account any other land degradation issues present, there are now several key criteria being applied with regards to clearing licenses. The criteria, as outlined in the WA EPA Position Statement No. 2, *Environmental Protection of Native Vegetation in Western Australia: Clearing of native vegetation, with particular reference to the agricultural area* (EPA, 2000) are used to help reverse the long-term decline in the quality and extent of Australia's native vegetation cover. The criteria are as follows:

- The "threshold level" below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30% of the pre-clearing extent of the vegetation type;
- A level of 10% of the original extent is regarded as being a level representing "endangered";
- Clearing which would put the threat level into the class below should be avoided; and
- From a biodiversity perspective, stream reserves should generally be in the order of at least 200m wide.

The status of remaining vegetation can be delineated into five different classes:

- *Presumed extinct*: Probably no longer present in the bioregion;
- **Endangered*: <10% of pre-European extent remains;
- **Vulnerable*: 10-30% of pre-European extent exists;
- **Depleted*: >30% and up to 50% of pre-European extent exists; and
- *Least concern*: >50% pre-European extent exists and subject to little or no degradation over a majority of this area.

* or a combination of depletion, loss of quality, current threats and rarity gives a comparable status.

1.5 Biological Factors of Environmental Significance

1.5.1 Declared Rare, Priority and Threatened Species

The Department of Environment and Conservation (DEC) assigns conservation status to endemic plant species that are geographically restricted to few known populations or threatened by local processes. Allocating conservation status to plant species assists in protecting populations and conserving species from potential threats (DEC, 2010a and 2010b).

Declared Rare Flora species are gazetted under subsection 2 of section 23F of the *Wildlife Conservation Act, 1950*. It is an offence to "take" or damage Rare Flora without Ministerial approval. Section 23F of the *Wildlife Conservation Act, 1950* defines "to take" as " to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means."

Species designated as Priority Flora are under consideration for declaration as 'Rare Flora' and are in urgent need of further survey (Priority One to Three) or require monitoring every 5-10 years (Priority Four). **Table 2** presents the definitions of Declared Rare and the four Priority ratings under the *Wildlife Conservation Act, 1950* as extracted from Department of Environment and Conservation (2010b).

Table 2 Definition of Rare and Priority Flora Species (Department of Environment and Conservation, 2010b)

Conservation Code	Category
DRF	**Declared Rare Flora – Extant Taxa** "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. "
P1	**Priority One – Poorly Known Taxa** "Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey. "
P2	**Priority Two – Poorly Known Taxa** "Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey. "
P3	**Priority Three – Poorly Known Taxa** "Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but need further survey. "
P4	**Priority Four – Rare Taxa** "Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years. "

Any species listed in State and Commonwealth legislation as being of conservation significance is said to be a significant species (EPA QLD, 2002) and incorporates species that are endangered, vulnerable and rare or covered by international conventions. Species at risk of extinction are recognised at a Commonwealth level and are categorised according to the *Environment Protection and Biodiversity Conservation (EPBC) Act*, *1999*, summarised in **Table 3**. Significance is not limited to species covered by State and Commonwealth legislation and also includes species of local significance and species showing significant range extensions or at the edge of their known range.

Threats of extinction of species are also recognised at a Commonwealth level and are categorised according to the *EPBC Act, 1999.* Categories of Commonwealth listed threatened species are summarised in **Table 3.**

Table 3 Categories of Threatened Flora Species (*Environment Protection and Biodiversity Conservation Act, 1999*)

Conservation Code	Category
Ex	**Extinct** Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation programme, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

1.5.2 Threatened and Priority Ecological Communities

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat, which are subject to processes that threaten to destroy or significantly modify the assemblage across its range (DEC, 2001).

Vegetation communities in Western Australia are described as 'TECs' if they have been defined by the DEC's Species and Community Branch and found to be Presumed Destroyed (PD), Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). For definitions of TEC categories and criteria refer to English and Blyth (1997). The DEC maintains a database of state listed TECs which is available for online searches via their website (www.dec.wa.gov.au).

The categories and the criteria for defining TECs have been described by English and Blyth (1997). A publicly available database, listing TECs within Western Australia, is maintained by DEC and available via their website (www.dec.wa.gov.au).

There is currently no legislation covering the conservation of TECs in WA, however some are protected under the Commonwealth *EPBC Act, 1999.* The TECs on the Commonwealth register are also listed on the Department of Environment, Water, Heritage and the Arts (DEWHA) website. For those State TECs not listed on the Commonwealth register, land clearing legislation under the *Environmental Protection Act, 1986* also provides protection from clearing. The Environmental Protection Authority's position on TECs states that proposals resulting in the direct loss of TECs are likely to be formally assessed.

Additional to TECs, potential TECs that do not currently meet survey criteria or that are not adequately defined, are rare but not threatened, have been recently removed from the TEC list or require regular monitoring are considered to be Priority Ecological Communities (PECs) (DEC, 2010c) and DEC require them to be taken into consideration during environmental impact assessments.

1.5.3 Local, Regional and National Significant Communities

Vegetation communities are referred to as Locally Significant where they:

- Support populations of Priority Flora species;
- Extend the geographic range of particular taxa from previously recorded locations;
- Are restricted to only one or a few locations;
- Occur as small isolated communities; or
- Exhibit unusually high structural and species diversity (Dr. E.M. Mattiske, *pers. comm.*).

Vegetation communities are referred to as Regionally Significant where they:

- Are limited to specific landform types;
- Are uncommon or restricted plant community types within the regional context; or
- Support populations of Declared Rare Flora (Dr. E.M. Mattiske, *pers. comm.*).

Vegetation communities are referred to as Nationally Significant where they:

- Support populations of Threatened (*EPBC* listed) species; or
- Support populations of Threatened Ecological Communities (TECs) listed with national (*EPBC*) significance (Dr. E.M. Mattiske, *pers. comm.*).

Guidance Statement 51 (EPA, 2004) also states that *"vegetation may be significant for a range of reasons, other than a statutory listing as a Threatened Ecological Community or because the extent is below threshold level".* According to Guidance Statement 51, other significant vegetation may include communities that have:

- Scarcity;
- Unusual species;
- Novel combination of species;
- A role as a refuge;
- A role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- Being representative of the range of a unit (particularly, a good local and/or regional example of a unit in "prime" habitat, at the extremes of a range, recently discovered range extensions, or isolated outliers of the main range);
- A restricted distribution.

1.5.4 Significant Species

Guidance Statement 51 (EPA, 2004) states that *"species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than as Declared Rare Flora or Priority Flora"*. According to Guidance Statement 51 (EPA, 2004), other significant flora may include taxa that:

- Have a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;
- Have a relic status;
- Have anomalous features that indicate a potential new discovery;
- Are representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- Show the presence of restricted subspecies, varieties or naturally occurring hybrids;
- Have local endemism / a restricted distribution; or
- Are poorly reserved.

1.6 Flora (Variants and Complexes)

Taxonomist, Malcolm Trudgen identified differences in the key characteristics of a number of collected flora specimens. In order to determine the significance of the collections, they have been split into different forms and further taxonomic work will be required in future (**Table 4**).

Table 4 Variants and Complexes from collected Taxa

Species	Variant and/or Complex	Malcolm Trudgen Comments
Triodia wiseana	*Triodia wiseana* (fine form)	One of several forms of *Triodia wiseana*. This one seems to be common, possibly restricted to the western Pilbara but may be in the central Pilbara as well
Polycarpaea longiflora	*Polycarpaea longiflora* (red form) *Polycarpaea longiflora* (white form)	There are several colour forms of *Polycarpaea longiflora*, which may have taxonomic significance. Studies are needed to resolve this problem
Acacia elachantha	*Acacia elachantha* (golden hairy variant)	This is an informal variant recognised by the WA Herbarium, but not catalogued on Florabase
Senna artemisioides subsp. *oligophylla*	*Senna artemisioides* ssp. aff. *oligophylla* (thinly sericeous)	A well known variant of *Senna oligophylla* with a distinct apressed sericeous tomentum
Indigofera monophylla	*Indigofera monophylla* (Cape Preston form) *Indigofera monophylla* (Burrup form) *Indigofera monophylla* (grey leaflet form)	*Indigofera monophylla* is a species complex, these are different forms, varying in characters such as tomentum and calyx
Euphorbia tannensis subsp. *eremophila*	*Euphorbia tannensis* subsp. *eremophila* (Burrup form)	A variant with some different characters
Gossypium australe	*Gossypium australe* (Whim Creek form) *Gossypium australe* (Burrup Peninsula form)	Two forms with different leaf tomentum
Sida pilbarensis	*Sida pilbarensis* (Ferrugineous form)	This is a form of recognised on determinavit slips by Robin Barker, who works on *Sida*. It is widespread and common in the Pilbara Bioregion
Scaevola spinescens	*Scaevola spinescens* (broad leaf form) *Scaevola spinescens* (narrow form)	*Scaevola spinescens* is a species complex. These forms require further study but appear to be separate taxa

2.0 Objectives

The primary objective of the flora and vegetation assessment of the Port Development Area was to accurately describe, map and quantify flora and vegetation values of the site. The specific objectives and tasks relating to the Port Development Area included for AECOM to:

- Review available reports and information for flora and vegetation of the Anketell Point area;
- Conduct a 'Level 2' flora and vegetation assessment in accordance with EPA Guidance Statement 51;
- Determine the presence or absence of DRF, Priority or Significant Flora Species; and Threatened and Priority Ecological Communities;
- Accurately map and delineate Vegetation Communities and Vegetation Condition; and
- Interpret and report on survey results, including a summary of the consequences of these results on environmental approvals.

3.0 Methodology

The flora and vegetation field assessment of the project area was conducted in accordance with the EPA Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004) for Level 2 Surveys, specifically addressing:

- Desktop studies;
- A reconnaissance field survey, including:
  - verification of desktop studies;
  - delineating and characterising flora and vegetation units; and
  - identify potential impacts.
- A detailed flora and vegetation field survey, including:
  - verification of vegetation mapping and vegetation units; and
  - a comprehensive and quantitative assessment of individual vegetation units.

3.1 Desktop Assessment

A search of DECs Declared Rare and Priority Flora database was undertaken, prior to the flora and vegetation field assessment to identify flora of conservation significance that could potentially occur within the Port Development Area.

The search co-ordinates used were 20° 23' - 20° 58' S and 116° 43' - 117° 20' E. The following databases were interrogated:

- DEC Threatened Flora Database;
- Western Australian Herbarium records;
- DEC Declared Rare Flora and Priority Flora List; and
- DEC Threatened Ecological Communities (TEC) and Priority Ecological Community (PEC) database.

3.2 Field Assessment

During May, June and July 2009, Level 2 Flora and Vegetation surveys were conducted for the Proposed Anketell Point Port Development Area, the eastern third of Dixon Island and the central portion of the proposed quarry site. Verification of areas previously mapped by Mattiske Consulting Pty Ltd of the Cape Lambert Project Area (Mattiske Consulting Pty Ltd, 2007) was also carried out in June 2009. Additionally, a Level 1 Flora and Vegetation survey was conducted for the western two thirds of Dixon Island, the proposed camp area on the coast near Anketell Point, the outer buffer of the proposed quarry site and a power access corridor linking into the proposed quarry site (**Figure 1**). The latter areas listed, that was initially assessed to Level 1 detail, were revisited during May 2010 and assessed to Level 2 detail.

The Flora and Vegetation assessments were conducted by AECOM teams lead by experienced Botanists and Ecologists. The full list of participants is presented in **Section 8.0**. The field assessments were conducted between 11 – 15 and 18 – 22 May, on 4 and 29 June, 21 – 22 July 2009 and 30 – 31 May 2010

The project area was traversed by vehicle, foot and helicopter (where appropriate), to verify, further define and spatially map vegetation communities within the project areas. Detailed information was recorded for each vegetation community where distinct changes in floristic composition and structure were noted.

Additional areas were added to the proposed development footprint following the completion of the field assessments during the optimum post wet season period. These additional areas occur along the edge of the proposed transport corridor to encompass a larger area than previously assessed. Prior to the field assessments, these areas were extrapolated by inferring vegetation communities from adjacent communities which were originally surveyed to Level 2 detail during favourable conditions within the project area. These areas were ground truthed during May 2010 to verify the vegetation communities, condition and floral composition of these locations.

A collective total of 31 vegetation quadrats have been established specifically for the suite of study areas within the Port Development Area. This consisted of 25 vegetation quadrats established during 2009 field assessments and six quadrats established during the 2010 field assessment. Additional quadrats have been established within the survey area for the Anketell Point transport corridor and associated infrastructure (AECOM, 2009), however these have not been included or documented as part of this assessment.

Each vegetation community was quantitatively assessed using permanent 50m x 50m quadrats. Reoccurrences of previously defined vegetation communities were also sampled using quadrats if appropriate, given geographical ranges of vegetation units across the project area.

Each quadrat was established in a north-south orientation. At the north western corner of each quadrat, GPS locations and quadrat reference photos were taken. A thorough site walkover was conducted surrounding each quadrat, to record additional (opportunistic) species occurring within the vegetation community that may not have been recorded within the quadrat.

Quadrat dimensions sometimes had to be adjusted to “fit” the habitat and to ensure that sample area doesn’t overlap into differing vegetation communities, particularly in narrow creeklines. Standard quadrats sampled are 50m x 50m (2,500m^2) and therefore if plot dimensions are adjusted, it is usually expected that the total area sampled still be comparable to regular quadrats, and total 2,500m^2. In order to achieve this, for example, a plot established to be 25m wide would need to be 100m long. However, in some cases it is not possible to “fit” sample plots of sufficient lengths within a vegetation type due to river/creek geometry. Additionally, due to the fact that species diversity and plant density are typically greater in river/creek vegetation types, if sufficient species have been recorded, it is expected that data is sufficient for comparison purposes. This is compounded by the fact that percentage cover is calculated based on proportions that are considered regardless of total area. Where the number of additional species being recorded begins to diminish, which is often after 150-200m, sufficient data is collected. Quadrat APQ93 is an example of this, where the size sampled was 25m x 100m and the number of new species recorded in the plot began to diminish before 100m. APQ93 is therefore considered comparable with the rest of the quadrats sampled.

Flora and vegetation assessment conducted during this season, was considered sufficient to capture the majority of perennial species.

The described method complies with the EPA’s guidelines for flora surveys as outlined in EPA Guidance Statement No. 51 (EPA, 2004). Standardised data collection sheets were used to ensure consistent data records for the following features at each quadrat:

- location;
- flora species;
- dominance of each species;
- average height of each species;
- Projected Foliage Cover;
- soil type and soil colour;
- topography; and
- vegetation condition.

A specimen collection of each flora species recorded within each quadrat was taken in order to minimise errors in identifications and within the data and to account for variability within species. Plant specimens were identified by Malcolm Trudgen (taxonomic specialist for the Pilbara), assisted by Gaby Martinez (AECOM Botanist) and Alexandra Sleep (AECOM Graduate Environmental Scientist), via a combination of the use of taxonomic keys, comparison with pressed specimens housed at the West Australian Herbarium and Mr Trudgen's personal, extensive knowledge and experience with the Pilbara flora. Nomenclature of the species recorded follows protocols of the West Australian Herbarium.

Aerial imagery provided by API was used in the field to delineate vegetation community boundaries within the project areas. A Panasonic Toughbook ® loaded with the aerial imagery was utilised in conjunction with a GPS unit and the mobile mapping capabilities and the ability to plot real time locations coupled together assisted with site navigation and tracking throughout the project area. This also ensured that field assessments were within the defined alignments and that vegetation community and condition mapping was recorded accurately.

Vegetation condition is determined in relation to the (perceived) ability of the bushland to maintain itself (Keighery, 1994). This is commonly interpreted primarily on the ratio of visible introduced species to native species however disturbance (e.g. grazing, erosion), degree of alteration to community and habitat structure, site ecology and other factors are also considered.

In order to map vegetation condition of the project area, the condition was determined at a range of detailed recording sites and in between as necessary, where condition changed. The categories of vegetation condition used were consistent with a combination of methods developed by Keighery (1994) and the Braun-Blanquet Scale (Mueller-Dombois and Ellenberg, 1974), as summarised in **Table 5**. Given that effective measures of bushland condition are a measure of both the amount of change in community structure and the proportion of weeds present, a quantitative measure is considered to add value to interpretations and results. Accordingly, the described method incorporates the Keighery (1994) (descriptive and qualitative) and the Braun-Blanquet Scale (Mueller-Dombois and Ellenberg, 1974) (quantitative) methods.

Table 5 Bushland Condition Ratings (adapted from Keighery, 1994 and the Braun-Blanquet Scale of Cover Abundance (from Mueller-Dombois and Ellenberg, 1974))

Descriptor	Explanation
Pristine	Pristine or nearly so, no obvious signs of disturbance. *0% weed cover*
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. *1 – 5% weed cover*
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. *5 – 25% weed cover*
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing. *25 – 50% weed cover*
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance of vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing. *50 – 75% weed cover*
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs. *75 – 100% weed cover*

A search of the *Department of Agriculture and Food Western Australia* (DAFWA) website for Declared Plants was conducted to determine if any of the recorded species are listed as Declared Plants pursuant to the *Agriculture and Related Resources Protection Act, 1976* (DAFWA, 2010).

3.3 Data Analysis

Statistical analysis of the survey data collected by AECOM (2008 and 2009) was undertaken by Astron (2010). The data analysis carried out included three multivariate techniques; Analysis of Similarity (ANOSIM), classification analysis and ordination analysis. The analyses focused on exploring the vegetation communities defined from the data and used in spatial mapping and then included in Environmental Impact Assessment. The purpose of the numerical analyses was to verify the groupings of flora species data into vegetation communities, to ensure that the AECOM descriptions, groupings and mapping has been robust and sufficiently detailed.

The stages of the data analysis were:

- Multivariate analysis of the whole data set to allow interpretation of results in a wider context than the Port Development Area;
- Tests of differences in vegetation between Port Development Area and the Anketell Point transport corridor; and
- Interpretation of the vegetation communities derived by the field botanists.

All analyses followed the procedures outlined in Clarke and Gorley (2006), and were carried out using the appropriate modules of *Primer v6*. Further details regarding methodologies utilised by Astron for this analysis are available in the comprehensive report provided as **Appendix A**.

4.0 Survey Limitations

The majority of the Level 2 floristic assessment was conducted during May 2009, with some areas assessed in June and July 2009 and May 2010. The timing of the majority of the survey (May 2009 – post wet) was agreed with DEC Pilbara specialist Stephen Van Leeuwen as being the optimal time to conduct surveys in the Pilbara. Additionally, the wet season that preceded this assessment was a notably wet season with high and prolonged rainfall that resulted in an ideal post-wet season, floristically.

An additional (Phase 2) Level 2 Flora and Vegetation Assessment would be required to be conducted during an appropriate season, in order to meet EPA Guidance requirements. This additional assessment will potentially capture additional species that may not have been recorded or present at the time of the initial floristic assessment.

It was intended that the field assessment conducted in May 2010 would represent the 'Phase 2' Level 2 assessment, however the poor rainfall during early 2010 resulted in many of the species within the project area being in poor condition, withered, not in flower or altogether absent. For this reason another detailed sampling effort will be required during more favourable conditions (i.e. possibly following winter rains) in order to meet EPA Guidelines. The entire project will then have been assessed by a two phase, Level 2 Flora and Vegetation assessment.

Some areas in the assessment area were added to the scope following the completion of initial field assessments, including a narrow edge of the transport corridor to the port area, to encompass slightly greater areas than previously assessed. A combination of desktop extrapolation of existing ground truthed data and some additional ground truthing during the May 2010 site visit were used to determine the vegetation communities, condition and floral composition of these areas. Six additional quadrats were also established and assessed in May 2010. It is considered that given the intensive assessment across such a large and comprehensive project area directly adjacent that was already carried out during optimal survey conditions; these areas previously extrapolated or assessed to Level 1 detail (and then ground truthed in May 2010 and done to Level 2), do not represent gaps in the data, accuracy or validity of the assessment project as a whole.

Vegetation communities have been delineated within the project area based on species composition and structure and may not necessarily take Land System Units into consideration. For this reason, the spatial extent of some vegetation communities may span numerous Land System Units. Deliberation of this in recent times including discussions with various DEC personnel has concluded that Land System Mapping is based on underlying soil and landform characteristics and whilst this usually has a direct relationship with supported vegetation, ground truthing is considered the most accurate and fine scale assessment and characterisation of vegetation distribution.

5.0 Results

5.1 Previous Assessment

During 2007, Mattiske Consulting was commissioned by Cape Lambert Iron Ore Ltd to conduct a flora and vegetation survey of a proposed development area near Cape Lambert and on Dixon Island (Mattiske Consulting Pty Ltd (Mattiske), 2007). The area surveyed for Cape Lambert Iron Ore encompassed, API's Anketell Point and Dixon Island Port Development Areas. A total of 228 plant taxa were recorded from 204 sites. Of these, six introduced flora species were recorded; however none are listed as Declared Plants under the *Agriculture and Related Resources Protection Act, 1976.*

No Declared Rare or Priority Flora was recorded during the Mattiske assessment. No Threatened Ecological Communities protected by the *Environment Protection and Biodiversity Conservation Act, 1999* and the Department of Environment and Conservation (Mattiske Consulting, 2007) were recorded.

Mattiske (2007) identified two vegetation communities with similarities with two PECs:

- *Roebourne Plains Gilgai Grassland* (Priority 1) formerly *Roebourne Plains Coastal Grassland* - exhibits similarities to Mattiske G2 community; and
- *Stony Chenopod Association of the Roebourne Plains Area* (Priority 1) – exhibits similarities to Mattiske CS1 community.

Based on surveys conducted by AECOM during 2009, liaison with Jill Pryde and Stephen van Leeuwen from DEC, as well as an analysis of Mattiske's previous assessment (**Appendix B**), it has been determined that Mattiske's inferred PECs (i.e. *Roebourne Plains Gilgai Grassland* and *Roebourne Chenopod Association*) do not exist in the project area. This is due to the fact that dominant species that characterise either the *Roebourne Plains Gilgai Grassland* or the *Roebourne Chenopod Association* were not recorded within Mattiske's CS1 or G2 communities. For further information, please refer to **Appendix B**.

5.2 Flora

5.2.1 Desktop Assessment

A search of the DEC Threatened and Priority Flora database identified 21 Priority Flora species that have previously been recorded in the vicinity of the project area, or that have the potential to occur within close proximity. The dataset results included three Priority One, two Priority Two, 16 Priority Three and one Priority Four species. No species of Declared Rare Flora (DRF) resulted from the database search. The Priority Flora Species results are presented in **Table 6**. Known locations of Priority Flora identified through the DEC database search and other flora of significance known to occur within the vicinity of the port Development Area is spatially presented in **Figure 5**.

Table 6 Threatened and Priority Flora identified to occur within the Anketell Point and Dixon Island Area (DEC, 2009)

Species	Conservation Code	Species Description	Preferred Habitat	Likelihood of occurring in survey area
Helichrysum oligochaetum	P1	Erect annual, herb to 0.25m tall. Flowers yellow August - November	Red clay, Alluvial plains	*Likely* to occur
Ipomoea sp. A Kimberly Flora (L.J. Penn 84)	P1	Creeping or twinning perennial, herb. Flowers (pink) in June.	Shallow soils on sandstone.	*Unlikely* to occur (Typically a Kimberley species)
Nicotiana heterantha	P1	Decumbent, short lived annual or perennial, herb to 0.5m high, forming low spreading colonies. Flowers (white/cream) in March-June/September.	Black clay. Seasonally wet flats.	Unlikely to occur
Gomphrena pusilla	P2	Slender branching annual, herb, to 0.2 m tall. Flowers white, March – June.	Fine beach sand, behind foredune on limestone	*Unlikely* to occur (Typically a Kimberley species)
Nymphoides beaglensis	P2	Aquatic annual, herb. Flowers (white, pink, purple) in March – June.	Shallow freshwater. Edges of permanent waterholes or in seasonally inundated claypans and depressions.	*Unlikely* to occur (Typically a Kimberley species)
Acacia glaucocaesia	P3	Dense, glabrous shrub or tree, 1.8–6 m tall Flowers yellow, July – September.	Red loam, sandy loam, clay. Floodplains	*Likely* to occur
Atriplex lindleyi ssp. *conduplicata*	P3	Monoecious, short lived or perennial herb to 0.2m height.	Crabhole plains	*May* occur
Eragrostis lanicaulis	P3	Knotty or bulbous rhizomatous, perennial, grass like or herb, 0.45 – 0.5m high. Flowers March- May/August – October	Red sandy clay. Flats	*Likely* occur
Eriachne semiciliata	P3	Slender, leafy usually ascending annual, grass like or herb to 0.52m in height. Flowers between March - April.	Shallow soils over rock, red sand, sandy clays. Ridges and sand dunes	*Unlikely* to occur (Typically a Kimberley species)
Eriochloa decumbens	P3	Tufted perennial, grass-like or herb, 0.2 – 1m tall.. Flowers in April	Regularly flooded areas, river banks	*Unlikely* to occur
Geijera salicifolia	P3	Tree 1.5 – 6m in height. Flowers white September	Skeletal soils, stony soils. Rocks, gorges	*May* occur
Gymnanthera cunninghamii	P3	Erect shrub to 1–2 m tall Flowers cream, yellow, green, January – December.	Hummock Grassland, Sandy soils	*May* occur
Polymeria distigma	P3	Prostrate trailing herb. Flowers (pink) in April – July.	Sandy soils.	*May* occur
Rhynchosia bungarensis	P3	Compact, prostrate shrub, to 0.5 m high. Fl. yellow.	Pebbly, shingly coarse sand amongst boulders.	*Unlikely* to occur

Species	Conservation Code	Species Description	Preferred Habitat	Likelihood of occurring in survey area
Schoenus punctatus	P3	Shortly rhizomatous, tufted perennial, grass-like or herb (sedge) ca 0.6m tall. Flowers brown, August	Water courses	*Unlikely* to occur
Stackhousia clementii	P3	Dense broom-like perennial, herb to 0.45m high. Flowers are green, yellow and brown.	Skeletal soils. Sandstone hills.	*May* occur
Stylidium costulatum	P3	Erect, tufted annual herb to 0.1-0.2m high. Flowers (yellow, orange, red) in April-August.	Sandy or clayey soils. Creeks or seasonally wet areas.	*Unlikely* to occur (Typically a Kimberley species)
Tephrosia bidwillii	P3	Shrub 0.3-0.9m high. Flowers (orange) in May/August.	Sandy margin of creeks in basalt hills,	*May* occur
Terminalia supranitifolia	P3	Spreading, tangled shrub or tree, 1.5–3 m high. Flowers green, yellow, May – July/December.	Sand. Among basalt rocks.	*Likely* to occur
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	Tussocky perennial, grass-like or herb, 0.9–1.8 m high. Flower. August.	Red clay. Clay pan, grass plain.	*May* occur
Pittosporum moluccanum	P4	Tree, 2-6m high. Flowers (white) in February – August.	White sand. Sand dunes.	*Unlikely* to occur (Typically a Kimberley species)

5.2.2 Field Assessment

A total of 207 flora species from 97 genera and 41 families were recorded within the project areas. The total includes 204 (98%) native species and 3 (2%) introduced (weed) species. The full list of vascular flora species recorded and the representative communities in which they occur are presented in **Appendices C and D**, respectively. Qualitative data recorded from individual quadrats is presented in **Appendix E**.

Families with the highest representation were Poaceae (Grass Family – 38 taxa; 37 native, 1 introduced), Papilionaceae (Pea Family – 28 taxa) and Malvaceae (Hibiscus Family – 17 taxa).

One flora species recorded (*Frankenia pauciflora* var. *pauciflora*) was found to be occurring outside its previously recorded range of distribution as documented by the West Australian Herbarium (DEC, 2010a). According to the West Australian Herbarium, this species is endemic to the Geraldton Sandplains, Coolgardie and Murchison areas.

5.2.3 Declared Rare, Priority and other Significant Flora

No species of DRF, listed under the *Wildlife Conservation Act, 1950* or as Threatened under the *EBPC Act, 1999* were recorded within the project area.

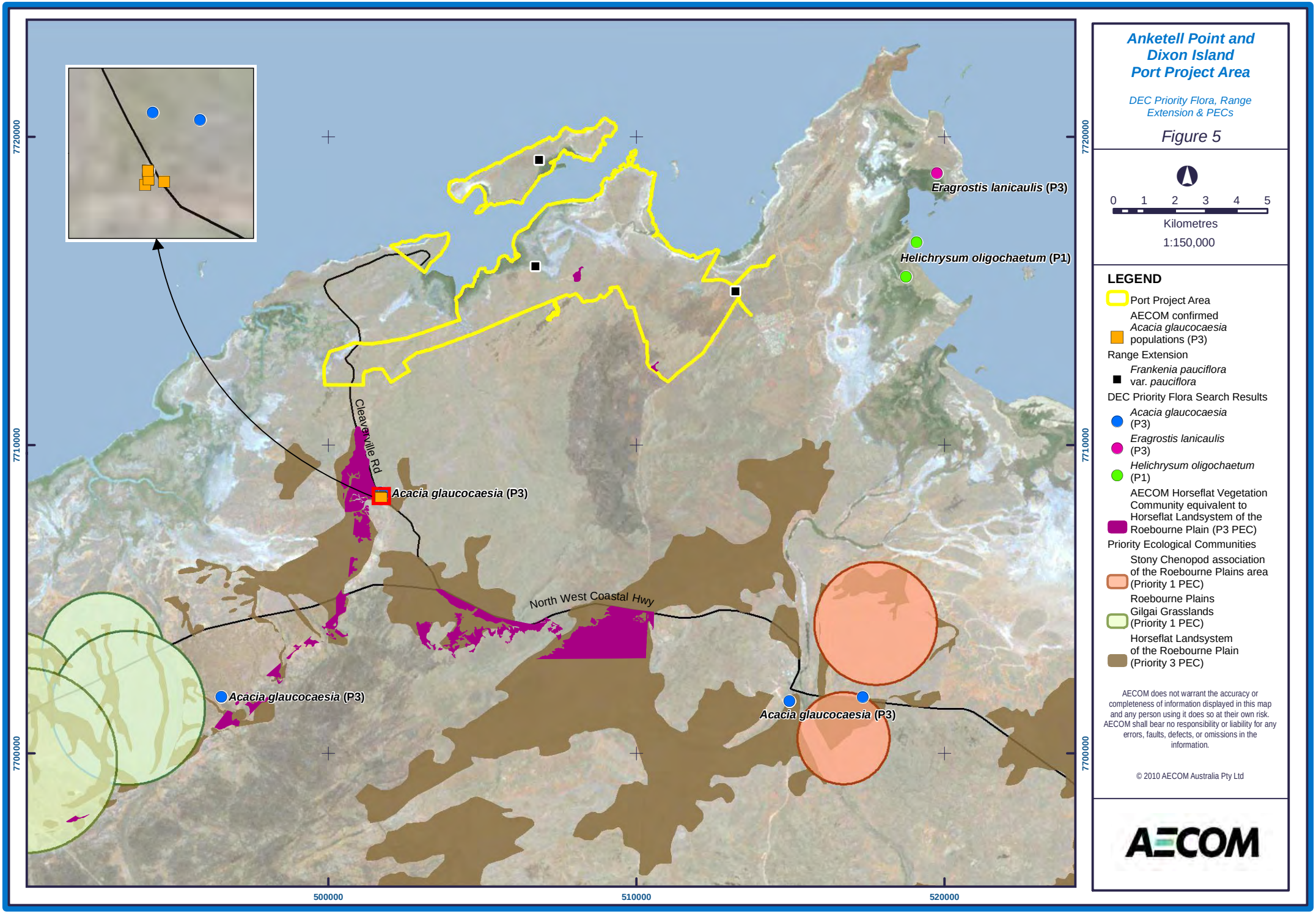
Four populations of *Acacia glaucocaesia* (P3) have been recorded by DEC along Cleaverville Road, 4km north of the North West Coastal Highway. These populations were collected and reported by Bruce Maslin in October 2004. The locations of all four populations were revisited by AECOM during 2009, however only two of these populations were confirmed on the ground (**Figure 5, Table 7**).

AECOM recorded a single main population of *Acacia glaucocaesia* (P3), comprising five sub-populations and a total of more than 67 individual plants in the vicinity of the project area between 501668 to 501677mE and 7708273 to 7708300mN (**Figure 5, Table 7**). These populations do not occur within the extent of the Port Development Area, as defined by API, and rather occur within the Anketell Point Transport Corridor area.

This population of *Acacia glaucocaesia* was identified as a result in the DEC database search and the site visit during 2009 confirmed this population (AECOM, 2009). This population was previously collected and reported by Bruce Maslin in October 2004. The WA Herbarium specimen collection for this record, notes the population as occurring 4km north of the North West Coastal Highway, on the road to Cleaverville.

Table 7 *Acacia glaucocaesia* (P3) populations recorded in the vicinity of the Port Development Area (AECOM, 2009)

Easting (mE)	Northing (mN)	Number of plants	DEC/AECOM record	Confirmed during 2009
501677	7708300	1	DEC	Yes
501677	7708298	1	DEC	Yes
501689	7708464	1	DEC	No
501825	7708443	1	DEC	No
501677	7708273	25+	AECOM	Yes
501668	7708273	20+	AECOM	Yes
501723	7708267	5	AECOM	Yes



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5.2.4 Introduced (Weed) Species

Some of the most significant weeds for the Pilbara region are:

- Mesquite (**Prosopis* species);
- Ruby Dock (**Acetosa vesicaria*);
- Buffel grass (**Cenchrus ciliaris*);
- Redtop Natal Grass (**Melinis repens*);
- Parkinsonia (**Parkinsonia aculeata*);
- Kapok bush(**Aerva javanica*); and
- Mexican poppy (**Argemone ochroleuca*).

Close attention was given to the presence of any of the aforementioned species during survey efforts. In total, eight introduced species were recorded, three of which occur within the Port Development Area (**Appendices C and D**); **Cenchrus ciliaris* (Buffell grass)*, *Aerva javanica* (Kapok bush)(significant weeds in the Pilbara region) and **Portulaca oleracea* (Purslane).

Appendix D indicates that there are five other weed species recorded, namely **Prosopis pallida, * Vachellia farnesiana, *Malvastrum americanum, *Cucumis melo* ssp. *agrestis* and **Flaveria trinervia.* These species have been recorded in vegetation communities mapped within the project area; however, the only records for these species are from quadrats outside of the Port Development Area (as part of the Anketell Point transport corridor survey). Of the eight introduced species recorded, one species (**Prosopis pallida*) is listed as a Declared Plant by DAFWA, pursuant to the *Agriculture and Related Resources Protection Act, 1976* (DAFWA, 2010).

Cenchrus ciliaris, *Aerva javanica* and **Portulaca oleracea* were recorded within 23, eight and five quadrats, respectively, during the 2009 and 2010 field assessments. The vegetation communities and quadrats in which these species were recorded is summarised in **Table 8.

Table 8 Summary of Vegetation Communities and Quadrats recording Introduced and Declared Plant Species

Species	Declared Plant	Species Description	Vegetation Community	Quadrat Number
**Aerva javanica* (Kapok bush)		Kapok bush is a perennial herb, up to 1.6m high, densely covered in short, branched hairs, giving it a greyish appearance. It was introduced to Australia to assist with the re-vegetation of degraded rangelands. It's now widespread in many types of vegetation from Carnarvon to the Kimberley, although it prefers calcareous soils. It flowers and fruits for most of the year. It is native to northern Africa to south west Asia.	Thg, Thg(c), ATg, CHT, CST, Lit and MAC	APQ64, APQ65, APQ66, APQ80, APQ81, APQ87, APQ94 and APQ95
**Cenchrus ciliaris* (Buffel grass)		Buffel grass is tufted, often tussocking perennial to 1m tall. The inflorescence is cylindrical, with purplish flowers produced for much of the year. It's widely planted in pastoral regions as a pasture grass and has become a widespread weed of roadsides, creeklines, river edges and most vegetation types from Shark Bay to the Pilbara and adjacent desert. It continues to spread in the north and south, both naturally and through deliberate establishment. It's native to Africa and India.	Thg, Thg(c), AThg1, MAT, DCAT1, DCAT2, Sam1, Lit, MAC, ATg, CST and GT	APQ62, APQ63, APQ64, APQ65, APQ66, APQ67, APQ68, APQ81, APQ87, APQ89, APQ90, APQ91, APQ92, APQ93, APQ94, APQ95, APQ96, APQ97, APQ100, APQ102, APQ103, APQ104 and APQ105

Species	Declared Plant	Species Description	Vegetation Community	Quadrat Number
**Portulaca oleracea* (Pigweed)		Pigweed is a prostrate, succulent annual. Under water stress the whole plant becomes reddish. The shiny leaves are spoon shaped and have yellow flowers in their axils. Pigweed grows and flowers in summer and is a common widespread weed of horticulture, paddocks and gardens. It is considered a native in most of the State but is probably introduced to the south-west.	Hf, Thg, AThg2, MAT and DCAT2	APQ69, APQ87, APQ92, APQ96 and APQ98
**Cucumis melo* ssp. *agrestis* (Ulcardo Melon)		Ulcardo Melon is a trailing annual, herb or climber. It flowers between February-June/September-October. It has yellow flowers.	Hf, AThg2, MAT	#APQ15, #APQ17, #APQ18, #APQ19, #APQ20, #APQ22, #APQ58 and #CP12
**Malvastrum americanum* (Spiked Malvastrum)		Spiked Malvastrum is an erect, hairy perennial up to 1.3m tall. It's native to America and has yellow to orange flowers in a dense terminal spike. It is inedible to herbivores and is therefore a weed of river and creek margins, wasteland and many arid zone habitats, from the Nullarbor to the Pilbara and Kimberley.	Hf, AThg1, DCAT2 and DCAT1	#APQ11, #APQ16, #APQ25, #APQ34, #APQ37, #APQ58, #APQ71, #APQ74, #APQ83, #CP12 and #CP14
**Prosopis pallida* (Algaroba)	✓	Algaroba is a fast growing thorny shrubs or tree 4 to 10m high, originating from South America. Algaroba has a widespread distribution throughout the State from Derby to Carnarvon. All *Prosopis* species are Declared Plants in WA (Hussey *et al*., 2007)	Hf, DCAT1 and DCAT2	#APQ16, #APQ25 and #CP12
**Vachellia farnesiana* (Mimosa Bush)		Mimosa Bush is a dense, sprawling, spiny shrub to 4m with bipinnata leaves and paired spines at each node. It is distinguished from Mesquite by the fact that it's sweetly scented flowers are grouped into globular flower heads arising from the leaf axils, and by its pods which are black and sausage shaped and tend to be retained on the plant. It's widespread weed of roadsides, creeks, rivers and disturbed flood plains from the Kimberley to Carnarvon and occasionally south to Muchea along the roads used by trucks carrying stock from the pastoral area. It's originally from South America and was introduced to Australia prior to European Settlement.	DCAT1	#APQ25 and #APQ35
**Flaveria trinervia* (Speedy Weed)		This weed was formerly known as *Flaveria australasica* ssp. *gilgai* (P3), however it is considered to be a synonym of *Flaveria trinervia*. Both the morphological and molecular evidence overwhelmingly support the merging of these two entities. Flaveria trinervia is found in southern USA, Mexico, Central America, Caribbean, northern parts of South America, central Africa, Middle East and India. It is thought that Flaveria trinervia originated in southern Mexico (Mckown et al., 2005)	Hf	#APQ86

NB: # Denotes quadrats which are outside the Port Development Area

The *Agriculture and Related Resources Protection Act, 1976,* lists weed species (93 species within WA) as Declared Plants or significant pest weeds. Under the Act, these species are subject to restrictions on movement or sale and landholders are obliged to carry out control measures to prevent their spread. Weeds effectively colonise areas where the soil has been disturbed and where there has been clearing and can then rapidly invade surrounding natural sites. *DAFWA* recommended control measures are detailed in **Appendix F**.

5.3 Vegetation

A total of 23 separate vegetation communities were described and mapped for the Port Development Area during the field assessment in 2009. The vegetation communities within the project areas are presented spatially in **Figures 6.1 to 6.20**.

NB: * denotes introduced or non-endemic species (weeds).

5.3.1 Vegetation Communities

Twenty three vegetation communities were recorded within the Port Development Area, consisting of three Grasslands, eleven Shrublands, one Mangal community, two Samphire communities, three Drainage and Creekline communities and three 'other' classifications of mapped areas. These communities are described in **Table 9**.

Table 9 Vegetation Communities occurring within the Port Development Area

Habitat	Vegetation Community Code	Vegetation Community Description
Grassland	**Hf**	Horseflats of *Eragrostis* spp., *Eriachne* spp. and *Dichanthium* spp. on stony red clayey loam. This community is represented by quadrats APQ98 and APQ103.
	Thg	Mid Dense to Closed Hummock Grasslands of *Triodia* spp. on hillslopes, ridgetops and stony plains. This community is represented by quadrats APQ82, APQ87, APQ88, APQ89, APQ90 and APQ97
	Thg(c)	Mid to Dense Hummock Grassland of *Triodia pungens* over an Open Tussock Grassland of **Cenchrus ciliaris* and *Eragrostis* aff. *eriopoda* (WAS site 963) on pale orange sandy clay. This community is represented by quadrat APQ66.
Shrubland	**AxT**	Tall Shrubland to Open Shrubland of *Acacia xiphophila* over Hummock Grasslands dominated by *Triodia wiseana* (fine form) and *Triodia angusta* on red rocky clay loam. This community is represented by APQ02, APQ11, APQ22, APQ47, APQ53 and APQ75 within the proposed Anketell Point Transport Corridor . There are no quadrats within the Port Development Area that represent this community.
	ATg	Shrubland of *Acacia inaequilatera, Acacia tumida* var. *pilbarensis* with occasional *Acacia coriacea* subsp. *coriacea*, *Acacia coriacea* subsp. *pendens* and *Acacia bivenosa* over an Open Shrubland of *Corchorus* aff. *parviflorus*, *Corchorus* aff. *walcottii* (K.J. Atkins 570), *Stemodia grossa* and *Sida* aff. *echinocarpa* (MET 15, 350) over a Hummock Grassland of *Triodia epactia* (Form A) over a Very Open Tussock Grassland of **Cenchrus ciliaris* on orange sandy clay drainage lines. This community is represented by quadrats APQ93 and APQ94.
	CHT	Shrubland of *Acacia stellaticeps, Acacia coriacea* subsp. *coriacea* and *Crotalaria cunninghamii* over a Very Open Herbland of *Ptilotus astrolasius* var. *astrolasius* over a Hummock Grassland of *Triodia epactia* (Form B) and *Cymbopogon ambiguus* on sands. This community is represented by quadrat APQ80.
	CST	Scattered *Spinifex longifolius* over **Aerva javanica* on pale brown sands on shoreline. This community is represented by quadrat APQ65.

Habitat	Vegetation Community Code	Vegetation Community Description
	GT	Tall Shrubland of *Grevillea pyramidalis* subsp. *leucadendron* over a Tussock Grassland of **Cenchrus ciliaris* with scattered *Triodia wiseana* (fine form) on rocky mid to upper slope sand. This community is represented by quadrat APQ63.
	Lit	Tall Open Scrub to Tall Shrubland of *Acacia coriacea* subsp. *coriacea* and *Acacia sabulosa* with scattered *Santalum lanceolatum* and *Senna artemisioides* subsp. *oligophylla x helmsii* over a Tussock Grassland of **Cenchrus ciliaris* on shorelines. This community is represented by quadrats APQ64, APQ81 and APQ105.
	MAC	Tall Open Scrub to Low Open Shrubland dominated by *Acacia sabulosa*, *Acacia bivenosa, Acacia stellaticeps* and *Acacia ampliceps* with occasional *Acacia pyrifolia* ssp. *pyrifolia* over a Closed Tussock Grassland of **Cenchrus ciliaris* with occasional Triodia wiseana on sandy clay. This community is represented by quadrat APQ95 and APQ104.
	MATE	Tall Shrubland of *Acacia xiphophila, Acacia bivenosa* and *Acacia synchronicia* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form), *Eriachne* spp. and *Aristida* spp. on red sandy loam. This community is represented by quadrats APQ01, APQ08 and APQ30 which are present within the proposed Anketell Point Transport Corridor. There are no quadrats within the Port Development Area that represent this community.
Shrubland (cont.)	**AThg1**	Tall Shrubland to Open Shrubland dominated by *Acacia pyrifolia* var. *pyrifolia*, *Acacia bivenosa*, *Acacia ancistrocarpa* and *Acacia synchronicia* over a Mid Dense Hummock Grassland dominated by *Triodia wiseana* (fine form) on rocky sandy flats, hill slopes and ridgetops. This community is represented by quadrats APQ91 and APQ100.
	AThg2	Open Shrubland to Low Open Shrubland of *Acacia pyrifolia* var. *pyrifolia* with scattered *Corchorus* aff. *parviflorus* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on rocky hill slopes. This community is represented by quadrat APQ69.
	MAT	Mixed Shrubland of *Acacia* spp. mainly dominated by *Acacia ancistrocarpa, Acacia bivenosa* and *Acacia pyrifolia* var. *pyrifolia* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form), *Triodia angusta*, *Triodia* aff. *epactia*, *Triodia epactia* (Form A) on orange brown sandy soil with rocky nodules. This community is represented by quadrats APQ62, APQ92 and APQ101.
Mangal	**MF**	Mangroves of *Avicennia marina* subsp. *marina* on brown tidal clay. This community is represented by quadrat APQ61.
Samphire	**Sam1**	Low Shrubland dominated by *Tecticornia halocnemoides* subsp. *tenuis* with scattered *Trianthema turgidifolia* and *Tecticornia pruinosa* on brown clayey loam. This community is represented by quadrat APQ67.
	Sam2	Low Open Heath dominated by *Hemichroa diandra, Tecticornia halocnemoides* subsp. *tenuis* and *Tecticornia indica* subsp. *bidens* with scattered *Avicennia marina* subsp. *marina* on edges of tidal mudflats. This community is represented by quadrat APQ79.
Drainage Lines, Creeklines and Minor Flow Lines	**Amg**	Tall Shrubland of *Acacia inaequilatera* with occasional *Corymbia hamersleyana* over a Grassland dominated by *Triodia wiseana, Triodia epactia* and *Chrysopogon fallax* in association with drainage lines. This community is represented by APQ55, APQ41 (Vegetation description only) which are present within the proposed Anketell Point Transport Corridor. This community is represented by quadrat APQ102 within the Port Development Area.
	DCAT1	Woodland of *Corymbia hamersleyana* over a Tall Shrubland mainly dominated by *Acacia bivenosa*, *Acacia tumida* var. *pilbarensis* and *Acacia ancistrocarpa* with occasional *Grevillea pyramidalis* subsp. *leucadendron* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia angusta* on red rocky soils in association with drainage lines. This community is represented by quadrat APQ68.

Habitat	Vegetation Community Code	Vegetation Community Description
	DCAT2	Low Open Woodland of *Corymbia hammersleyana* over a Tall Shrubland of *Acacia pyrifolia* var. *pyrifolia*, *Acacia bivenosa* and *Grevillea pyramidalis* subsp. *leucadendron* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) over a Tussock Grassland dominated by *Chrysopogon fallax* and **Cenchrus ciliaris* in minor drainage lines. This community is represented by quadrats APQ96.
Other	**Bare and/or Cleared**	Cleared areas void of any native and non-native species.
	Tidal Mud Flats	Tidal Mud Flats (Low-lying muddy flats that are inundated at high tide and exposed at low tide).
	Beach	Sand on shorelines.

5.3.2 Vegetation Condition

The condition of the vegetation within the project areas ranges from Completely Degraded to Very Good – Excellent. The majority of the project area was recorded to be in Good and Good – Very Good condition. The proportion varying vegetation condition is presented in **Table 10**.

Table 10 Proportion of Varying Vegetation Condition

Condition Rating	Area (Ha)	% Total Area Surveyed
?Degraded - Good	5.34	0.14
?Good – Very Good	0.64	0.02
Completely Degraded	29.26	0.76
Completely Degraded – Degraded	0.35	0.01
Degraded	189.35	4.93
Degraded – Good	259.45	6.76
Good	1,404.21	36.57
Good – Very Good	1,265.68	32.96
Very Good	665.55	17.33
Very Good – Excellent	20.40	0.53
TOTAL	**3,840.23**	**100**

NB: Vegetation Condition Codes prefixed with "?" have been extrapolated with a low level of certainty

Vegetation condition of the Port Development Area has been mapped spatially and is presented in **Figures 6.1 – 6.20.**

Some tracks and gravel roads traverse the alignment at various locations; however they have not been individually delineated as part of the vegetation condition mapping. Generally tracks and roads are in Completely Degraded condition but have not been delineated due to the small areas they occupy in comparison to the entire project area.

5.3.3 Threatened and Priority Ecological Communities

5.3.3.1 Desktop Assessment

There are currently two communities listed as TECs that are known from the Pilbara region. These are:

- *Themeda* Grasslands - *Themeda* grasslands on cracking clays (Hamersley Station, Pilbara). Grassland plains dominated by the perennial *Themeda* (kangaroo grass) and many annual herbs and grasses; and
- Ethel Gorge - Ethel Gorge aquifer stygobiont community.

It has been reported by Kendrick and McKenzie (2001), and Kendrick and Stanley (2001) that there are no known TECs within the Chichester or the Roebourne Biogeographical Subregions. At the time of the initial assessment in 2009, a search of the DEC Threatened and Priority Ecological Communities database did not identify any known TECs within the Port Development Area. However, the search did identify two Priority 1 Ecological Communities, namely; *Roebourne Plains Coastal Grassland* (herein referred to as *Roebourne Plains Gilgai Grassland*) and *Stony Chenopod Association of the Roebourne Plain Area* (herein referred to as *Roebourne Chenopod Association*) as occurring in close proximity to the project area (**Figure 5**).

The locations of PECs are represented by point data, based on confirmed study plots assessed by DEC. Based on the initial database search results the boundary of a buffer area of the Priority 1 Ecological Community, *Roebourne Plains Gilgai Grassland* was identified to occur approximately 10km south-west from the interface with the adjacent Anketell Point Transport Corrdior area, also assessed by AECOM (2009). Additionally, the boundary of a PEC buffer area for an occurrence of the Priority 1 Ecological Community *Roebourne Chenopod Association* was identified to occur approximately 17km south-east from the interface with the Transport Corridor project area (**Figure 5**). None of these buffers occur adjacent to the Port Development Area.

The buffers of DEC's PEC point data are sized such that the radius extends to the furthest point of the community, to ensure that the 'buffer' area encompasses at least the entire PEC. Therefore, occasionally buffers may extend across vegetation community boundaries into communities that do not represent PEC vegetation. In this regard, for proposed impacts on areas of PEC vegetation, it is important to accurately ground truth the boundaries of vegetation classifications and relate these back to PEC equivalence. Furthermore, protection buffers should also be delineated for the PEC boundary. A detailed account of the results of ground-truthing are presented in the following section.

Further consultation with DEC in 2010 now indicates that there are 29 known PECs within the Pilbara Region. This represents an increase of ten PECs since commencement of the assessment of this project area. A new PEC of interest within the project area is the Priority 3 *Horseflat Land System of the Roebourne Plains.* This PEC represents the entire extent of the Horseflat Land System, not including the *Roebourne Plains Gilgai Grassland* and the *Roebourne Chenopod Association* that are classified as PECs of more significant importance (Priority 1).

The Horseflat Land System is dominated by *Eragrostis xerophila* and other perennial Tussock grass species (*Eriachne* sp., *Eragrostis* sp. and *Dichanthium* sp. on red clay loam), elements of which are present within the project area. If not on cracking clay but with an abundance of annual *Sorghum* and uncommon *Astrebla* then a grassland is a typical *Horseflat Land System Roebourne Plain Grassland*. This PEC extends from Cape Preston to Balla Balla (Whim Creek). DEC's current spatial mapping of the extent of the *Horseflat Land System Roebourne Plain Grassland* PEC does not overlap the project area (**Figure 5**). However, more detailed consideration of species composition and other factors have determined that this extent is likely to be more widespread.

5.3.3.2 Field Assessment

No TECs were identified from field collected data within the Port Development Area during the 2009 or 2010 flora and vegetation assessments.

Consultation with DEC now indicates that the *Roebourne Plains Gilgai Grassland* PEC differs from the surrounding clay flats of the Horseflat Land System Unit which are dominated by *Eragrostis xerophila* and other perennial tussock grass species (*Eragrostis* mostly) (Jill Pryde, April 2009, *pers. comm*.).

Recently, the *Roebourne Plains Gilgai Grassland* was subject to a much more detailed assessment following results of the DEC Pilbara Biological Surveys, which set up survey sites on Roebourne Grasslands. This assisted in further defining the community and subsequently the *Roebourne Plains Coastal Grasslands with Gilgai micro-relief of deep crackling clays* (*Roebourne Plains Gilgai Grasslands*) was defined and nominated as a TEC to the WA Threatened Ecological Communities Scientific Committee in August 2008 (Jill Pryde, April 2009, *pers. comm*.).

The Roebourne Plains Gilgai Grasslands is described as coastal grassland with self mulching cracking clays that emerge on depositional surfaces. It occurs on microrelief of deep cracking clays, surrounded by clay plains/flats and sandy coastal alluvial plains. The gilgai depressions support ephemeral and perennial tussock grasslands dominated mainly by *Sorghum* sp. and *Eragrostis xerophila* along with other native species including *Astrebla pectinata, Eriachne benthamii, Chrysopogon fallax* and *Panicum decompositum*. Although the Horseflat Land System on which these grasslands occur is extensive, the *Roebourne Plains Gilgai Grasslands* are confined to only a small portion of the system that consists of heavy cracking clay soil. It occurs as disjunct occurrences of cracking clays on the Nickol/Maitland River floodplain in the vicinity of Karratha (Jill Pryde, Dec 2009, *pers. comm*.).

According to DEC, the Priority 1 PEC *Roebourne Chenopod Association* is dominated by chenopods growing in saline clay soil that has a dense surface strewn with pebbles and cobbles. This PEC appears to be uncommon with only one occurrence has located to date (Roebourne Airport/Common; **Plate 1, Appendix B**) and differs from the other Roebourne Plains Grassland communities due to the predominance of Chenopod species on clay soils (Stephen van Leeuwen, June 2009, *pers. comm.*).

Mattiske Consulting (2007) identified two communities within the proposed Port Development Area to exhibit similarities to two known Priority Ecological Communities, namely; *Roebourne Plains Gilgai Grassland* (Priority 1) and *Roebourne Chenopod Association* (Priority 1). Further investigation conducted by AECOM of the areas thought to represent these PECs confirmed that the associations here do not in fact represent these PECs. A detailed comparison document prepared by AECOM (2009) for API Management is presented in **Appendix B**. Furthermore, the project area is not considered to support either of these PECs in any location.

5.3.4 Other Communities of Conservation Significance

Reservation priorities have been given to the three vegetation communities previously mapped by Beard (1975) within the Chichester and Roebourne Biogeographic Subregion. The Reservation Priority Status relates to the proportion of each vegetation type that is currently protected in IUCN reserves or DEC protected lands. In general, if none of a particular community is currently protected in reserves, then it is given ‘High” Reservation Priority Status, whilst land currently protected in reserves may have a lower status of “Moderate”. The Reservation Priority status for the Beard vegetation communities occurring within the project areas are provided in **Table 11**.

Although they are not categorised as TECs, communities are determined to be at risk where a number of threatening processes have been identified with the potential to destroy or significantly modify biological assemblages of the community. High Reservation Priority communities are often of limited extent and are subject to threatening processes such as grazing pressures, altered fire regimes and competition from weed species.

Vegetation communities not well represented in reserves are considered to be more at risk of becoming a TEC. Therefore, clearing of such community types is likely to be considered of greater environmental impact than clearing of vegetation that is well represented in the reserve system.

Table 11 Community Reservation Priority Status for Beard Vegetation within the Chichester and Pilbara Island Subregions (Kendrick and Stanley, 2001 and Beeston *et al.*, 2002)

Vegetation Code No.	Beard Code	Community Descriptions	Pre-European Extent (ha)	Current Vegetation Extent (ha)	Remaining (%)	Area in Conservation Reserve (ha)	Reservation Priority
629	xGc/t_3Hi	Mosaic: Short bunch grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; hard spinifex, *Triodia wiseana*	59,308	59,308	100	0	High
157	T_3Hi	Hummock grasslands, grass steppe; hard spinifex, *Triodia wiseana*	501,139	500,420	100	0	Medium / Low
43	Mangrove	Low forest; mangroves (Kimberley) or thicket; mangroves (Pilbara)	225,819	187,661	83.10	0	High

6.0 Discussion

6.1 Flora

A total of 207 species from 97 genera and 41 families were recorded within the Port Development Area. Families with the highest representation were Poaceae, Papilionaceae and Malvaceae, a floristic composition typical for the Pilbara region. A collective total of 31 sites were sampled, this consisted of 25 sites sampled during the 2009 assessment and 6 sites sampled during the 2010 assessment. Site assessments incorporated; quadrats, data collection sites for vegetation descriptions and opportunistic observations.

The 207 flora species were identified from 20 different vegetation community types. Based on the collective area of the survey area totalling 3840.23ha, this species diversity over this area is considered to be relatively low, i.e. equating to 0.05 species per hectare. This relatively low species diversity can mainly be attributed to the largely homogenous nature of the vegetation communities supported by the project area. In some instances, very large expanses of a homogenous vegetation community, particularly Thg (*Triodia* Hummock Grassland) or MAT (*Acacia* species over *Triodia* Hummock Grasslands) span several square kilometres. The sampling effort that occurred in each of the different survey areas, may also have contributed to the low species diversity as all areas have only been assessed to Level 2 detail as part of a phase 1 assessment (once) and a second phase assessment is required to be conducted to meet EPA Guidance. It is generally expected that a greater number of sampling event results in recording a greater proportion of the occurring species, eventually reaching a plateau. The number of taxa recorded is likely to increase following the second phase of the Level 2 Flora surveys from additional sampling quadrats as well as recordings of perennial and ephemeral species that may not have been previously recorded. This would also meet the requirements for a 'Comprehensive Survey' as part of a Level 2 Flora and Vegetation Assessment, according to EPA Guidance (2004).

There were a number of flora specimens collected which showed significant differences in their key characteristics. Therefore in order to determine the significance of the collections, Malcolm Trudgen (Taxonomic specialist for the Pilbara region) has spilt the specimens into different forms and further taxonomic work will be required in future (**Table 4**).

One flora species recorded, *Frankenia pauciflora* var. *pauciflora* was found to be occurring outside its previously recorded range of distribution as documented by the West Australian Herbarium (DEC, 2010a). According to the West Australian Herbarium, this species is endemic to the Geraldton Sandplains, Coolgardie and Murchison regions. However, the taxonomy of this specimen is somewhat inconsistent and the genus is under current revision. The entity that the name has been applied to is common (Malcolm Trudgen, December 2009, *pers. comm*.) and therefore is unlikely to represent a significant range extension. The significance of this recorded species and the community that supports it, have not been regarded as significant for the purposes of this assessment.

The majority of the Level 2 floristic assessment was conducted during May 2009, with some areas assessed in June and July 2009 and May 2010. The timing of the majority of the survey (May 2009 – post wet) was agreed with DEC Pilbara specialist Stephen Van Leeuwen as being the optimal time to conduct surveys in the Pilbara. A second phase assessment is still considered to be appropriate and this should be done during favourable conditions, potentially following winter rains if these are considered adequate.

6.1.1 Declared Rare, Priority or Other Significant Flora

No species of DRF, listed under the *Wildlife Conservation Act, 1950* or as Threatened under the *EBPC Act, 1999* were recorded within the Port Development Area. Desktop assessments have not identified the potential for any DRF species to occur in the project area.

Spatial information obtained from DEC indicates that all previously known populations of Priority Flora occur a significant distance from the extent of the Port Development Area.

Interrogation of the DEC database identified the potential for 21 Priority Flora species to potentially occur within the project areas (**Table 6**). This consisted of the following species:

- *Helichrysum oligochaetum* (P1)*;*
- *Ipomoea* sp. A Kimberly Flora (J.L.Penn 84) (P1)*;*
- *Nicotiana heterantha* (P1)*;*
- *Gomphrena pusilla* (P2)*;*
- *Nymphoides beaglensis* (P2)*;*
- *Acacia glaucocaesia* (P3)*;*
- *Atriplex lindleyi* subsp*. conduplicata* (P3)*;*
- *Eragrostis lanicaulis* (P3)*;*
- *Eriachne semiciliata* (P3)*;*
- *Eriochloa decumbens* (P3)*;*
- *Geijera salicifolia* (P3)*;*
- *Gymnanthera cunninghamii* (P3)*;*
- *Polymeria distigma* (P3)*;*
- *Rhynchosia bungarensis* (P3)*;*
- *Schoenus punctatus* (P3)*;*
- *Stackhousia clementii* (P3)*;*
- *Stylidium costulatum* (P3)*;*
- *Tephrosia bidwillii (P3);*
- *Terminalia supranitifolia* (P3)*;*
- *Themeda* sp. Hamersley Station (M.E.Trudgen 11431) (P3)*;* and
- *Pittosporum moluccanum* (P4).

Based on the current known locations and the preferred habitat types, it was determined that *Ipomoea* sp. A Kimberley Flora (L.J.Penn 84) (P1), *Gomphrena pusilla* (P2), *Nymphoides beaglensis* (P2), *Eriachne semiciliata* (P3), *Stylidium costulatum* (P3) and *Pittosporum moluccanum* (P4) were not likely to occur within the project areas. When conducting the Threatened Flora database search for the Anketell Point and Dixon Island Proposed Development areas, DEC staff used “Dampier” as a location. This search includes species from the “Dampier Peninsula” in the Kimberley and thus includes species such as those mentioned above which are unlikely to occur within the project area.

Although no populations of Priority Flora have been recorded within the project area, there are four Priority Flora species that have been determined to have the potential to occur in the project area, based on their habitat requirements and the occurrence of these habitats within the project area. These species are; *Helichrysum oligochaetum* (P1)*, Acacia glaucocaesia* (P3)*, Eragrostis lanicaulis* (P3) and *Terminalia supranitifolia* (P3). The recorded vegetation communities that have been determined to have the potential to support Priority Flora populations are listed in **Table 12** and an explanation as to why each of these species was not recorded is given below.

Table 12 Priority species and potential habitat identified in desktop assessments as having the potential to occur in the project area

Species	Potential Habitats
Acacia glaucocaesia (P3)	Thg, AThg1, AThg2, ATg, AxT, MAC, MAT, MATE
Helichrysum oligochaetum (P1)	Amg, DCAT1, DCAT2, ATg, AThg1, AThg2, AxT, Lit, MAC, MATE, MAT, Hf
Eragrostis lanicaulis (P3)	Thg, Thg(c), Sam1, Sam2, ATg, Hf, AxT, MAC
Terminalia supranitifolia (P3)	Thg, ATg, GT, AThg1, AThg2, MAT, Amg, DCAT1, DCAT2

Acacia glaucocaesia (P3) is described as a dense, glabrous shrub or tree, 1.8m to 6m high (DEC 2010a). If this species was present within the project area, it would have been easily observed and recognisable during May and seasonal timing of the assessment would not be dependent.

Acacia glaucocaesia (P3) has the highest potential of occurring within the project area of all the Priority Flora species listed in **Table 12**. The closest known population of *Acacia glaucocaesia* (P3) has previously been recorded approximately 3.5km from the boundary of the survey extent, at the interface with the proposed Anketell Point Transport Corridor assessment area. Four populations recorded by DEC have been recorded along Cleaverville Road, 4km north of the North West Coastal Highway. All four populations were revisited by AECOM during 2009, however only two of these populations were confirmed (**Table 7**) and a total more than 67 individual plants were recorded between 501668 to 501677mE and 7708273 to 7708300mN (**Figure 5**). These occurrences are not within the Port Development Area.

Helichrysum oligochaetum (P1) is described as an erect, annual herb to 0.25m in height with yellow flowers (DEC, 2010a). Being an annual herb which flowers between August to November, this species may have been inconspicuous at the time of survey and not observed. However this species will be given specific attention during follow up surveys, following winter rains, in 2010.

Eragrostis lanicaulis (P3) is described as a knotty or bulbous rhizomatous, perennial grass to 0.5m in height. It flowers in March and May/August-October. Due to its herb like form, this species may have been inconspicuous at the time of survey and not observed. However, this species will be given specific attention during follow up surveys, following winter rains, in 2010.

Terminalia supranitifolia (P3) is a perennial shrub of considerable size (2-3m in height), which if present in the project area would have been easily observed and recognisable. This species was not recorded; however, it is possible that this species may occur within the project area and therefore it will be given specific attention during follow up surveys, following winter rains, in 2010.

The Level 2 flora and vegetation survey conducted in the survey area was carried out following the wet season, at the optimum flowering time. The wet season was considered to have provided sufficient rains to classify the weeks that followed as a “good season” from a floristic point of view (Stephen van Leeuwen, DEC, 2009).

The poor rainfall during early 2010 contributed to many of the species within the project area to be in poor condition, withered, not in flower or absent. The wet season in 2010 did not provide sufficient rains to classify the weeks that followed as a “good season” from a floristic point of view. Therefore these areas will be one of the main targets for follow-up assessment during the 2010 field assessment (following winter rains). Additionally, areas that are determined to potentially support populations of Priority Flora most likely to occur (determined from desktop assessments); will also be targeted for ground searches at appropriate scales. Finally, in order to meet EPA Guidance requirements, areas assessed to Level 2 detail will be revisited in order to achieve comprehensive survey criteria.

Although it is difficult to predict the likely outcomes of the follow-up surveys, within areas already assessed to Level 2 detail, it is considered unlikely that significant additional information will be obtained. This is due to the fact that the initial assessment was done to a high level of detail and was carried out during excellent post-wet conditions.

6.1.2 Introduced (Weed) Species

To date, over 1,200 introduced (weed) species have been recognised to occur within Western Australia (EPA, 2007). Specifically within the Pilbara Bioregion a total of 86 weed species are known. Of these, 71% have been classified as Environmental (pest) Weeds (EPA, 2007). Environmental Weeds establish in natural ecosystems and adversely modify natural processes, resulting in the decline of the invaded community. Weeds threaten the survival of many flora because of their rapid growth and the ability to out-compete native plants for available nutrients, water, space and sunlight.

In total, eight introduced flora species were recorded within vegetation communities supported by the Port Development Area. However this data includes species recorded from quadrats within the adjacent Anketell Point transport corridor survey area. Some weed species, although recorded within communities which are common to both survey areas were only actually recorded in quadrats within the Anketell Point transport corridor (**Appendix D**). Three of the eight weed species identified in **Appendix D** were recorded from quadrats within the Port Development Area only (not in quadrats in the Anketell Point transport corridor), namely **Cenchrus ciliaris, *Aerva javanica* and **Portulaca oleracea*.

Aerva javanica* (Kapok bush) was recorded in eight quadrats (Table 8**). This species is a perennial herb up to 1.6m in height and is densely covered in short, branched hairs giving it a greyish appearance. This species is native to northern Africa and south west Asia and was introduced to Australia to assist with revegetation of degraded rangelands. It is now widespread in many types of vegetation from Carnarvon to the Kimberley.

Cenchrus ciliaris* (Buffel grass) was recorded in 23 quadrats (Table 8**). Buffel grass has been identified as a major threat to biodiversity in areas across Australia including the Rangelands of WA (CRC Weed Management, 2008). This species is native to Africa and south Western Asia. It grows on a range of soil types and is commonly found on stony and sandy soil (National Weed Strategy, 2009). This species has been identified as one of the worst environmental weeds in Australia, requiring a very high urgency of action. It is considered a critical invasive species because of its potential to displace native herbaceous species, affect the availability of food for native herbivores and alter fire regimes. This species was originally introduced for erosion control and pasture as it can withstand heavy grazing, however it has become an aggressive coloniser of mesic habitats (e.g. alluvial pans) in the arid zone (DEWHA, 2009b).

Portulaca oleracea* (Pigweed) was recorded in five quadrats and within communities Hf, Thg, AThg2, MAT and DCAT2 (Table 8**). Pigweed is a prostrate, succulent annual. It grows and flowers in summer and is a common widespread weed of horticulture, paddocks and gardens.

Additionally, **Prosopis pallida* (Algaroba) has been found to be supported by Communities Hf, DCAT1 and DCAT2, however it was only actually recorded from quadrats within the Anketell Point transport corridor (**Table 8**). Although not actually recorded from within the Port Development Area, it is possible that this species occurs within the area.

Algaroba is a tree or shrub to 10m in height and occurs on the coast, in sand, loam, wet soil (and saline soil), tidal flats, banks of watercourses, paddocks, wastelands and on bare areas (DEC, 2009a). This species is very salt tolerant, deep rooted and survives long periods of drought. Algaroba is known to infest an extensive area of Mardie station and is found in coastal areas on Peedamulla and Yarraloola stations (Van Vreeswyk *et. al.,* 2004). It is an aggressive invader of the rangelands and forms dense thorny thickets which shade out more useful foraging plants (Van Vreeswyk. *et al*., 2004). Under the *Agriculture and Related Resources Protection Act, 1976*, this species is listed as a Declared Plant and obligatory control measures apply. The *DAFWA* recommended control measures that are detailed in **Appendix F**. This species has also been declared a weed of National significance (National Weed Strategy, 2009).

Flaveria trinervia*, formerly known as Priority 3 species *Flaveria australasica* subsp. *gilgai,* was recorded in one quadrat within the Anketell Point transport corridor and was found to be supported by community Hf. However, it was only actually recorded from one quadrat (Table 8**). Although not actually recorded from within the Port Development Area, it is possible that this species occurs within the area and close attention will be given to this species during the second Phase 2 Level 2 survey expected to occur in 2010 following winter rains. *Flaveria australasica* ssp. *gilgai* (P3) was removed from the DEC Priority List and recognised as a synonym of **Flaveria trinervia* in March 2010 (Melanie Smith, June 2010, *pers. comm*.). It is thought that **Flaveria trinervia* originated in southern Mexico.

The remaining three weed species recorded during the 2009 field assessment are Ulcardo Melon, Spiked Malvastrum and Mimosa Bush. These species are considered less invasive than Kapok Bush, Buffel Grass and Algaroba.

6.2 Vegetation

Twenty three vegetation communities were recorded within the Port Development Area. These communities consist of three Grasslands, eleven Shrublands, one Mangal community, two samphire communities, three Drainage and Creekline communities and three 'other' classifications of mapped areas.

The Vegetation Communities were mapped based on species composition and changes in soil type and did not primarily take into consideration the changes in Land System Units. For this reason a number of vegetation communities identified during the preliminary assessment may traverse a number of differing Land Systems.

A range of factors, including isolation, supporting significant flora or fauna and the supporting landform type determines the significance of native vegetation communities. However, the most important factor in consideration of community significance is the degree of representation in the local and regional area. That is, vegetation communities are considered significant if they are poorly represented elsewhere.

Vegetation Communities can be considered to be significant at either a local or regional level, depending on their representation in the local or regional context. Local and regional significance of the vegetation communities surveyed for the project are discussed in the following sections.

6.2.1 Statistical Analysis of Vegetation Data

The statistical analysis was carried out by Astron in order to verify that flora/vegetation data collected in the field and then grouped for the purposes of vegetation descriptions and mapping has been robust and sufficiently detailed. The report of this analysis is provided as **Appendix A**.

Analysis of the AECOM survey data found that there was a significant difference in data obtained for the Port Development Area in comparison to the adjacent API transport corridor (Global $R = 0.398$, $p<0.001$), which confirms significant differences in the species occurrences across the two project areas, and also allows a closer examination of each of the two data sets; Port Development Area and transport corridor, separately. A summary of the key results follows.

Classification analysis reflected the difference between the Port Development Area and the transport corridor. Only one Port Development Area quadrat (APQ98) was clustered within a transport corridor community due to the occurrence of the dominant tussock grass *Eragrostis xerophila* in the quadrat samples within this numerical community.

Twelve significant groups of quadrats that represented vegetation communities were identified within the data from the Port Development Area (Sample statistic $Pi = 4.304$, $p<0.001$), which indicates that the AECOM botanical field survey and results applied a precautionary approach to delineating individual vegetation communities in comparison to the numerical analysis. The implication for the Environmental Impact Assessment is that the mapping used to define vegetation communities is very unlikely to have grouped vegetation communities that may be of environmental significance. This cautious approach indicates that AECOM results have been presented to a finer level of detail than statistically indicated and that vegetation types have not been inappropriately grouped.

The cautious approach discussed above that was used to undertake delineation of vegetation communities is confirmed by the ANOSIM test of the groupings based on the 'field defined' vegetation communities. AECOM used field descriptions of vegetation communities coupled with aerial photography to undertake vegetation mapping and applied a vegetation code based on field descriptions of vegetation communities to each individual survey quadrat. The purpose of this final ANOSIM test was to determine if these field descriptions of vegetation communities were significantly associated with the actual quadrat data, and examine if strong overlap between the vegetation codes exists. This test indicated that significant associations between the field defined vegetation communities and the quadrat data occur (Global R = 0.563, $p<0.001$). However, in the "pair-wise test" of significant differences between each individual vegetation code, several vegetation codes were not significantly different . Several vegetation communities appear to have been split without support from numerical analyses. The "closeness" of each of these codes was displayed as an ordination plot within **Appendix A**.

The conclusion of the range of statistical analyses carried out is that a cautious approach has been used in defining individual vegetation communities and, based on the numerical analysis, inappropriate 'grouping' of vegetation communities has not occurred.

The conclusions discussed above have determined that the described and mapped vegetation communities from the AECOM assessments have a sound basis for further consideration and assessment of their conservation significance, discussed in the following sections.

6.2.2 Locally Significant Vegetation

Determining vegetation representation on a local level involves assessing the proportionate extent of each recorded community within the study area. Based on this, it is considered that vegetation communities Amg, CST, DCAT2, Hf, AxT, ATg, MAC, GT, Sam1, Sam2 and Thg(c) may be considered significant due to the limited in representation (by area) within the local context (**Table 13**). Representation of less than 1% of the total surveyed area has been considered to define limited representation within the local context. Vegetation communities prefixed with a "?" have been extrapolated (desktop based) and areas for these have not been considered in this assessment. Vegetation communities Bare, Cleared and Beach have also not been included in this assessment as they are not native vegetation assemblages.

Although vegetation communities Amg, CST, DCAT2, AxT, ATg, MAC, GT, Sam1, Sam2 and Thg(c) are considered to be locally significant due to their limited proportionate extent within the project area, these communities have not been determined to be regionally significant as part of the assessment discussed below. Since these communities have been determined to be well represented in the wider region, they are not considered to be of conservation significance. Community Hf is the exception to this and further explanation to the conservation significance of this community is given in **Sections 6.2.3.3.2 and 6.2.4.**

Table 13 Proportion of vegetation communities within surveyed areas

Vegetation Community	Area (ha)	% Total Area Surveyed
?ATg	0.06	0.002
?AThg2	0.64	0.017
?DCAT2 or ?AThg1	0.64	0.017
?MAC	0.75	0.020
?Thg	0.38	0.010
?Thg or ?Hf	3.27	0.085
ATg	22.30	0.581
AThg1	258.62	6.734
AThg2	112.71	2.935
Amg	36.86	0.960
AxT	14.24	0.371
Bare	1.20	0.031
Beach	36.32	0.946
CHT	94.02	2.448
CST	4.57	0.119
Cleared	30.34	0.790

Vegetation Community	Area (ha)	% Total Area Surveyed
DCAT1	70.43	1.834
DCAT2	16.37	0.426
GT	25.98	0.677
Hf	11.50	0.299
Lit	266.75	6.946
MAC	35.42	0.922
MAT	375.88	9.788
MATE	63.92	1.664
MF	352.60	9.182
Sam1	24.49	0.638
Sam2	14.21	0.370
Thg	1494.83	38.925
Thg(c)	32.53	0.847
Tidal Mud Flat	438.41	11.416
TOTAL	**3840.23**	**100**

Some of the vegetation community codes appearing in the mapping are prefixed with a "?" which have been extrapolated (desktop based) with a low level of certainty. The proportionate representation of these communities, as shown in **Table 13** is low, however, they are unlikely to be separate (additional) community types, rather they are likely to be equivalent to the communities that they are anticipated to be. These communities require ground-truthing for them to be assigned a certain code, but areas of these have not been included in clalculations to determine vegetation significance, based on area representation.

Vegetation communities that support populations of Priority Flora are also considered to be of local significance. Two vegetation communities, Thg and AThg2, may be considered locally significant due to supporting populations of the Priority Three Flora species, *Acacia glaucocaesia*. Although *Acacia glaucocaesia* was not recorded within the Port Development Area, it was recorded within communities Thg and AThg2 in the adjacent project area and therefore also has the potential to occur in these communities elsewhere. This species will be given specific attention during subsequent assessments, such as the Phase 2 assessment that will potentially take place during the post-winter rain period.

6.2.3 Regionally Significant Vegetation

The EPA's Position Statement No. 2 lays out a series of constraints which relate to biodiversity. One of them is to protect at least 30% of the original extent of vegetation complexes in unconstrained areas and 10% in constrained areas (i.e. urban zoned regions). All of the vegetation types identified as occurring within the Chichester and Roebourne Subregions meet the 30% target (**Table 11**).

The project area is situated almost entirely within the Chichester Subregion with a small portion on the western side located within the Roebourne Subregion (**Figure 4**). The Port Development Area lies within a region for which the Land Systems have been mapped as part of the Rangeland Assessment Programme (Van Vreeswyk, *et al*., 2004). Dixon Island has not been mapped as part of this programme. Six Land System Units are traversed by the Port Development Area and these are Rocklea, Ruth, Littoral, Cheerrawarra, Uaroo and Boolgeeda. The proportions of each of the Land System present within the Chichester Subregion are presented below in **Table 14**.

Table 14 Proportion of Land System Units within the Project Area and Chichester Subregion

Land System	Hectares of each Land System in the whole of Chichester IBRA region	% of total Chichester	Hectares in Survey Area	% of Survey Area
Boolgeeda	167650.40	5.74	135.77	4.16
Cheerawarra	786.11	0.03	407.93	12.48
Littoral	3217.33	0.11	1055.32	32.30
Rocklea	2125325.66	72.71	315.89	9.67
Ruth	137147.00	4.69	1276.30	39.06
Uaroo	488730.36	16.72	76.39	2.34
TOTAL	**2922856.86**	**100.00**	**3267.60**	**100.00**

All of the Land System Units represented in the project area are well represented in the local and regional area, with the exception of the Cheerawarra Unit (**Table 14**). Vegetation supported by the Cheerrawarra Unit, may therefore be considered regionally significant. The vegetation units within the project area supported by the Cheerawarra Land System are:

- AThg1;
- DCAT1;
- Hf;
- MAT;
- MATE;
- Thg;
- Thg(c);
- GT; and
- Lit.

In order to determine whether the aforementioned vegetation communities are in actual fact regionally significant (i.e. limited to specific landform types/Land System Units), a more detailed assessment of their representation in the region has been carried out.

Land System mapping for the Pilbara bioregion has been prepared by the *Department of Agriculture and Food Western Australia* (Van Vreeswyk *et al*., 2004) and describes the interrelationships between the physical environment and the plant communities they support by describing and classifying sampling points (inventory sites) into site types. Site types are described in terms of combinations of landforms, soil types and plant communities and are denoted by an appropriate four letter code (e.g. sandplain soft spinifex grassland; SSSG). Site types are then aggregated into broader site type groups. Site types within a particular site type group have generally similar positions in the landscape as well as similar vegetation and soils. Van Vreeswyk *et al*., (2004) described 44 major site types which have been split into eleven site type groups.

Land System mapping for the Pilbara bioregion was compared to the species composition and habitat of potential regionally significant communities recorded in the project area (previously listed). This was done in order to determine whether the potentially regionally significant communities are restricted to specific Land System Units, or whether they possibly occur elsewhere and are therefore actually regionally restricted or significant. Information was considered for the Cheerawarra Land System (that supports the project area) and the two adjacent coastal Land Systems (Ruth and Littoral), to examine the potential for wider regional representation of vegetation outside the project area.

Site types and groups as described by Van Vreeswyk *et al*., (2004) have been mapped and described at a broad regional level. The vegetation communities described and mapped by AECOM in 2009 have been done to a finer level and as such, an exact match of AECOM's communities versus site type and groups as described by Van Vreeswyk *et al*., (2004) is not always possible. Where this is the case, an argument based on representation of that particular community in other areas is presented.

6.2.3.1 Rationalisation of Regionally Significant Vegetation

A description of the Cheerrawarra and adjacent Land System Units (i.e. Ruth and Littoral) is provided below and is based on Van Vreeswyk *et al*., (2004).

6.2.3.1.1 Cheerawarra Land System Unit

1) Sandplains (52% of this land system): Hummock grassland of *T. pungens, T. epactia* with isolated low shrubs (SSSG). Less frequently T. sp. (hard spinifex) (SHSG).
2) Sandy surfaced alluvial plains (30%): Hummock grasslands of *T. secunda, T. longiceps* (hard spinifex) with isolated low shrubs (AHSG).
3) Saline clay plains (10%): Patchy tussock grasslands mostly *Eragrostis xerophila* with occasional *Sclerolaena hostilis* and other halophytes (ARPG).
4) Saline scalds and sand hummocks (5%): Much bare ground. A few patches of *E. xerophila* tussocks, elsewhere sparse cover of halophytic annuals including *Sclerolaena* and *Trianthema* spp. Sand Hummocks support *Triodia pungens*.
5) Drainage tracts (3%): Dense Tussock grassland of *Eragrostis xerophila, Eriachne benthamii* and *Chrysopogon fallax*, occasional acacia shrubs along channels (APXG, DEGW). More saline sites support sparse halophytic low shrublands of *Halosarcia* spp. and *Frankenia* spp (PSPS).

6.2.3.2 Ruth Land System

1) Hills, ridges and upper slopes (75% of this land system): Hummock grasslands of *Triodia wiseana*
2) or *T. pungens* with isolated shrubs such as *Acacia inaequilatera, A. pyrifolia* or *A. orthocarpa* (HSPG).
3) Lower slopes and stony plains (15%): Typically supporting vegetation similar to unit 1 (PHSG, PSSG).
4) Narrow drainage floors, creek lines and channels (5%): Typically supporting vegetation similar
5) to unit 1 (DAHW).
6) Sand plains (5%): Hummock grasslands of *Triodia* spp. with isolated to scattered *Acacia* shrubs (SHSG, SSSG).

6.2.3.3 Littoral Land System

1) Beaches (<1% of this land system): Shelly beaches flanked either by mangroves or fore dunes.
2) Coastal dunes (3%): Vegetation of dunes is Hummock grasslands of *T. pungens* or *T. epactia* and scattered shrubs of *Acacia coriacea, Aerva javanica* and *Threlkeldia diffusa* (CDSG).
3) Limestone ridges (<1%): Grassland mixed with *T.pungens, *Cenchrus ciliaris* and isolated shrubs.
4) Tidal Flats (70%) and samphire flats (10%): Bare mudflats with occasional patches of scattered low shrublands *of Halosarcia halocnemoides* and *H. auriculata* (and/or *H. indica*), and *Sporobolus virginicus* (PSPS).
5) Mangrove outer margin (5%) and Tidal channels (4%): Closed Mangrove woodlands of *Avicennia marina*.
6) Alluvial Plains (2%): Tussock Grasslands of **Cenchrus ciliaris* (APBG) or mixed perennial grassland such as *Chrysopogon fallax*, *Eragrostis xerophila* and *Sporobolus virginicus* (APXG).
7) Sandy plain and islands (5%): Hummock Grassland of *T.epactia/pungens* with isolated shrub (SSSG); less frequently with T. spp. (SHSG).

All of the vegetation communities previously determined to potentially be of regional significance have been examined in more detail, based on Van Vreeswyk *et al*., (2004), and the outcomes for each are summarised in the following sections.

6.2.3.3.1 DCAT1

When comparing AECOM's DCAT1 community to Van Vreeswyk *et al.,* (2004) Site Type Groups and their component site types, this community corresponds to the Drainage Shrubland and Woodland Site Type (Site Type Group K). This group of site types occurs as drainage tracts in the lowest part of the landscape.

On a finer scale, Site Type Group K (Drainage Shrubland and Woodland) has six site types as follows:

1) Drainage *Acacia* Hummock grass Shrubland/woodland (DAHW);
2) Drainage spinifex grassland with Eucalypt overstorey(DESG);
3) Drainage Eucalypt and *Acacia* grassy woodland/shrubland (DEGW);
4) Drainage Eucalypt and *Acacia* woodland/shrubland (DEAW);
5) Drainage *Melaleuca* Shrubland (DMES); and
6) Gallery (riverbank and channel) *Melaleuca* Eucalypt woodland (GMEW).

Community DCAT1 can be inferred to be equivalent to the Drainage spinifex grassland with *Eucalypt* overstorey (DESG) site type, based on species composition and habitat.

DESG is a fairly common site type that occurs on drainage tracts and narrow floors. It occurs as Hummock grasslands with an overstorey of *Eucalyptus* trees. The dominant Hummock grass is often *Triodia pungens* (soft spinifex) but may be other *Triodia* species. The dominant Eucalypts may be *Corymbia hamersleyana, Eucalyptus victrix* or *Eucalyptus camaldulensis*.

DESG is represented in conservation reserves and has been recorded in Millstream-Chichester National Park and on the Meentheena pastoral lease and also on unallocated Crown land. DESG occurs as a minor component on twelve land systems (Van Vreeswyk *et al.,* 2004).

It can therefore be concluded that DCAT1 community is potentially not restricted to the Cheerrawarra Land System Unit as it occurs elsewhere and within other Land Systems. It is therefore also unlikely to be regionally significant, based on this conclusion.

6.2.3.3.2 Hf

When comparing AECOM's Hf community to Van Vreeswyk *et al.,* (2004) Site Type Groups and their component site types, this community corresponds to the Alluvial Plain Tussock Grassland (and occasionally grassy shrublands) Site Type (Site Type Group I). This broad group of sites occurs in depositional landscapes and support tussock grasslands, and occasionally grassy shrublands. Soils are most commonly cracking clays or texture contrast (duplex) soils. Vegetation is usually dominated by Tussock grasses of the genera *Astreleba, Cenchrus, Chrysopogon, Eriachne, Eragrostis, Eulalia, Sporobolus* and *Themeda*.

On a finer scale, Site Type Group I (Alluvial Plain Tussock Grassland (and occasionally grassy shrublands)) has seven site types as follows:

1) Alluvial Plain Tussock Grassland (includes 7 subtypes) (APTG);
2) Alluvial Plain Roebourne Plains grass grassland (ARPG);
3) Alluvial Plain Buffel grassland (APBG);
4) Alluvial Plain Buffel grass grassland with Eucalypt overstorey (AEBG);
5) Plain mosaic grassland (PMOG);
6) Saline plain Sporobolus grassland (SPSG); and
7) Stony alluvial plain snakewood grassy shrublands (SSTS).

Community Hf can be inferred to be equivalent to the Alluvial Plain Roebourne Plains grass grassland (ARPG) based on species composition and habitat. ARPG is a fairly common site type that occurs on level slopes and alluvial plains with gilgai micro relief. The development of micro relief is very variable and is associated with patterns in grassland species and density. More densely grassed gilgai areas are mixed or dispersed between higher (runoff) soil phases with much less grass and prominent stony mantles. Soils are cracking clays and clays which frequently become saline with depth (Van Vreeswyk *et al.,* 2004).

ARPG occurs as *Eragrostis xerophila* Tussock grassland usually with other minor grass species and occasionally with a poorly developed low shrub stratum. Grasses other than *Eragrostis xerophila* occur on the majority of sites, invariably as minor components at much lower frequencies. Of these, *Eragrostis setifolia* and *Eriachne benthamii* are the most common.

ARPG is the most extensive site type on Horseflat, Pullagarah and Hooley Land Systems and is also common on Paraburdoo Land System. It also occurs as a minor component on 22 other systems.

It can therefore be concluded that the community Hf potentially occurs in other Land System Units, some of which are located outside the project area (i.e. Pullagarah, Paraburdoo and Hooley), and that therefore it is also unlikely to be regionally significant, based on this conclusion.

However, in accordance with the equivalence of the vegetation of the Horseflats Land System (of which the AECOM Hf community occurs on) to the PEC as discussed in more detail in Section 6.2.4, Hf is of conservation significance for this reason, albeit not due to limited regional representation.

6.2.3.3.3 Thg

When comparing community Thg to Van Vreeswyk *et al.,* (2004) Site Type Groups and their component site types, this community corresponds to the Hill Hummock Grassland Site Type (Site Type Group A). The Site Types in this group are based on Hummock grasses (spinifexes) and occur on nearly all hills, ridges and ranges in the Pilbara. Soils are stony skeletal sands, loams and clays with dense surface mantles of pebbles or cobbles and frequent rock outcrop. The site types contrast markedly with shrubland site types which dominate hills and ranges in adjacent survey areas to the south of the Pilbara.

On a finer scale, Site Type Group A (Hill Hummock Grassland) and occasionally grassy shrublands) has two site types as follows:

1) Hill spinifex grassland (HSPG); and
2) Hill Eucalypt spinifex grassland (HESG).

Community Thg can be inferred to be equivalent to the Hill spinifex grassland (HSPG) based on species composition and habitat.

HSPG is Hummock Grasslands of *Triodia* species, with isolated to scattered trees and shrubs. The dominant Hummock grass species varies but is often *Triodia wiseana* or *Triodia pungens*. HSPG is represented in conservation reserves and was recorded in the Karijini National Park and the Meetheena pastoral lease (a lease acquired by DEC for conservation purposes). It also occurs extensively on unallocated Crown Land.

HSPG is the dominant site type on Black, Boolaloo, Callawa, Capricorn, Granitic, Houndstooth, McKay, Mosquito, Nanutarra, Robe, Robertson, Rocklea, Ruth and Talga Land Systems. It is a major site type on Adrian, Coongimah and Newman Land Systems and a minor site type on another 27 systems.

It can therefore be concluded that the community Thg is potentially not restricted to the Cheerrawarra Land System Unit as it occurs in other Land System Units, some of which are located outside the project area, and that therefore it is also unlikely to be regionally significant, based on this conclusion.

6.2.3.3.4 Thg(c)

When comparing Thg(c) community to Van Vreeswyk *et al.,* (2004) Site Type Groups and their component site types, this community corresponds to the Sandplain and Dune Grassland Site Type (Site Type Group G). The Site Types in this group occur on sandplains and dunes from coastal areas to inland desert areas. Four of the five site types in this group are comprised of Hummock (spinifex) grassland, while the fifth group is tussock grassland dominated by the introduced species **Cenchrus ciliaris*. The site types in this group occur on sandplains and sand dunes from coastal areas to inland desert areas. Soils are deep sands.

On a finer scale, Site Type Group G (Sandplain and Dune Grassland) has five site type groups as follows:

1) Sandplain hard spinifex grassland (SHSG);
2) Sandplain soft spinifex grassland (SSSG);
3) Coastal dune soft spinifex grassland (CDSG);
4) Coastal Dune Buffel grass grassland (CDBG); and
5) Sandy bank acacia spinifex Shrubland (SBAS).

Community Thg(c) can be inferred to be equivalent to either the Sandplain Soft Spinifex Grassland (SSSG) community or the Coastal Dune soft spinifex Grassland (CDSG) based on species composition and habitat.

SSSG is a common and fairly widespread site type which occurs on sandplains and dunes. Soils are deep sands and sandy earths without surface mantles. SSSG occurs as a Hummock Grassland of *Triodia pungens, Triodia epactia* or *Triodia schinzii* with variable shrubs and occasional trees. SSSG is the most extensive site type on Cheerrawarra, Dune, Lime, Nita and Onslow Land Systems. It is common on Gregory, Little Sandy and Uaroo Land Systems and is a minor component of 14 other systems.

CDSG occurs on coastal dunes, limestone ridges, swales and narrow sandplains. CDSG occurs as Hummock grasslands of *Triodia pungens* or *Triodia epactia* (soft spinifex) with occasional shrubs or patches of shrubs such as *Acacia coriacea* (present within Thg (c)) or *Crotalaria cunninghamii*. CDSG is a major site type on Dune Land System and a minor site type on Eighty Mile and Littoral Land Systems.

It can therefore be concluded that the community Thg(c) is potentially not restricted to the Cheerawarra Land System Unit and occurs within other Land Systems, some which are located outside the project area (i.e. Dune, Little Gregory, Little Sandy and Eighty Mile Land Systems), and that therefore it is also unlikely to be regionally significant, based on this conclusion.

6.2.3.3.5 GT and Lit

When comparing GT and Lit communities to Van Vreeswyk *et al.,* (2004) Site Type Groups and their component site types, these communities corresponds to the Sandplain and Dune Grassland Site Type (Site Type Group G). The Site Types in this group occur on sandplains and dunes from coastal areas to inland desert areas. Four of the five site types in this group are comprised of Hummock (spinifex) grassland, while the fifth group is tussock grassland dominated by the introduced species **Cenchrus ciliaris*. The site types in this group occur on sandplains and sand dunes from coastal areas to inland desert areas. Soils are deep sands.

On a finer scale, Site Type Group G (Sandplain and Dune Grassland) has five site type groups as follows:

6) Sandplain hard spinifex grassland (SHSG);
7) Sandplain soft spinifex grassland (SSSG);
8) Coastal dune soft spinifex grassland (CDSG);
9) Coastal Dune Buffel grass grassland (CDBG); and
10) Sandy bank acacia spinifex Shrubland (SBAS).

Although no exact match for community GT was identified, this community is similar to the Sandplain Soft Spinifex Grassland (SSSG).

SSSG is a common and fairly widespread site type which occurs on sandplains and dunes. Soils are deep sands and sandy earths without surface mantles. SSSG occurs as a Hummock Grassland of *Triodia pungens, Triodia epactia* or *Triodia schinzii* with variable shrubs and occasional trees. There may be a patchy tree layer of Eucalypts or occasionally *Owenia reticulata* (desert walnut) or *Bauhinia cunninghamii* (Bauhinia). There may be a tall, mid or low shrub layer, mostly of *Acacias* or *Grevilleas*, but not all layers are always present or they may be poorly developed. SSSG is the most extensive site type on Cheerrawarra, Dune, Lime, Nita and Onslow Land Systems. It is common on Gregory, Little Sandy and Uaroo Land Systems and is a minor component of 14 other systems.

Additionally, although no exact match for community Lit was identified, this community is similar to the Coastal Dune Buffel Grass Grassland (CDBG).

CDBG occurs on coastal dunes, swales and narrow sandplains. CDBG occurs as **Cenchrus ciliaris* tussock grass grassland with isolated shrubs comprising mainly of but not limited to *Acacia coriacea, Acacia stellaticeps, Crotalaria cunninghamii, Aerva javanica* and *Cajanus cinereus.* CDBG is a site type which has replaced Coastal Dune Spinifex Grassland (CDSG) in some coastal areas. The original CDSG has been profoundly altered in terms of grass composition from *Triodia pungens* to **Cenchrus ciliaris*. It is likely that disturbance of CDSG is due to overgrazing and/or fire has enabled Buffel grass to colonise and then replace the spinifex. CDBG is the most extensive site type on the Eighty Mile Land System and is a minor site type on the Anna and Dune Land System.

It can therefore be concluded that the communities GT and Lit are potentially not restricted to the Cheerawarra Land System Unit and occur within other Land Systems, some of which are located outside the project area (i.e. Eighty Mile, Anna, Dune, Lime, Nita and Onslow) and that therefore they are also unlikely to be regionally significant, based on this conclusion.

6.2.3.3.6 AThg1, MAT and MATE

When communities AThg1, MAT and MATE were compared to site type groups and their corresponding component site types (Van Vreeswyk *et al.,* 2004), no exact or closely matched communities were found.

Although this detailed assessment of the likely representation of these communities in the wider region did not produce any justifiable results, based on AECOM survey data it is apparent that these communities are locally widespread throughout the project areas surveyed (i.e. Port Development Area and adjacent Anketell Point Transport Corridor area).

These communities were recorded to be abundant in the adjacent transport corridor area and occur on Land System Units other than the Cheerawarra unit in these locations. Vegetation communities AThg1, MAT and MATE are therefore not restricted to the Cheerrawarra Land System Unit (**Table 15**) and therefore also unlikely to be regionally significant, based on this conclusion.

Table 15 Proportion of Vegetation communities and Land System Units within the surveyed areas

Vegetation Communities	Land System Unit	Hectares in Survey Area	
		Port	Transport Corridor
AThg1	Boolgeeda	30.1	330.7
	Cheerrawarra	36.4	0
	Littoral	44.3	0
	Rocklea	15.5	393.3
	Ruth	132.4	570.4
	Horseflat	0	153.1
	Mallina	0	58.3
	Paraburdoo	0	98.9
	River	0	26.6
TOTAL		**258.7**	**1631.3**
MAT	Boolgeeda	30.3	77.1
	Cheerrawarra	132.2	0
	Littoral	1.8	0
	Rocklea	29.0	71.7
	Ruth	176.0	433.32
	Uaroo	6.5	0
	Horseflat	0	335.3
	Paraburdoo	0	39.3
TOTAL		**375.8**	**956.7**
MATE	Cheerrawarra	63.0	0
	Ruth	0.9	54.3
	Boolgeeda	0	3.0
	Horseflat	0	67.8
	Mallina	0	4.3
	Paraburdoo	0	67.3

Vegetation Communities	Land System Unit	Hectares in Survey Area	
		Port	Transport Corridor
	River	0	2.1
	Rocklea	0	5.5
TOTAL		**63.9**	**204.3**

In summary, all of the vegetation communities supported by the Cheerrawarra Land System Unit within the Port Development Area that were previously considered to be of regional significance, (i.e. AThg1, DCAT1, Hf, MAT, MATE, Thg and Thg (c)), GT and Lit) have been determined to more than likely be more widespread than initial results indicate. It can therefore also be concluded that it is unlikely that any of these vegetation communities are in actual fact, regionally significant (due to poor representation within the Cheerrawarra Unit). However, Hf is of significance for reasons other than regional representation, as discussed in the following section.

6.2.4 Threatened and Priority Ecological Communities

Kendrick and McKenzie (2001) and Kendrick and Stanley (2001) have stated that there are no known TECs within the Chichester or the Roebourne Biogeographical Subregions. A search of the DEC Threatened and Priority Ecological Communities database did not identify any known TECs within the Port Development Area. However, it did identify two Priority 1 Ecological Communities, namely *Roebourne Plains Gilgai Grassland* and *Roebourne Chenopod Association* as occurring in close proximity to the project area. DEC's most recent assessments of vegetation in the region have identified the Priority 3 PEC *Horseflat Land System of the Roebourne Plains* in close proximity to the project area (**Figure 5**). As discussed below, this community is likely to actually be more widespread, including within the project area.

Consultation with DEC in 2010 indicates that there are now 29 PECs within the Pilbara region. A combination of new information regarding specific boundaries and distributional extent for PECs in the Pilbara as well as species composition, soil types and position in the landscape, were used to determine which of the mapped and described communities within the project areas may be characterised or considered equivalent to the three PECs of interest, namely *Roebourne Plain Gilgai Grassland* (P1), *Roebourne Chenopod Association* (P1) or the *Horseflat Land System of the Roebourne Plain* (P3).

It should be noted that the DEC boundaries and distributional extent for PECs are a work in progress and are not definite, therefore it is important to accurately ground truth the boundaries of vegetation classifications and relate these back to PEC equivalence (Stephen van Leeuwen, DEC, June 2010, *pers. comm.*).

Mattiske Consulting (2007) identified two communities within the proposed Port Development Area that exhibit similarities to two known Priority Ecological Communities, namely; *Roebourne Plains Gilgai Grassland* (Priority 1) and *Roebourne Chenopod Association* (Priority 1). Further investigation conducted by AECOM of the areas thought to represent these PECs, did not confirm their presence.

The vegetation community defined as CS1 by Mattiske Consulting Pty Ltd (2007) report is not considered consistent with the inferred PEC (*Roebourne Chenopod Association*) as stated in the report. This has been determined based on a range of information, including correspondence from Jill Pryde and Stephen van Leeuwen from DEC between May and June 2009. According to the DEC, the dominant species that define the PEC (*Roebourne Chenopod Association*) are *Eragrostis xerophila, Sclerolaena hostilis* and *Atriplex ?bunburyana*, none of which were recorded within Mattiske's CS1 community. Therefore Vegetation Community CS1 as described by Mattiske Consulting Pty Ltd is not equivalent to the *Roebourne Chenopod Association* as described by the DEC.

The vegetation community defined as G2 by Mattiske Consulting Pty Ltd (2007) is not considered consistent with the inferred PEC (*Roebourne Plains Gilgai Grassland*) and is deemed unlikely to be representative of this PEC. The *Roebourne Plains Gilgai Grassland* was subject to a much more detailed assessment following results of the DEC Pilbara Biological Survey, which set up six survey sites on Roebourne Grasslands. This assisted in further defining the community and subsequently the revised version of the community type, now referred to as the "*Roebourne Plains Gilgai Grassland*" was nominated as a TEC to the Western Australia Threatened Ecological Communities Scientific Committee in August 2008.

Based on updated information received by the DEC in April 2009, it was determined that *The Roebourne Plains Gilgai Grasslands* supports mainly Tussock grasses (*Sorghum* sp.) and ephemeral herbs dominated by Papilionaceae (*Desmodium* sp. and *Glycine* sp). Vegetation community G2 as described by Mattiske Consulting Pty Ltd (2007) did not record *Sorghum, Desmodium* or *Glycine* species which are considered to be 'indicator species' for determining the presence of the nominated PEC (*Roebourne Plains Gilgai Grasslands*). Therefore based on species composition of the PEC, Vegetation Community G2 as described by Mattiske Consulting Pty Ltd (2007) is not equivalent to the *Roebourne Plains Gilgai Grasslands* PEC.

Figure 5 is based on data provided by DEC and this mapping indicates that two small pockets of the Priority 3 *Horseflat Land System of the Roebourne Plain* occur within the project area. Recent ground truthing conducted in May 2010 as well as liaison with Jill Pryde and Stephen van Leeuwin from DEC, indicates that Horseflat (Hf) vegetation community described and mapped within the project area is considered to be equivalent to the Priority 3 *Horseflat Land System of the Roebourne Plain* PEC. This is due to the fact that the DEC description and data that characterises the aforementioned PEC in the region is comparable to the data for the Hf vegetation community described and mapped within the survey extent, in terms of species composition and site characteristics such as soil type and position in the landscape. The methods used to conduct this comparison are commensurate with the expectations of DEC for determination of TEC/PEC status.

The Hf community described and mapped within the project area is therefore considered significant due to being equivalent to the P3 PEC and comprises of approximately 11.50ha or 0.3% of the total area surveyed (**Figure 5**). The species composition from quadrat data (i.e. APQ103) representative for the Horseflat community from this area, indicates the presence of *Eragrostis xerophila,* one of the PEC indicator species. However, this location also exhibits a high proportion of **Cenchrus ciliaris* an environmental weed of the Pilbara Region. The presence of **Cenchrus ciliaris* indicates the degraded nature of the community, which correlates to the vegetation condition at this location (Good – Degraded). Due to the relatively degraded nature of the community, impacts to this community are unlikely to be significant in the context of the project area.

There is currently no legislative protection for PECs, particularly in the Pilbara region; however, it is advisable that the DEC be consulted regarding the proposed impact to areas containing Hf vegetation community in order to evaluate the appropriate measures in which to proceed.

6.2.5 Other Communities of Significance

Reservation Priority status has been allocated to all three of the Beard (1975) vegetation communities present within the project area. Reservation Priorities are allocated to communities based on the known current extent of the community and the percentage of that community currently protected within conservation reserves in each subregion (**Table11**). For example, Beard's Short bunch community (xGc/t_3Hi) has a current extent of 59,308ha (Beeston *et. al*, 2002), and since there is currently none of this community protected within reserves, it has been given a High Priority Status.

6.2.6 Vegetation Condition

The majority of the project areas was identified to be in Good and Good – Very Good condition. The limited number of weeds identified and the relative remoteness of the area contributed to its condition ranking. The vegetation and landforms traversed during the assessment have limited access, therefore reducing degradation by weed invasion caused by human degradation and access track clearing.

7.0 Conclusions and Recommendations

The significance of any potential impacts that may arise from the construction of the Anketell Point and Dixon Island Proposed Port Development Area is dependent on the conservation status and reservation priorities of the vegetation communities that will be affected.

Overall, the majority of the vegetation occurring within the project areas is in Good and Good – Very Good condition and most of the area assessed has been subject to very little clearance and disturbance. In addition to the limited disturbance, only eight weed species were recorded to occur, indicating limited weed invasion within the most of the area. However, the eight weed species recorded, include three of the most significant terrestrial weed species for the Pilbara region, one of which is listed as a Declared Plant by the *Department of Agriculture and Food,* namely **Prosopis pallida.* Obligatory control measures, enforced by DAFWA apply to this species (**Appendix F**).

The timing of the survey conducted in 2009 (May post-wet) was considered optimum to record all species (annuals and ephemerals) as it was conducted during the main flowering season, typically four to six weeks following major cyclonic events. However, it is recommended that an additional 'Phase 2' Level 2 Flora and Vegetation Assessment be conducted in 2010 (following winter rains), in order to capture additional species that may not have been present during the May assessment in 2009. This would also meet the requirements for a 'Comprehensive Survey' as part of a Level 2 Flora and Vegetation Assessment, according to EPA Guidance (2004).

The additional vegetation assessment has the potential to identify additional populations of Priority Flora that were previously recorded or have the potential to occur in the survey area. Based on preferred habitat and soil types, along with previously recorded locations for the flora species resulting from the DEC database, it has been determined there is high potential for four of these species to occur within the project area. These species are; *Helichrysum oligochaetum* (P1)*, Acacia glaucocaesia* (P3)*, Eragrostis lanicaulis* (P3) and *Terminalia supranitifolia* (P3)*.*

Additionally, a Targeted Priority Flora Survey should be conducted during the favourable flowering season (post wet), targeting vegetation communities where Priority Flora that potentially occur in the project area would be likely to occur.

No species of DRF, listed by DEC under the *Wildlife Conservation Act, 1950* or as Threatened under the *EBPC Act, 1999* were recorded within the project area. No Priority Flora was recorded within the project area, however *Acacia glaucocaesia* (P3) was recorded in communities Thg and AThg2 approximately 3.5km from the interface with the adjacent Anketell Point Transport Corridor project area, also assessed by AECOM (2009).

One flora species recorded, *Frankenia pauciflora* var. *pauciflora* was found to be occurring outside its previously recorded range of distribution as documented by the West Australian Herbarium (DEC, 2010a). According to the West Australian Herbarium, this species is endemic to the Geraldton Sandplains, Coolgardie and Murchison regions. However, the taxonomy of this specimen is somewhat inconsistent and the genus is under current revision. The entity that the name has been applied to is common (Malcolm Trudgen, December 2009, *pers. comm*.) and therefore is unlikely to represent a significant range extension. The significance of this recorded species and the community that supports it, have not been regarded as significant for the purposes of this assessment.

There are no vegetation communities within the survey area considered to be of conservation significance due to being listed as TECs. None of the vegetation communities recorded are considered to be of regional significance due to factors such as poor regional representation. However, vegetation community Hf is considered to be of conservation significance (i.e. regionally significant) due to it being equivalent to the Priority 3 *Horseflat Land System of the Roebourne Plain* PEC. Some of the vegetation communities may be considered to be locally significant due to factors that include the potential to support populations of significant flora and being limited in their local representation.

The factors of environmental significance (constraints) with regards to flora and vegetation associated with the port project area that should be considered within any EIA include:

- The occurrence of a Declared Plant, listed by the *Department of Agriculture and Food* that was recorded (**Prosopis pallida*);
- Two communities, Thg and AThg2, that may be considered to be locally significant due to supporting populations of Priority Flora species; and
- One community, Hf, is regionally significant due to being equivalent to the Priority 3 *Horseflat Land System of the Roebourne Plain* PEC.

8.0 List of Participants

- Kellie Honczar (Senior Environmental Scientist/Botanist)
  - Project Manager, Field Assessment, Report preparation
- Andrew Batty (Senior Environmental Scientist/Ecologist)
  - Project Manager, Field Assessment
- Gabriela Martinez (Environmental Scientist/Botanist)
  - Field Assessment, data collation, Herbarium work, Report preparation
- Lisa Chappell (Environmental Scientist/Botanist)
  - Report preparation
- Alexandra Sleep (Graduate Environmental Scientist)
  - Field Assessment
- Peter Magaro (Senior Environmental Planner)
  - Field Assessment
- Kathryn Jones (GIS Analyst)
  - Map production

9.0 Acknowledgements

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10.0 References

AECOM Australia Pty Ltd (2009) *Proposed Anketell Point Railway Alignment, Associated Borrow Pits and Communications Towers. Level 2 Flora and Vegetation Assessment*. Unpublished document prepared for Australian Premium Iron Management Pty Ltd.

Beard, J. S. (1990) *Plant Life of Western Australia.* Kangaroo Press

Beard, J. S. (1975) Vegetation Survey of Western Australia. Pilbara. 1:1 000 000 Vegetation Series Map and Explanatory Notes to sheet 5

Beeston, G.R., Hopkins, A.J.M. and Shepherd, D.P (2002) *Land Use and Vegetation in Western Australia.* Department of Agriculture, Western Australia, Resource Management Technical Report 250.

Bureau of Meteorology (2009) *Climate Statistics for Australian Locations*. http://www.bom.gov.au/climate/averages/tables/cw_004083_All.shtml Accessed 9th July 2009

CRC Weed Management (2008) *Buffel Grass (Cenchrus ciliaris) Weed Management Guide*. Managing Weeds for Biodiversity. http://www.weedscrc.org.au/documents/wmg_buffel%20grass.pdf

Accessed 3rd March 2009.

CSIRO (1967*) Atlas of Australian Soils. Explanatory Data for Sheet 6. Meekatharra – Hamersley Range Area.* In association with Melbourne University Press.

Department of Agriculture and Food Western Australia (2010) *Declared Plants List*. Publicly available list prepared by the Department of Agriculture and Food (Western Australia) www.agric.wa.gov.au

Department of Environment and Conservation (2010a) *Florabase*. The Flora of Western Australia Online (and collections housed at the WA Herbarium). www.florabase.calm.wa.gov.au

Department of Environment and Conservation (2010b) *Declared Rare and Priority Flora List*. Publicly available list prepared by the Department of Environment and Conservation, Western Australia.

Department of Environment and Conservation (2010c) *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities*. Publicly available list prepared by the Department of Environment and Conservation. Western Australia.

Department of Environment and Conservation (2001).*Conserving Threatened Ecological Communities.* Publicly available brochure prepared by the Department of Environment and Conservation in conjunction with National Heritage Trust.

Department of Environment, Water, Heritage and the Arts (2009a) *Interim Biogeographic Regionalisation for Australia*. Version 6.1 http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html Accessed 14th July 2009

Department of Environment, Water, Heritage and the Arts (2009b) *The Effects of Artificial Sources of Water on Rangeland Biodiversity*. Biodiversity. http://www.environment.gov.au/biodiversity/publications/technical/artificial-water/ch2.html Accessed 7 April 2009.

English, V. and Blyth (1997) *Identifying and Conserving Threatened Ecological Communities in the South West Botanical Province.* Final report (Project Number N702) to Environment Australia. Department of Environment and Conservation, Perth, W.A.

Environment Australia (2000) *Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and Development of Version 5.1 – Summary report.*

http://live.greeningaustralia.org.au/nativevegetation/pages/pdf/Authors%20E/4_Environment_Australia_2000.pdf Accessed 14th July 2009

Environmental Protection Authority (EPA) (2004). *Guidance for the Assessment of Environmental Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*. No. 51 Environmental Protection Authority, Perth, Western Australia.

Environmental Protection Authority (EPA)(QLD). (2002) *Significant Species Toolkit Sheet 2* .https://www.epa.qld.gov.au/register/p00736ac.pdf. Accessed 14th July 2009

(EPA) Environmental Protection Authority (2007) *State of the Environment Report: Western Australia 2007,* Department of Environment and Conservation Perth, Western Australia.

(EPA) Environmental Protection Authority (EPA)(2000) *Environmental Protection of Native Vegetation in Western Australia: Clearing of Native Vegetation, with Particular Reference to The Agricultural Area. Position Statement No. 2.* December 2000.

Hussey, B.M.J., Keighery, G.J., Dodd, J., Lloyd, S.G and Cousens, R.D. (2007) *Western Weeds. A Guide to the Weeds of Western Australia.* Second Edition. The Western Weed Society of Western Australia (Inc) 2007.

Karratha Visitors Centre (2009) Karratha and West Pilbara Coast Weather. http://www.pilbaracoast.com/en/About+the+West+Pilbara+Coast/Weather+and+climate/default.htm Accessed 13th July 2009

Keighery, B.J. (1994) *Bushland Plant Survey - A Guide to Plant Community Survey for the Community* Wildflower Society of WA (inc) Nedlands WA.

Kendrick, P. and McKenzie, N. (2001) *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Pilbara 1 (PIL1 – Chichester subregion)..* Collaboration between the Department of Conservation and Land Management and the Western Australian Museum.

Kendrick, P. and Stanley, F. (2001) *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Pilbara 4 (PIL4 – Roebourne synopsis).* Collaboration between the Department of Conservation and Land Management and the Western Australian Museum.

Mattiske, E., Personal Communication. Principal Ecologist at Mattiske Consulting Pty Ltd.

Mattiske Consulting Pty Ltd (2007) *Flora and Vegetation Survey of Cape Lambert Project Area*. Unpublished report prepared for Cape Lambert Iron Ore Ltd.

Mueller-Dombois, D. and Ellenberg, H. (1974) *Aims and Methods of Vegetation Ecology* John Wiley and Sons, New York, 547 pp.

National Weed Strategy (2009) *Weed Identification*. Weed identification online. http://www.weeds.org.au/cgi-bin/weedident.cgi?tpl=region.tpl&state=wa&region=pil Accessed 7 January 2010.

Pryde, J., Personal Communication. Senior Ecologist. Species and Communities Branch. Department of Environment and Conservation.

Shire of Roebourne (2006) *Shire of Roebourne* – About us.

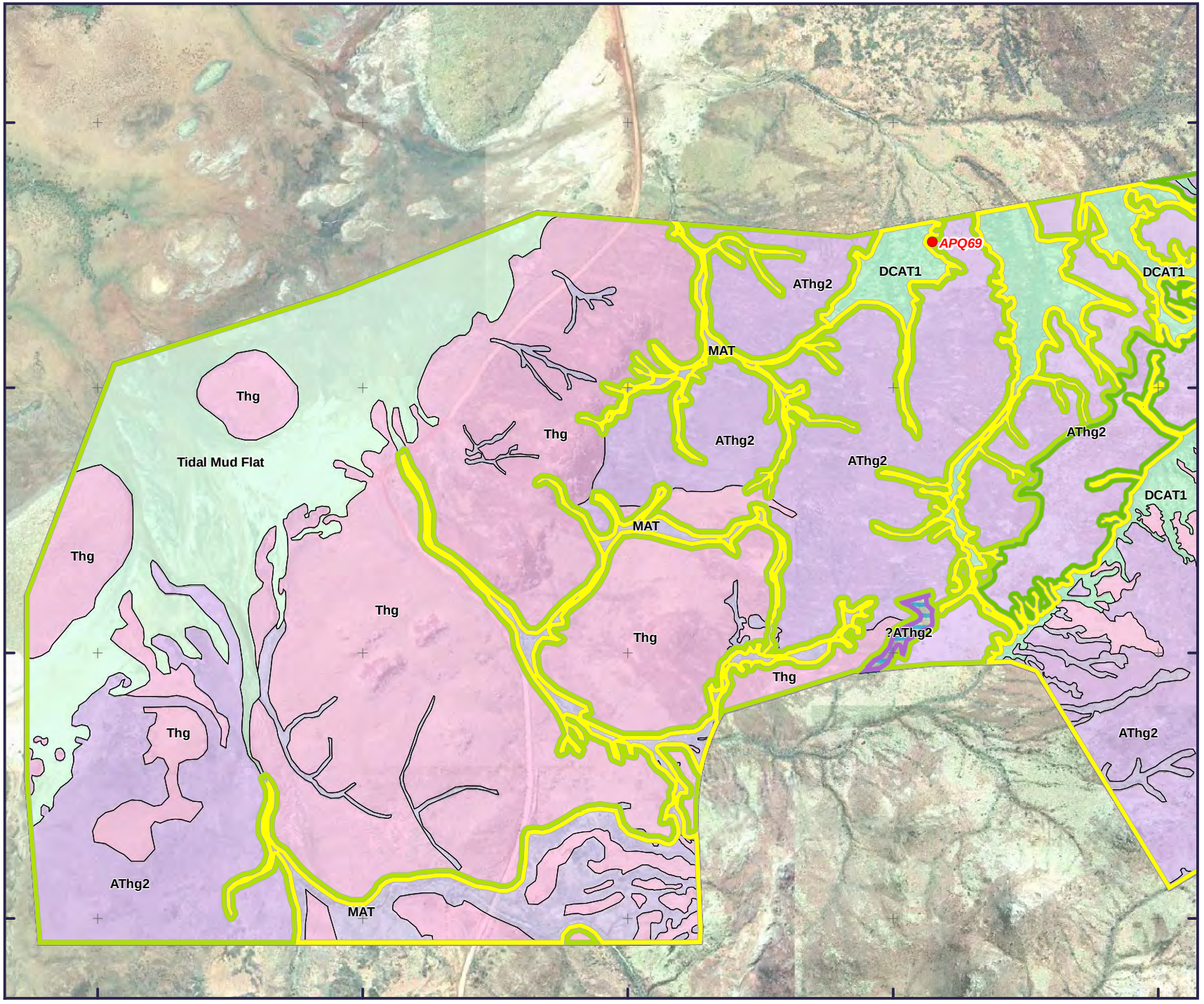
http://www.roebourne.wa.gov.au/aboutus/aboutus.htm Accessed 13th July 2009

Smith, M., Personal Communication. Senior Botanist . Species and Communities Branch. Department of Environment and Conservation.

Steven Van Leeuwen, pers. comm. Biogeography Program Leader and Partnerships Manager Woodvale Research Centre, Science Division, Department of Environment and Conservation

Trudgen, M., Personal communication. Taxonomist Specialist for the Pilbara.

Van Vreeswyk, A., Payne, A., Leighton, K. and Hennig, P. (2004). *An inventory and condition survey of the Pilbara region*, *Western Australia*. *Technical Bulletin No. 92.* Western Australian Department of Agriculture.



Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.1

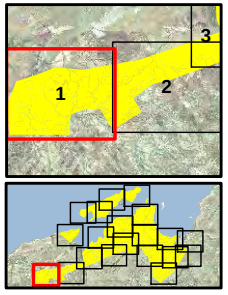
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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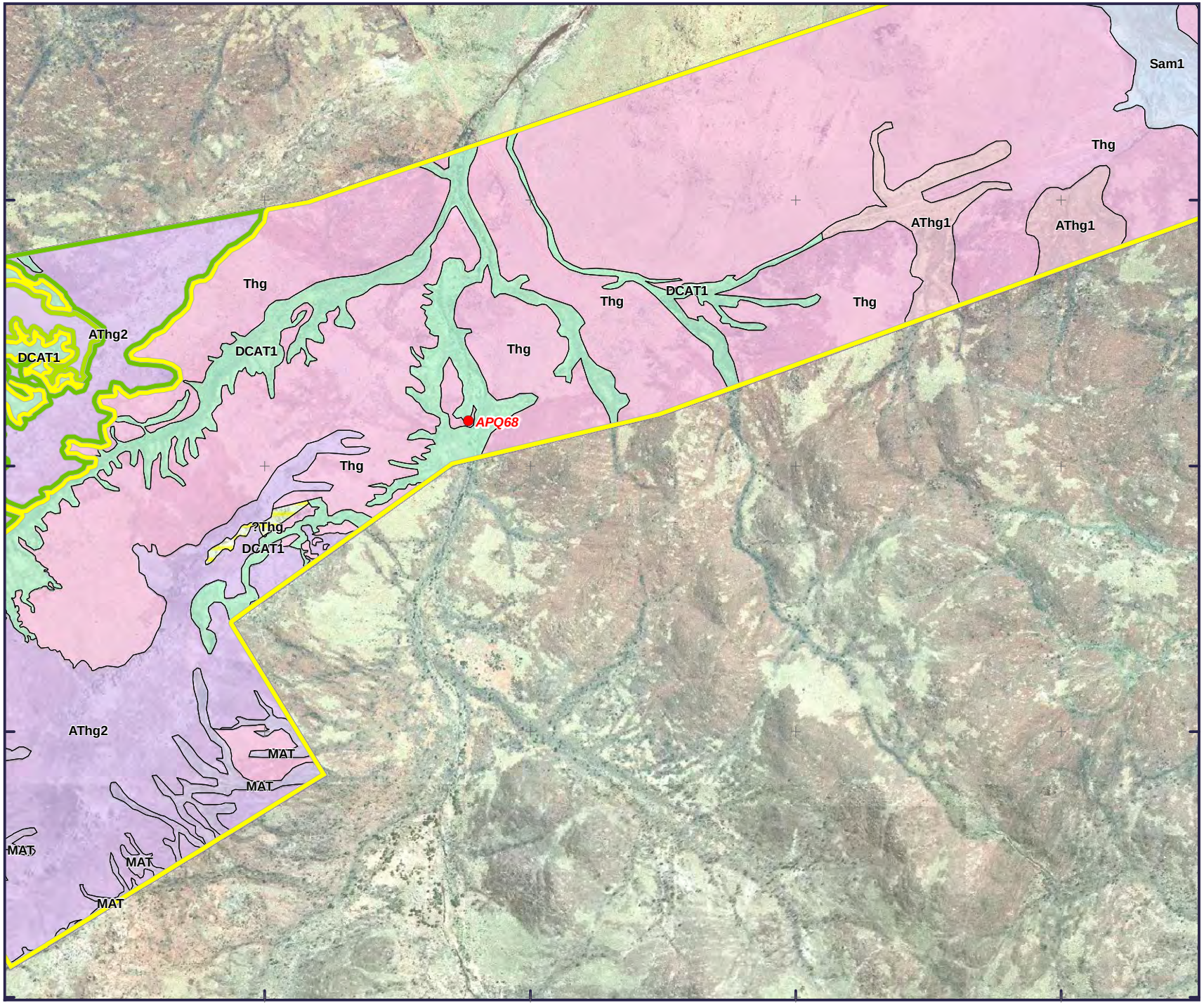

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.2

0 100 200 300

Metres

1:10,000

Condition

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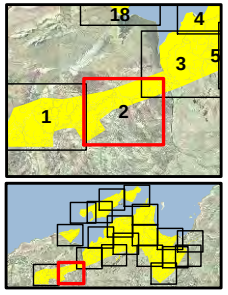
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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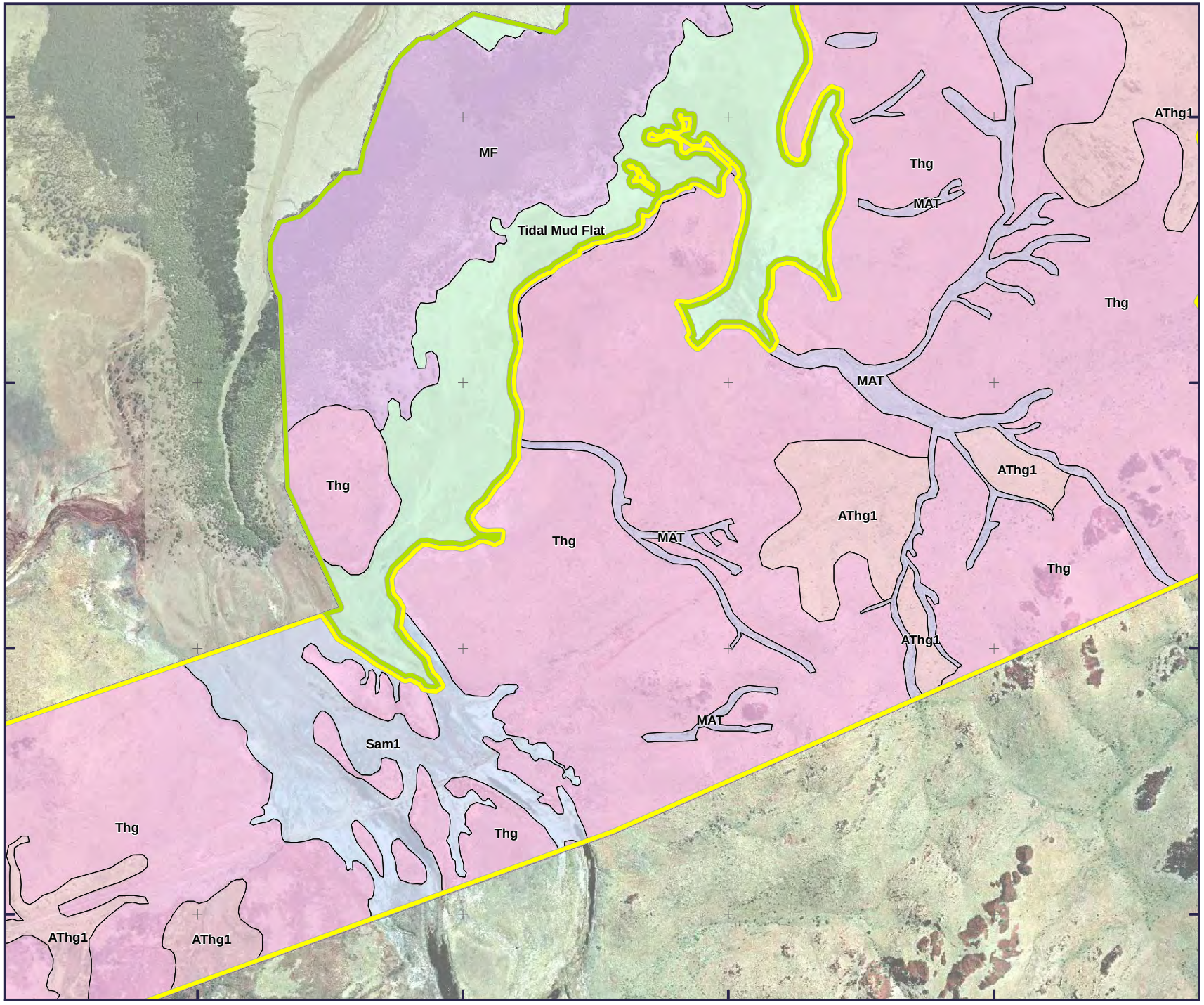

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.3

0 100 200 300

Metres

1:10,000

Condition

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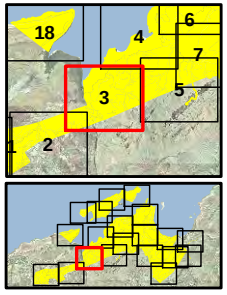
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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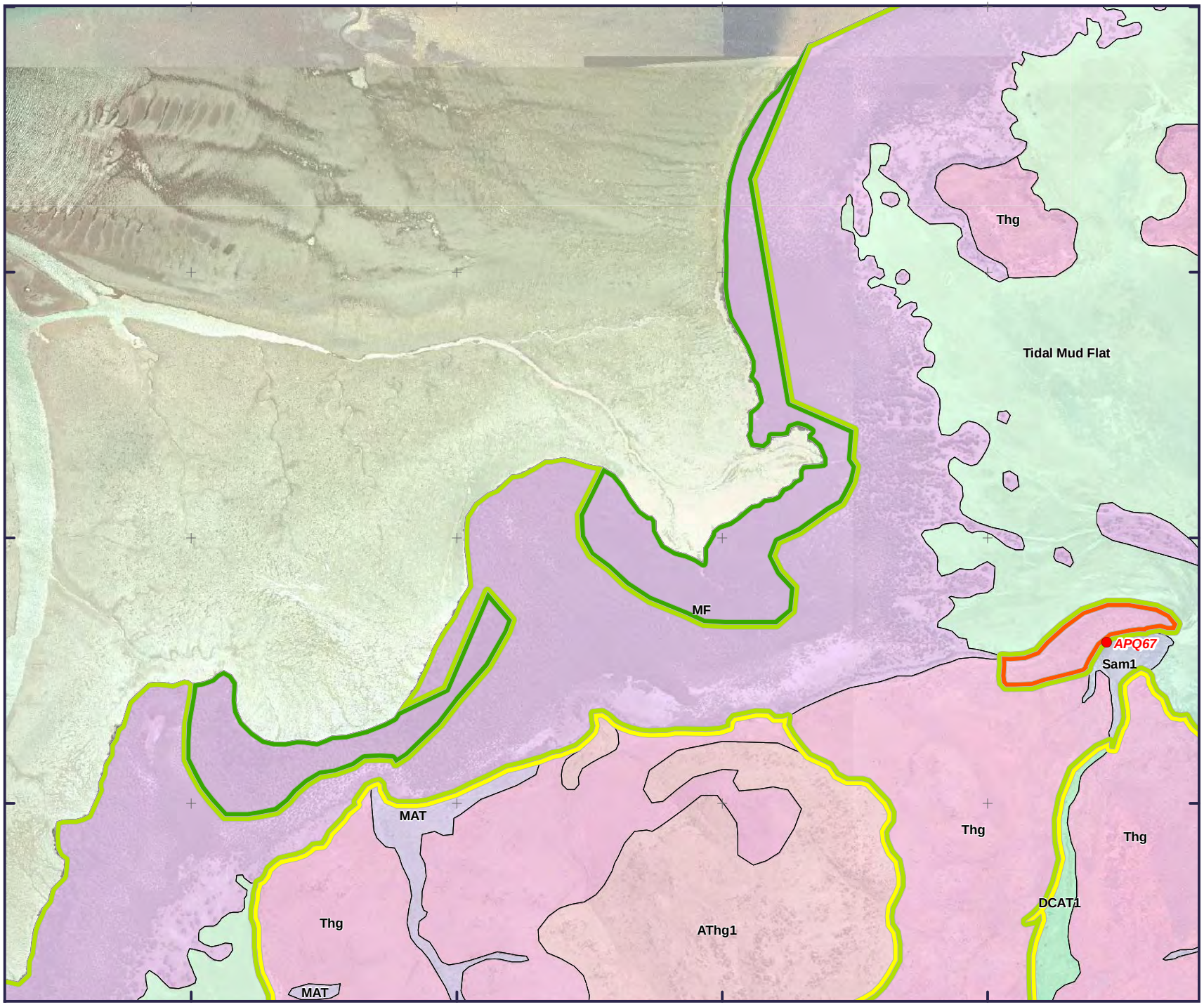

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.4

0 100 200 300

Metres

1:10,000

Condition

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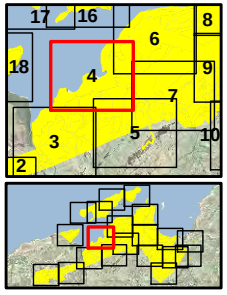
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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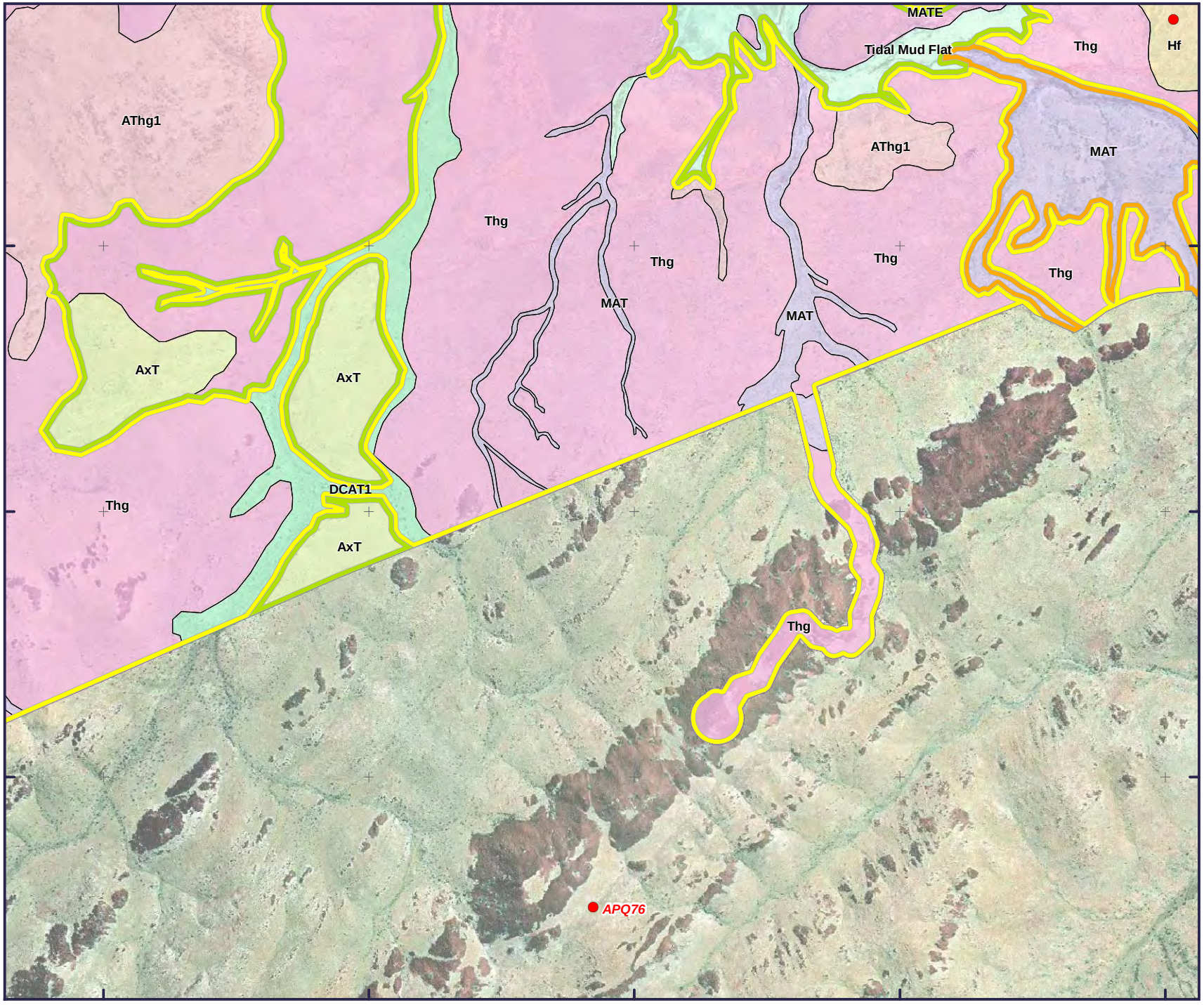

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.5

0 100 200 300

Metres

1:10,000

Condition

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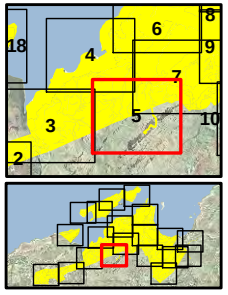
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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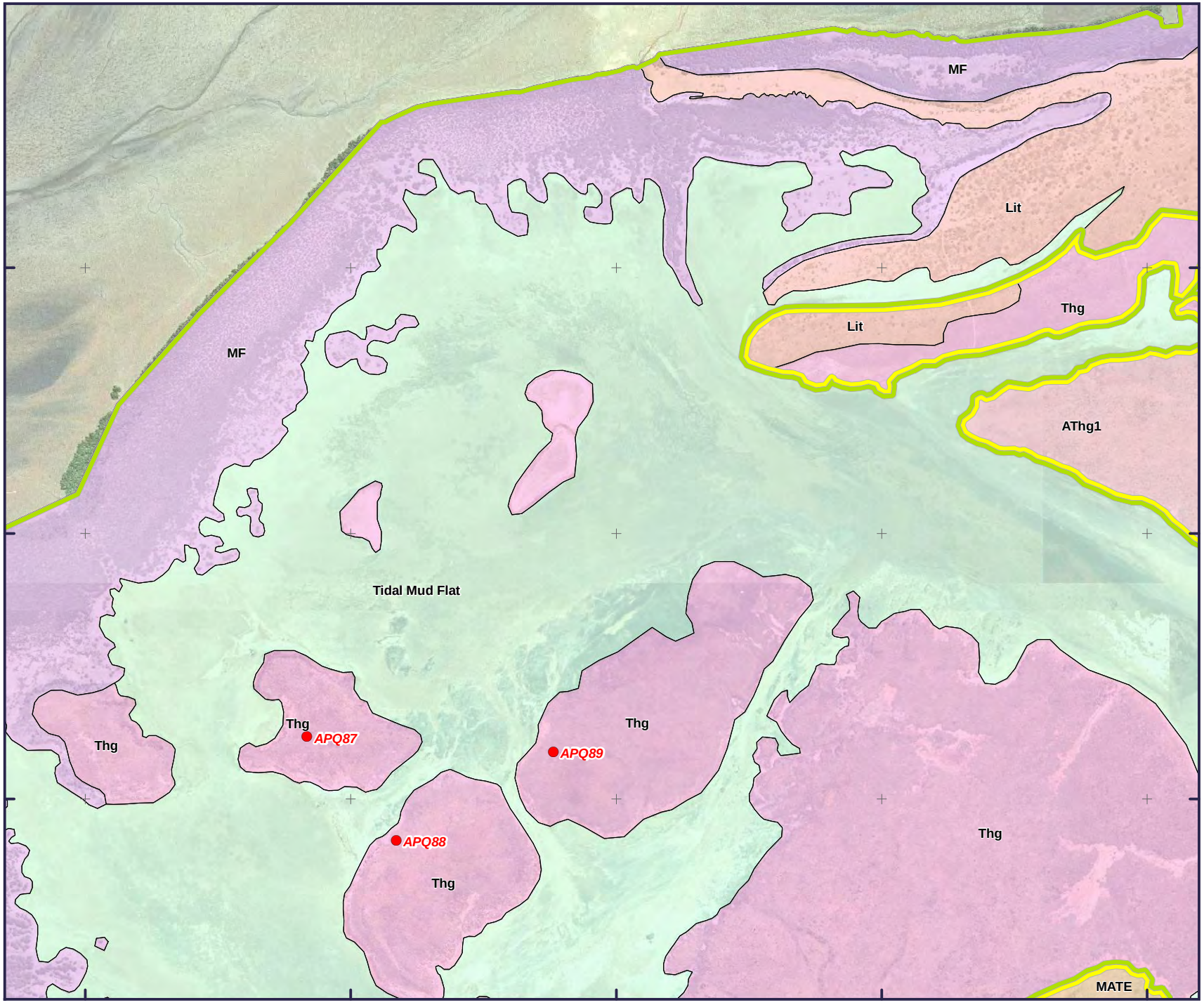

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.6

0 100 200 300

Metres

1:10,000

Condition

- CD
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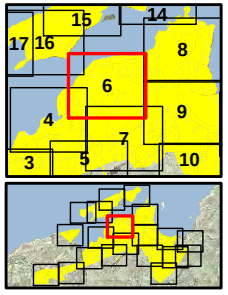
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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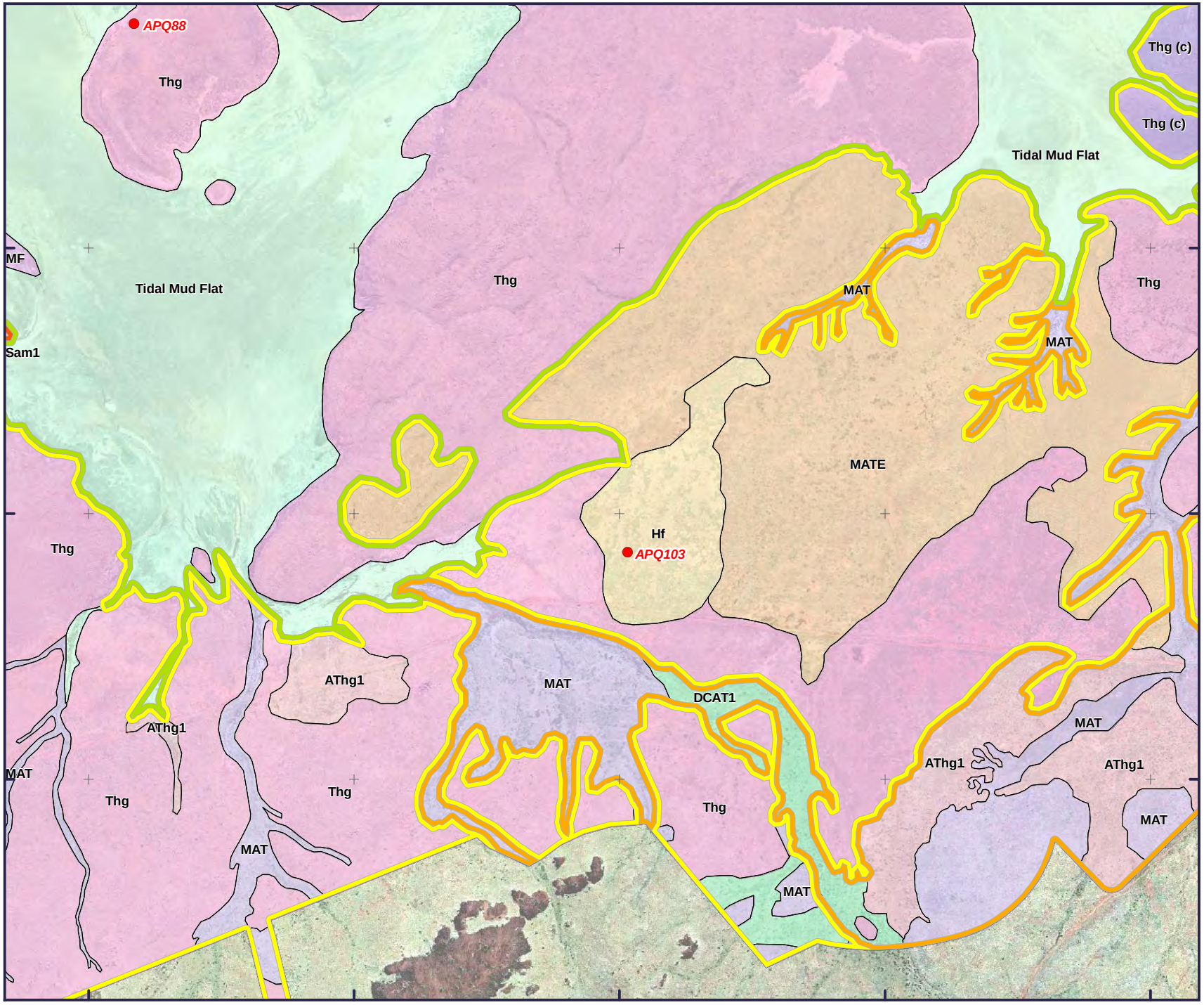


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.7

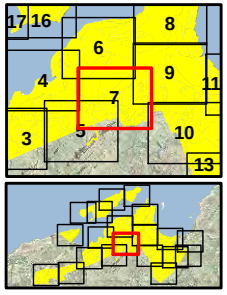
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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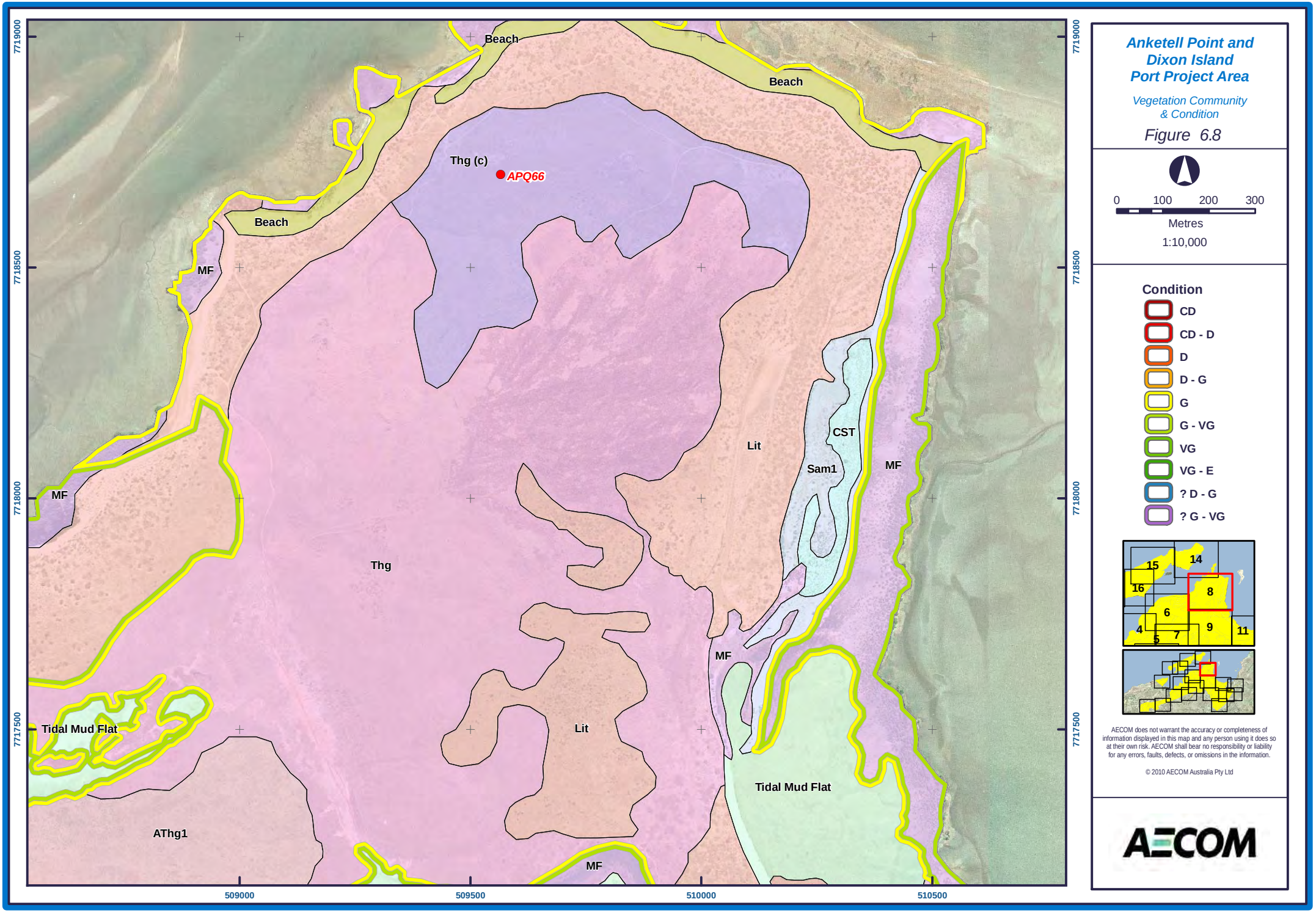

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.8

0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG

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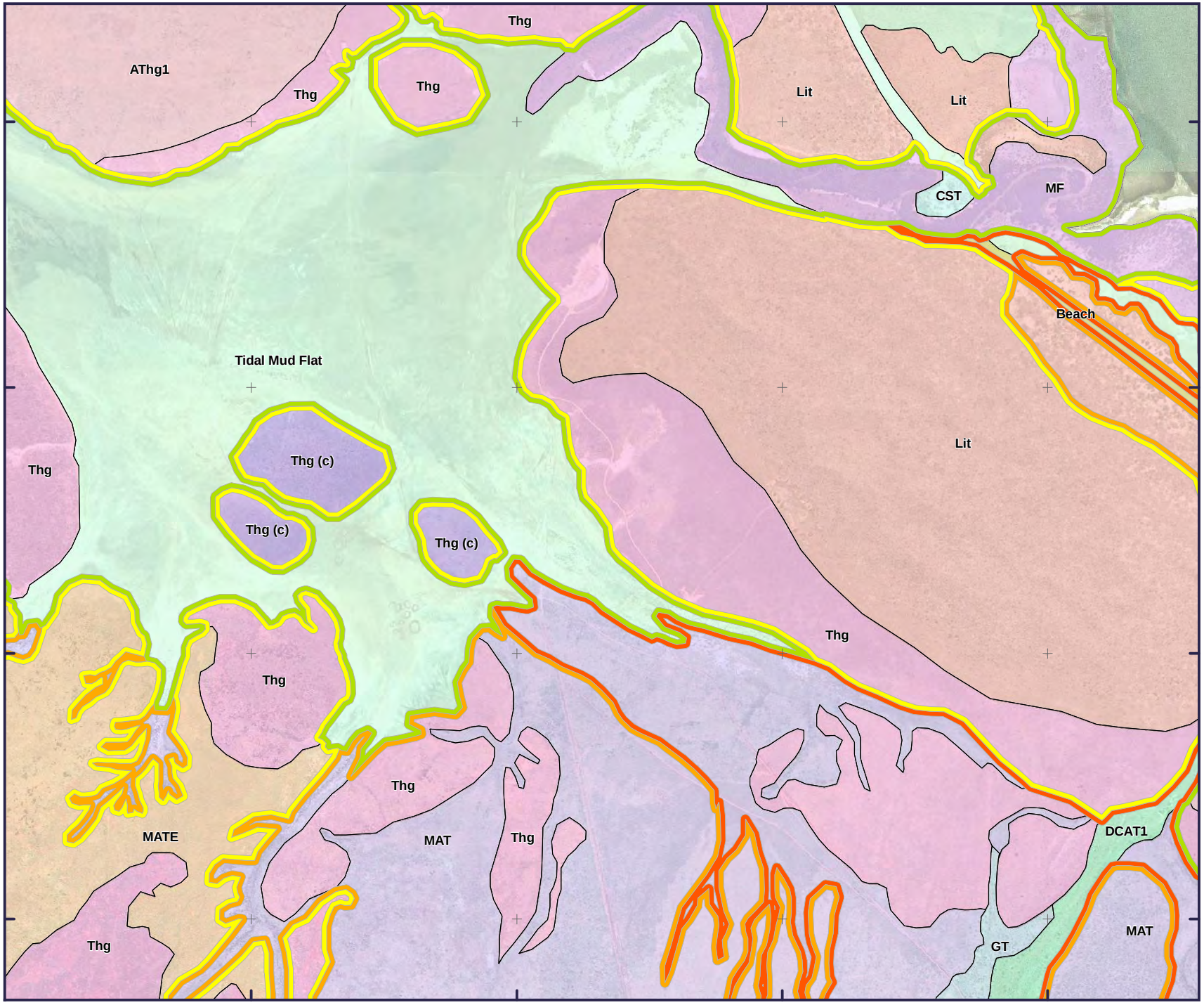


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.9

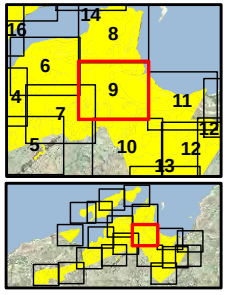
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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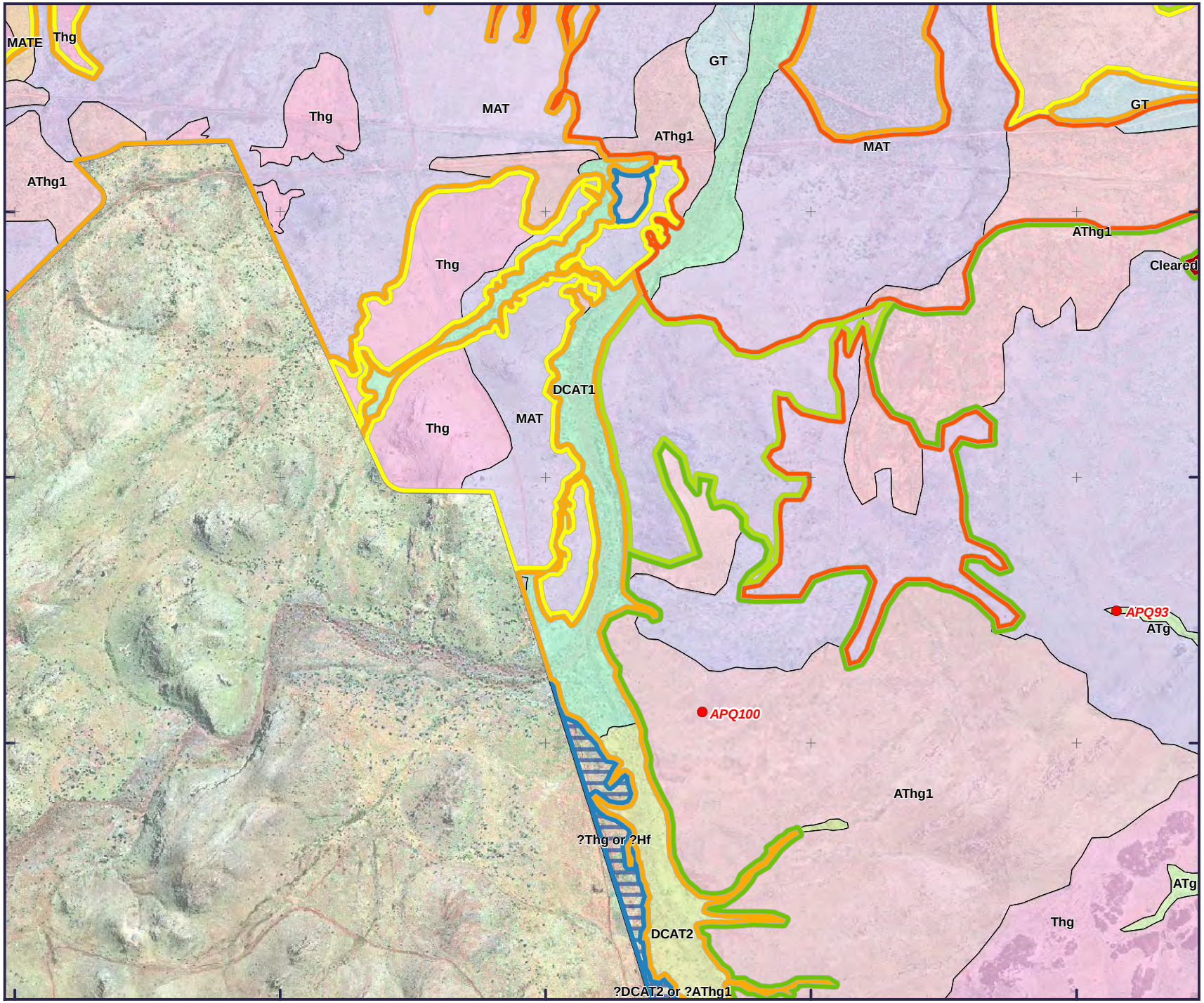

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.10

0 100 200 300

Metres

1:10,000

Condition

- CD
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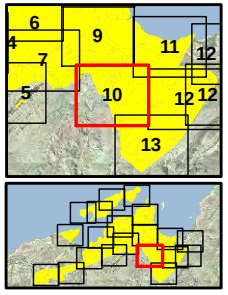
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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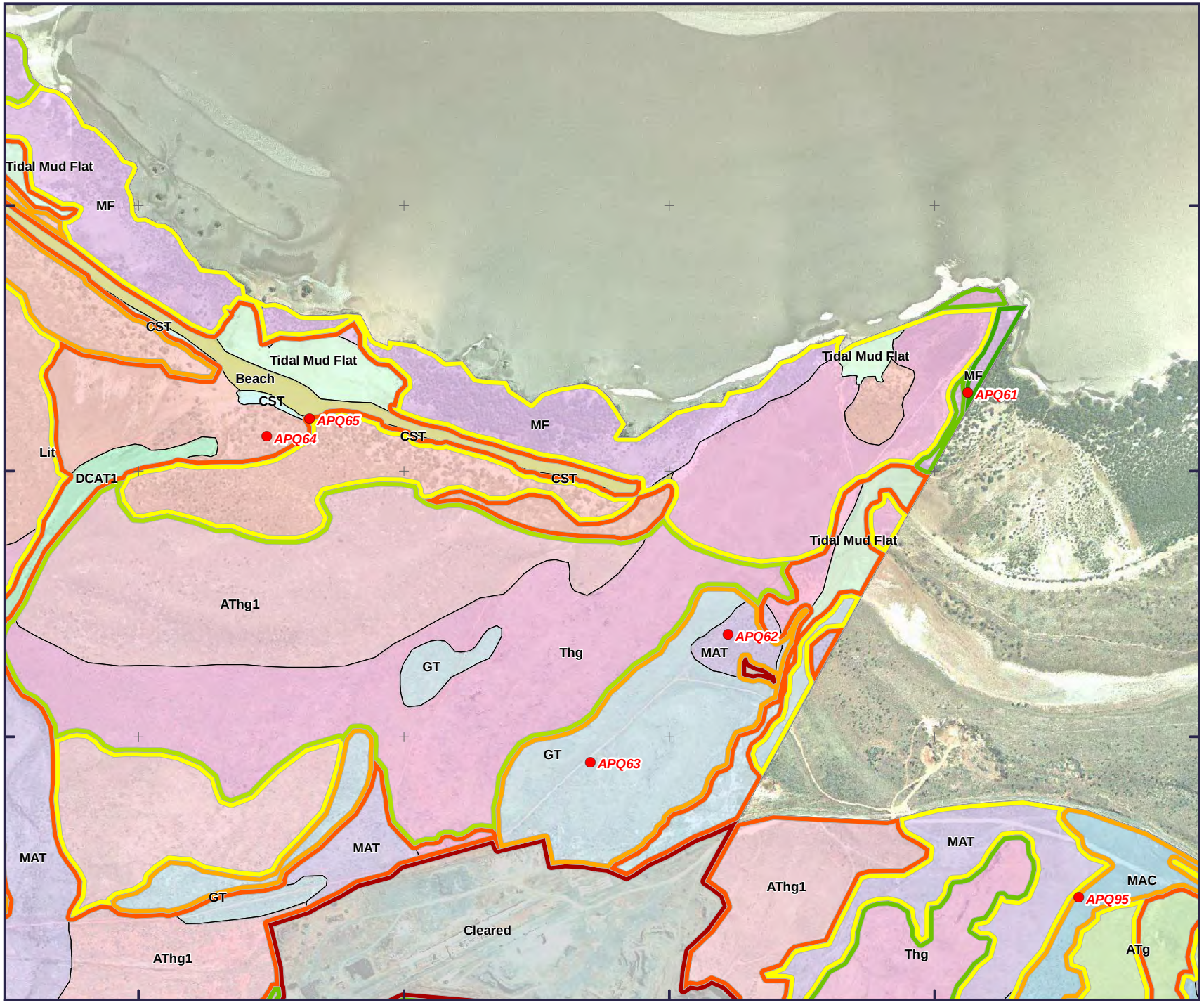


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.11

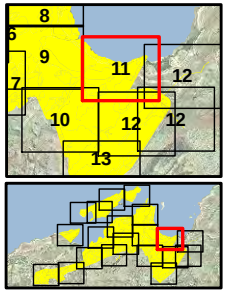
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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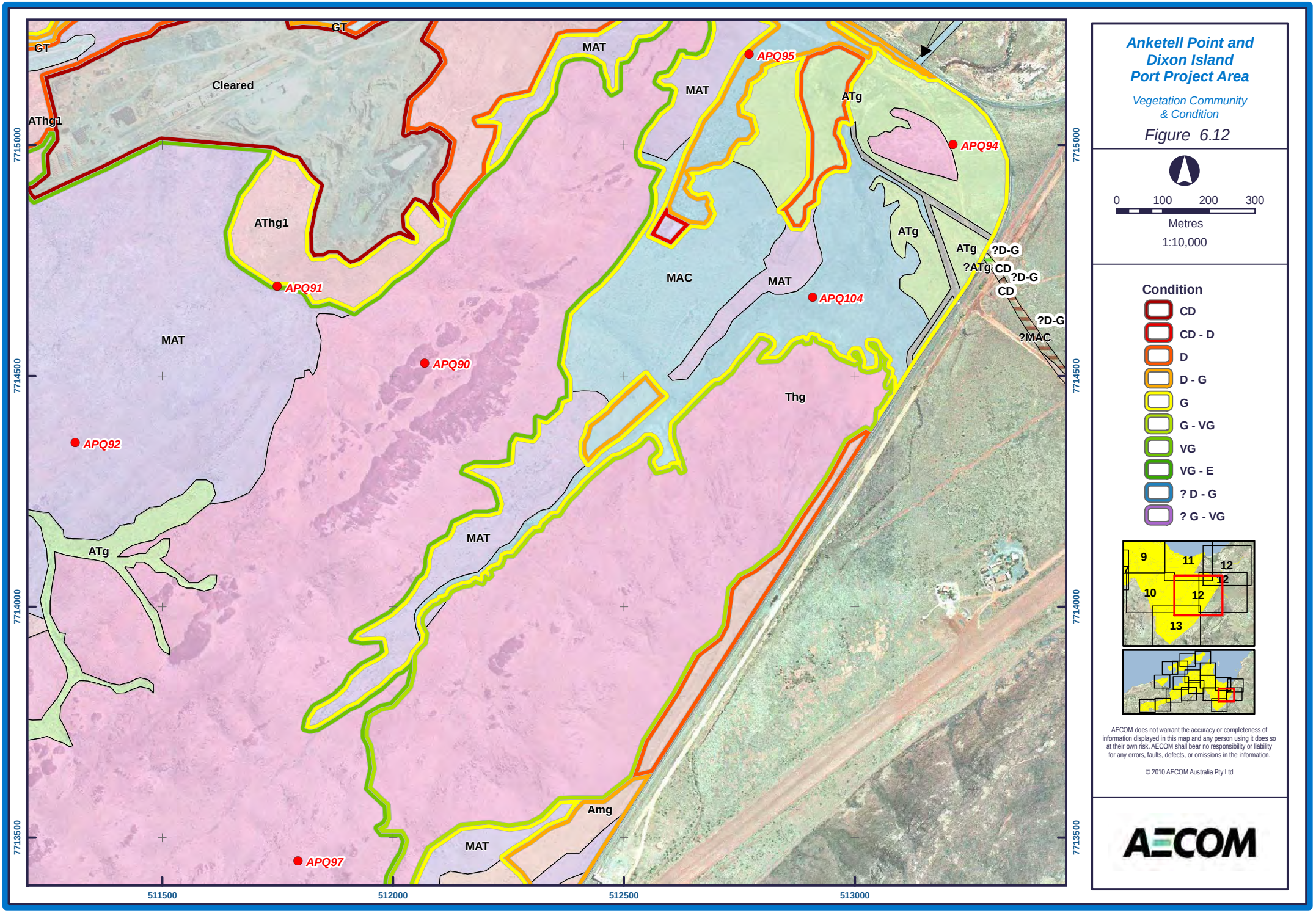

Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.12

0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG

AECOM

Date Modified: 5/07/2010

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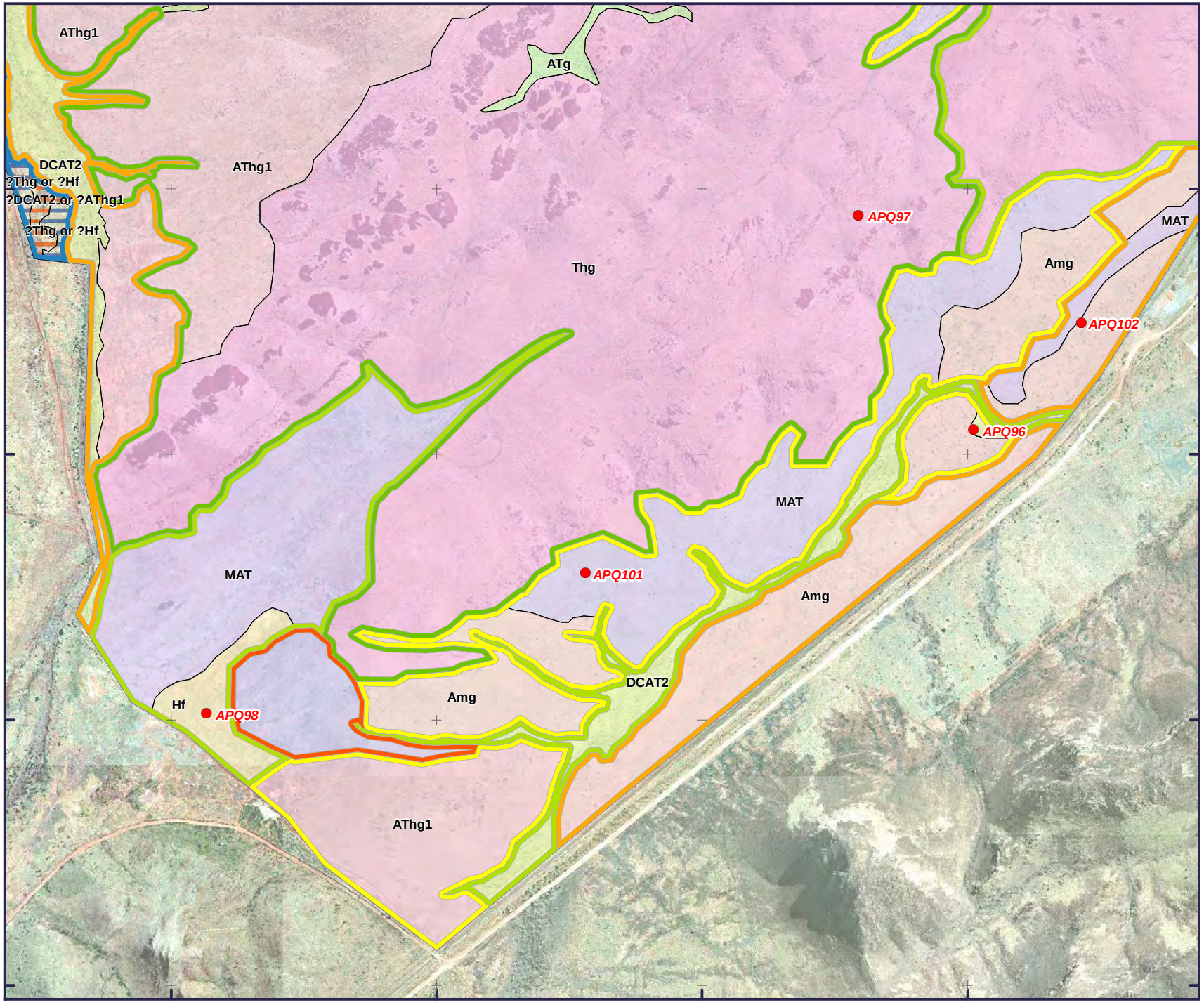


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.13

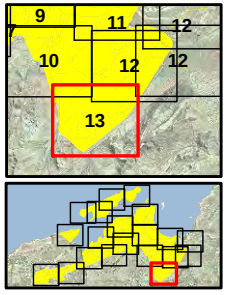
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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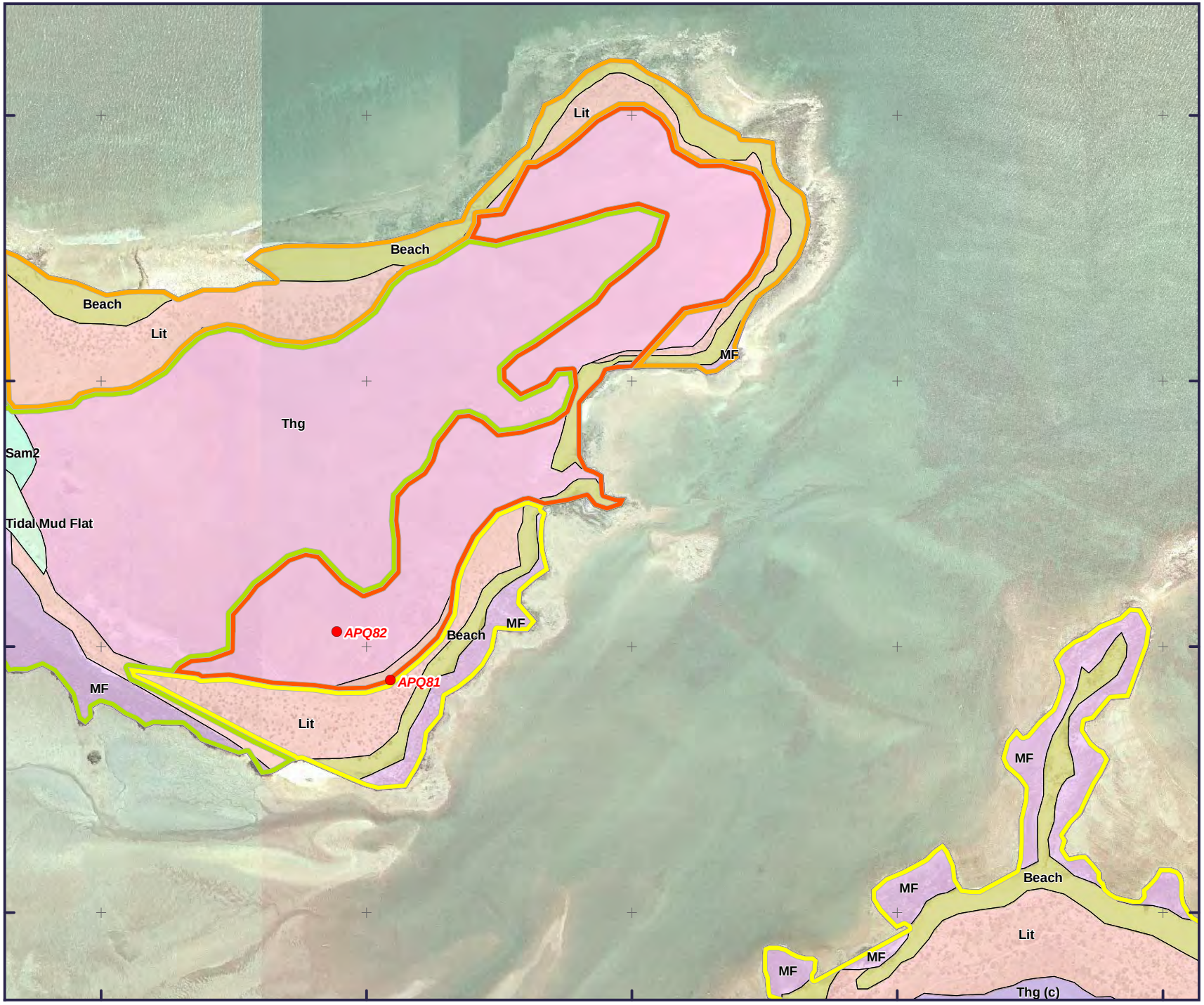


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.14

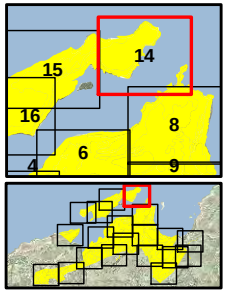
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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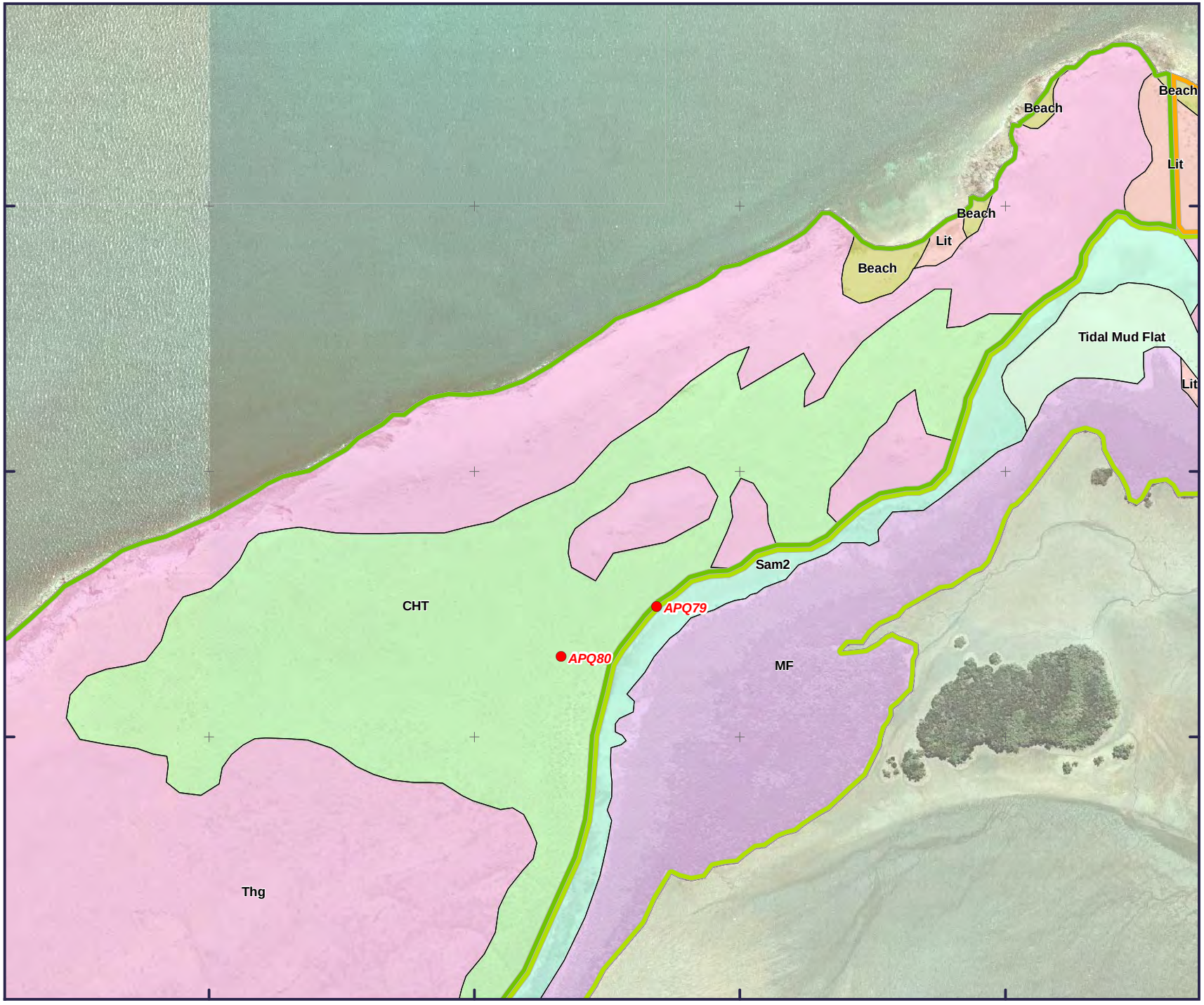


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.15

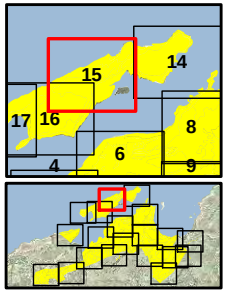
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.16

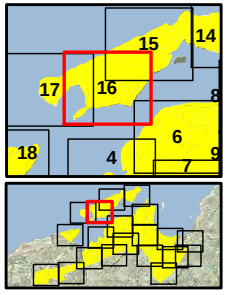
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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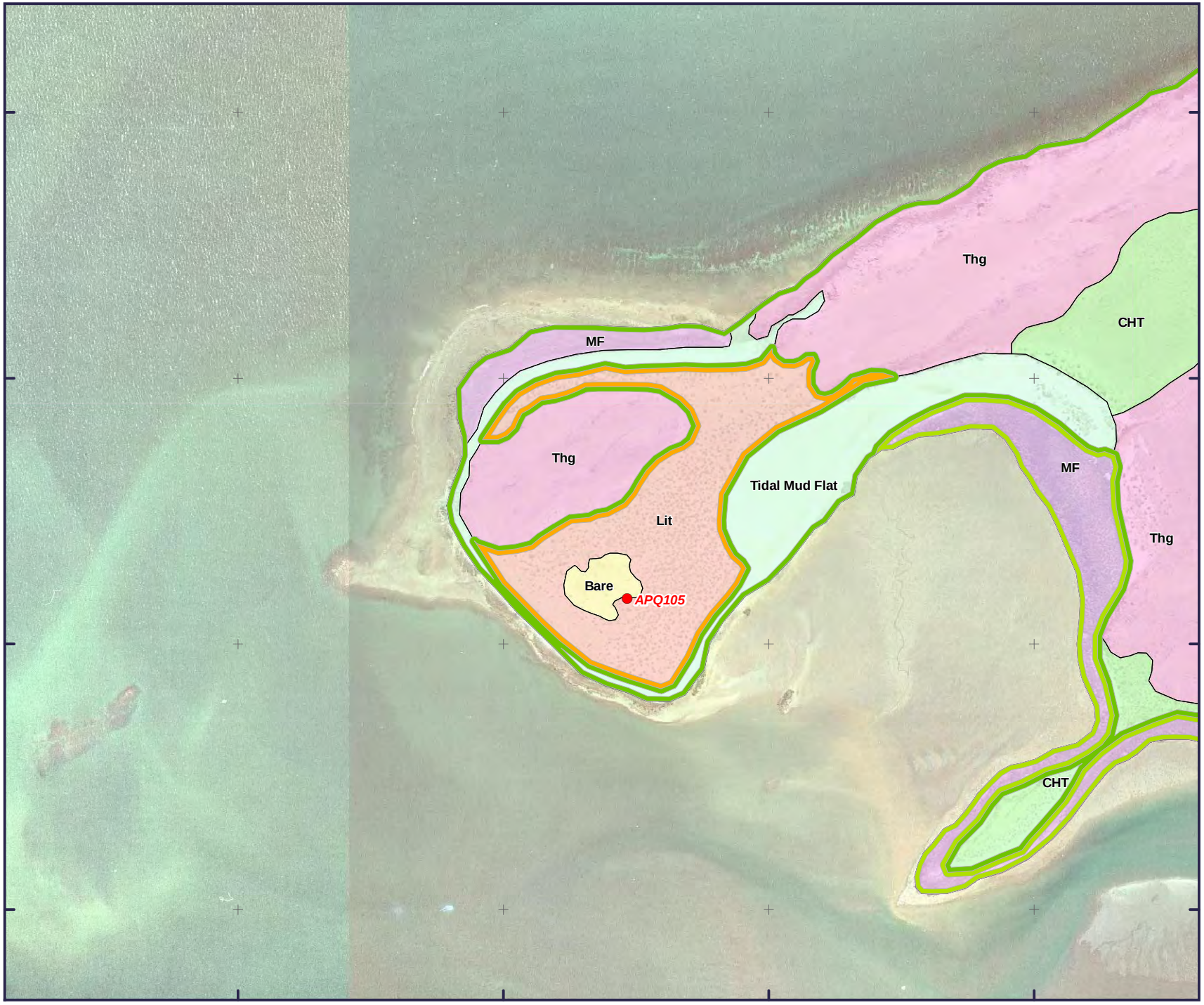


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.17

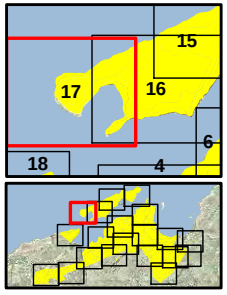
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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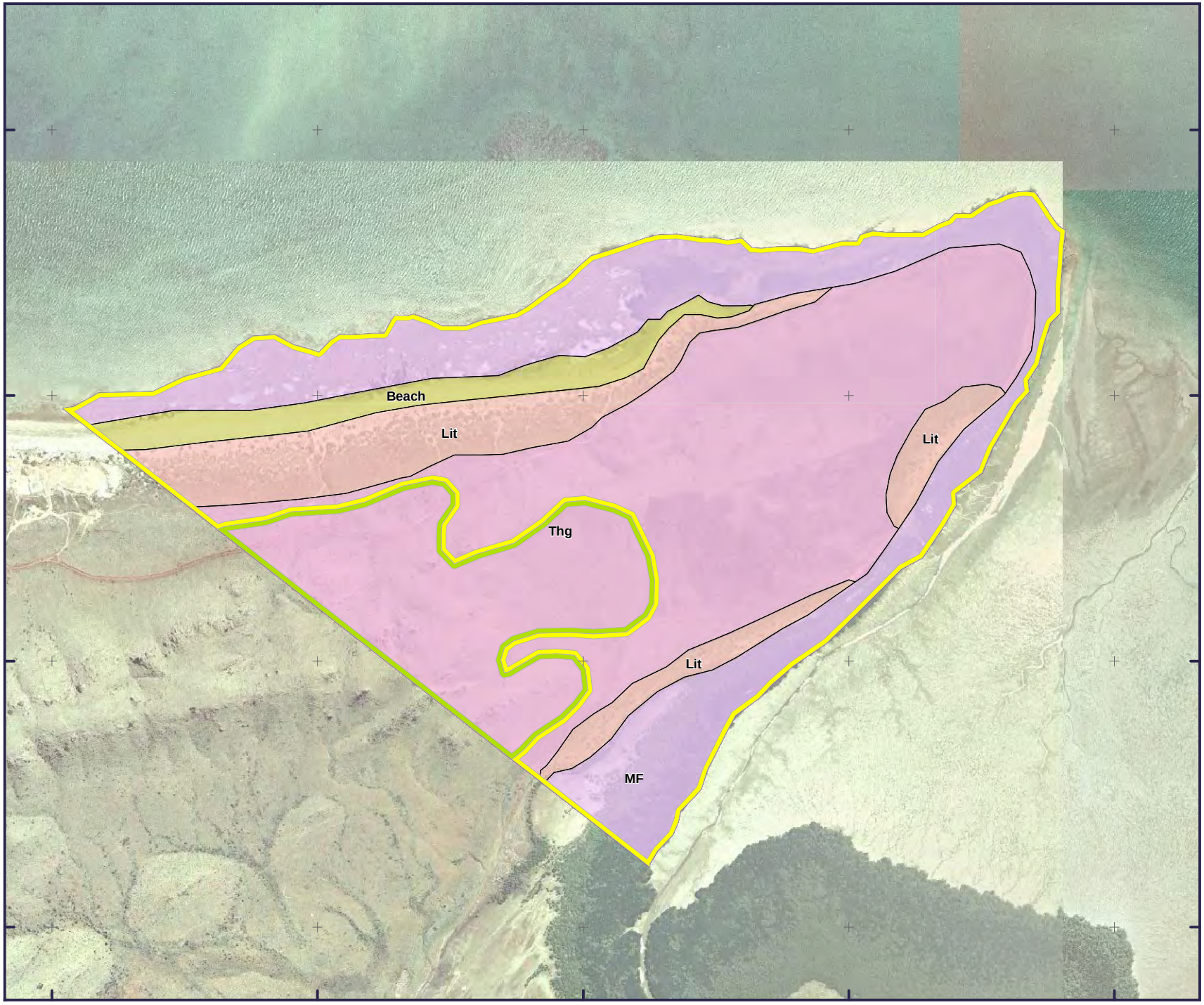


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.18

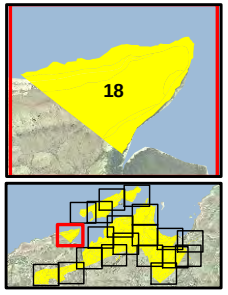
0 100 200 300

Metres

1:10,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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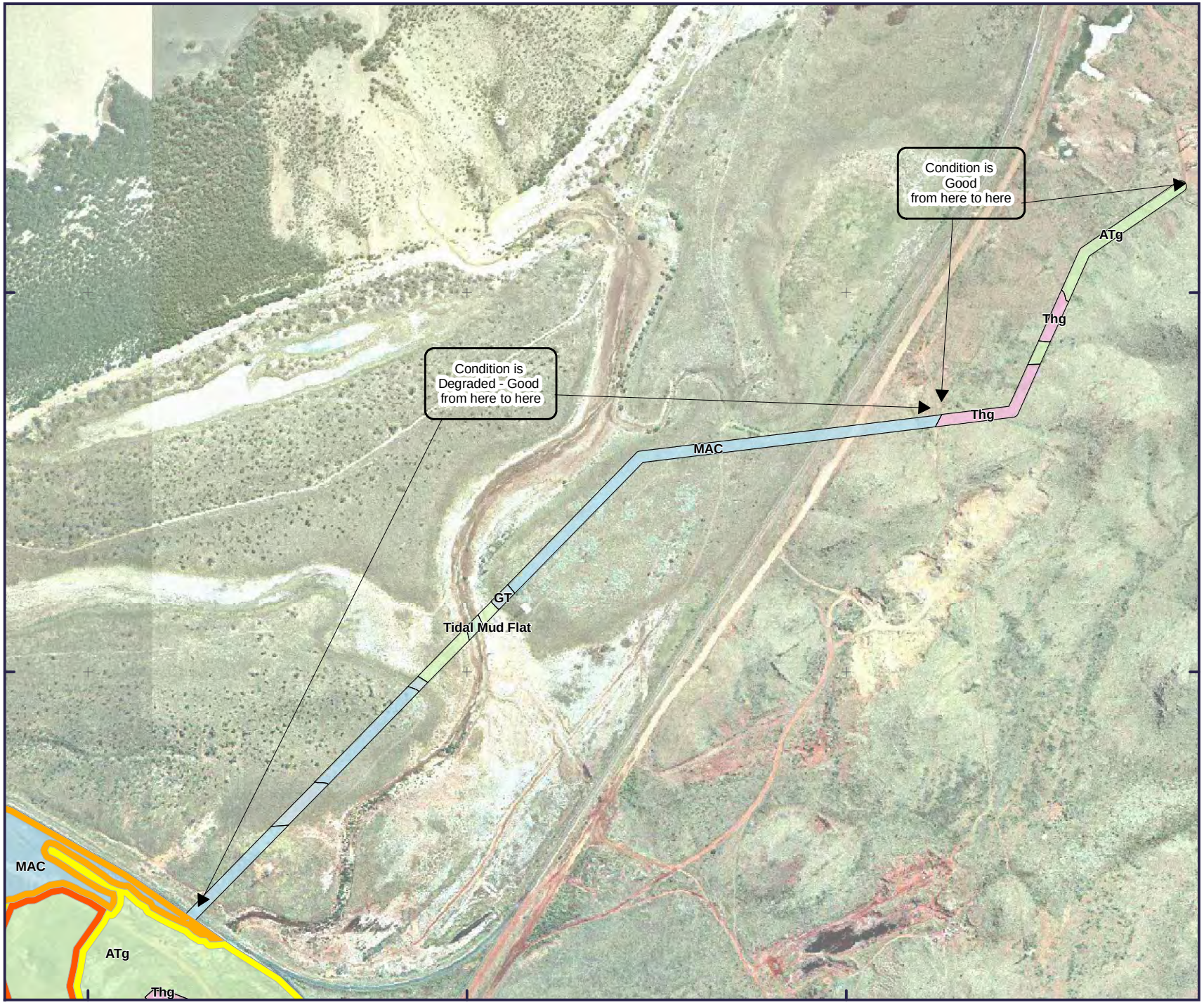


Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.12

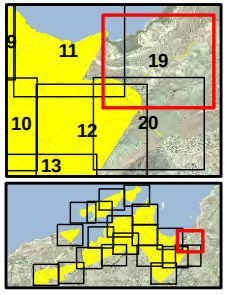
0 50 100 150 200

Metres

1:7,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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Anketell Point and Dixon Island Port Project Area

Vegetation Community & Condition

Figure 6.20

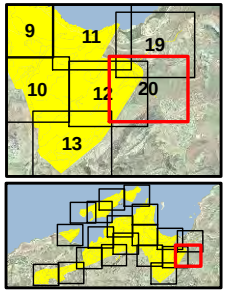
0 50 100 150

Metres

1:4,000

Condition

- CD
- CD - D
- D
- D - G
- G
- G - VG
- VG
- VG - E
- ? D - G
- ? G - VG



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Appendix A

Astron (2010) statistical analysis report

West Pilbara Iron Ore Project
Proposed Anketell Point Port Area
Vegetation Survey Data Analysis

April 2010

Prepared for
API Management Pty Ltd

Astron Environmental Services
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Report Reference: 12012-10SRV1Rev0_100720

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Revision Status

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Report Reference: 12012-10SRV1Rev0_100720

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Referencing	Harvard

Checking Status	
Text	IR
Figures	IR
Tabulations	IR
Calculations	NR
Statistics	NR

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Executive Summary

Australian Premium Iron Management Pty Ltd (API) proposes to develop the West Pilbara Iron Ore Project (WPIOP), an iron ore mining and export operation based on a number of resources located on the western fringe of the Hamersley Ranges, south of Pannawonica, in the Pilbara region of Western Australia. The project involves the development of a series of open cut mines, a transport corridor and port facilities at Anketell Point, near Dixon Island.

Flora and vegetation surveys of the Anketell Point and Dixon Island Port Project Area and Transport Corridor were undertaken by AECOM (2009, 2010). The purpose of this numerical analysis was to identify vegetation communities from the botanical survey data of the Port Area. This follows the recommendations for Level 2 surveys outlined within Guidance Statement 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004). The following procedures were used: Analysis of Similarity (ANOSIM), classification analysis, and ordination analysis.

Differences in vegetation between the Port Area and the Transport Corridor (ANOSIM)

Within the whole Study Area dataset there is a significant difference between quadrats surveyed in the Port Area compared to quadrats surveyed within the Transport Corridor (Global R = 0.398, $p<0.001$). This confirms significant differences in the species occurrences, and also supports a closer examination of each part of the data set, Port Area and Transport Corridor, separately.

Classification Analysis

Classification analysis reflected this difference between the Port Area and the Transport Corridor. Only one Port Area sample (APQ98) was clustered within a Transport Corridor community. This was because of the occurrence of the dominant tussock grass *Eragrostis xerophila* in the quadrat samples within this numerical community.

The Number of Numerical Vegetation Communities in the Study Area data set (SIMPROF)

Twelve significant groups of quadrats that represent vegetation communities were identified within the data from the Study Area (Sample statistic Pi = 4.304, $p<0.001$). However, these 12 significant groupings based on the numerical analysis of the Study Area are far less than the 26 individual vegetation communities applied as codes used in the mapping and conservation assessment in both AECOM reports (AECOM 2009 and 2010). It indicates that a precautionary or conservative approach was applied during the field survey to delineate individual vegetation communities. The numerical analysis supports the communities being amalgamated. The implication for the Environmental Impact Assessment is that the mapping used to define vegetation communities is very unlikely to have grouped vegetation communities that may be of environmental significance. A cautious approach has been adopted.

Ordination Analysis and ANOSIM Tests of Field Defined Vegetation Communities for the Study Area

This cautious approach to field mapping is confirmed by the ANOSIM test of the groupings based on the 'field defined' vegetation communities. Botanists use field descriptions of vegetation communities coupled with aerial photography to undertake vegetation mapping. In addition, botanists will apply a vegetation code based on their field descriptions of vegetation communities to each individual survey quadrat. The purpose of this final ANOSIM test was to determine if these field descriptions of vegetation communities are significantly associated with the actual quadrat data, and examine if strong overlap between the vegetation codes exists. This test indicates that significant associations between the field defined vegetation communities and the quadrat data occur (Global R = 0.563, $p<0.001$). However, in a "pairwise test" of significant differences between each individual vegetation code, several vegetation codes are not significantly different. Several vegetation communities appear to have been split without support from numerical analyses. The 'closeness' of each of these codes is displayed as an ordination plot within this Letter Report. The implication for the EIA undertaken is that a cautious approach has been used in defining individual vegetation communities, and based on the numerical analysis, inappropriate 'lumping' of vegetation communities has not occurred.

Examination of Port Area Vegetation Communities

Within the Port Area, numerical analysis confirmed three 'numerical' vegetation communities and three single quadrat outliers. The outliers were:

- Quadrat APQ97 – a community described as Closed Hummock Grassland of *Triodia wiseana* on hillslopes and ridgetops. The dominance of *T. wiseana* (70%) with 24 associated species having a cover of less than 1% was the driver for this quadrat being classified as an outlier. However, other *T. wiseana* dominated quadrats are still relatively close to this sample in ordination.
- Quadrat APQ61 – Mangroves of *Avicennia marina* spp. *marina* on brown tidal clay. This was the only mangrove survey quadrat in the data set.
- Quadrat APQ65 – Scattered *Spinifex longifolius* over **Aerva javenica* on pale brown sands on shoreline. This was the only shoreline survey quadrat in the data set.

These outliers do not represent unusual communities, and are an artefact of limited sampling within them.

The three numerical communities are identified as those 'quadrat groups' significantly associated with each other. Each of the three groups contains more than one field-defined vegetation community. The three numerical communities are:

- *Triodia wiseana* dominated (defined as Vegetation Community **Thg** in vegetation mapping);
- *Triodia* dominated communities with or without *Acacia* species (defined as **DCAT2**, **Thg**, **Atg**, **GT, AThg2**, **MAT, DCAT1** and **AThg1** in vegetation mapping)
- Tall *Acacia* shrublands with *Triodia* (defined as **MAT**, **Lit**, **MAC**, **Thg**(c) and **CHT** in vegetation mapping).

Table of Contents

List of Figures

List of Appendices

1 Introduction

1.1 Project Background

Australian Premium Iron Management Pty Ltd (API) proposes to develop the West Pilbara Iron Ore Project (WPIOP), an iron ore mining and export operation based on a number of resources located on the western fringe of the Hamersley Ranges, south of Pannawonica, in the Pilbara region of Western Australia. The project involves the development of a series of open cut mines, a transport corridor and port facilities at Anketell Point, near Dixon Island.

Flora and vegetation surveys of the Anketell Point and Dixon Island Port Area (including a section of Transport Corridor) were undertaken by AECOM (2010). Multivariate statistical analysis (also referred to as numerical analysis) of the botanical quadrat survey data is needed to fulfil the requirements of a Level 2 comprehensive flora and vegetation survey in accordance with EPA Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004).

1.2 Study Background

API commissioned Astron Environmental Services (Astron) to conduct a numerical analysis to explore patterns in vegetation communities within the areas surveyed by AECOM for the WPIOP Port Area and Transport Corridor near Anketell Point, and to test if quadrat vegetation survey data supported further splitting of mapped vegetation communities. The latter would have implications for the assessment of conservation significance of the vegetation communities used in vegetation mapping for the WPIOP.

Botanical survey data for this analysis was obtained from the AECOM (2010) report. The data are for the Port Area and the Transport Corridor; both within the zone defined by AECOM (2010) as the *Anketell Point and Dixon Island Port Project Area* (see Figure 1 AECOM 2010). Within the current report the *Anketell Point and Dixon Island Port Project Area* is herein referred to as the Study Area.

Additional information regarding environmental variables for each quadrat surveyed was provided by API (M. Carey Pers. Comm.) The botanical survey data obtained from AECOM (2010) was Percentage Foliar Cover of each species recorded within permanently marked 50 m x 50 m quadrats (AECOM 2010). The environmental and location information provided was:

- Location of the quadrats within the Port Area or the Transport Corridor;
- Vegetation Communities defined by field botanists; and
- Vegetation Condition.

The stages of this analysis were:

- Multivariate analysis of the whole data set to allow interpretation of results in a wider context than the Port Area;
- Tests of differences in vegetation between Port Area and Transport Corridor ; and

- Interpretation of the vegetation communities derived by the field botanists.

2 Methods

Data analyses exploring vegetation communities used in mapping and Environmental Impact Assessment were undertaken using multivariate techniques. Environmental data often fails the basic assumptions required for standard statistical tests (Anderson and Thompson 2004). These are the requirement for the data to be normally distributed and for variance between sample populations to be the same. In addition, ecological data often measures the response of multiple species; in this case multiple plant species. The data are multivariate and therefore requires 'non-parametric' multivariate analyses. This is the approach used in the current Report.

2.1 Data Pre-Treatment

Data transformations in multivariate analyses allow a better interpretation of differences in communities due to changes in the occurrence (presence/absence) or dominance of plant species between each quadrat (Clarke and Green 1988). In this current Study fourth-root transformations were used following the recommendations of Clarke and Green (1988).

2.2 Classification

The purpose of classification is to produce a figure called a dendogram that allows patterns in the data to be identified. In their simplest form, dendograms are a visual aid and they allow obvious groups of quadrats to be identified. On their own they are not a test of the groups.

Test for significant groups of survey quadrats uses a technique called Similarity Profile Analysis (SIMPROF). The test indicates if groups of quadrats are significantly associated. This is determined by a 'p-value', which for significant groups using this technique should be less than 0.01 (Clarke and Gorley 2006). In the dendograms provided in this report, a vertical black line that splits to red indicates a numerical community or group of similar quadrats. These groups have been tested by SIMPROF. A solid black line linking to a single quadrat indicates an outlier in the data set. The outlier may result because of low sampling effort for this community, or because it is a very unusual vegetation community that only has a single sample.

2.3 Ordination

The purpose of ordination is to show the relationship between individual quadrats rather than the groupings of individual quadrats, which is the outcome of classification. The output of an ordination analysis is called an ordination plot, which is similar to a scatter plot. The intention of undertaking an ordination analysis in this analysis is to show 'relatedness' between quadrats. Points close to each other are quite similar, while those further away are less similar. On its own, ordination is not a test of significance of a grouping, or difference. This requires a specific test called Analysis of Similarity (ANOSIM). Ordination plots should be viewed along with this test of significance to help interpretation of the pattern seen.

The purpose of undertaking an ANOSIM is to test for the significance of groupings of quadrats based on identified categories (*a priori* factors in the data). In this current Study, one-way ANOSIM was used to test the hypothesis that the *a priori* vegetation community groupings determined by the field botanists are reflected in the data. The purpose is to check that the numerical information does not suggest that vegetation communities identified by the field botanists should be split or

grouped. This may have implications for a conservation assessment because 'split' communities, smaller in size, may be rare or unusual. In this current report, pairwise tests of differences between each community were undertaken and these results are presented as an ordination plot to show the relationship between vegetation communities used in vegetation mapping (see Clarke and Gorley (2006) for pairwsie analysis procedures in ANOSIM).

2.4 Summary of Analyses Used

All analyses followed the procedures outlined in Clarke and Gorley (2006), and were carried out using the appropriate modules of *Primer v6*. A flowchart outlining the steps in the analyses and the graphical outputs is provided in Figure 1.

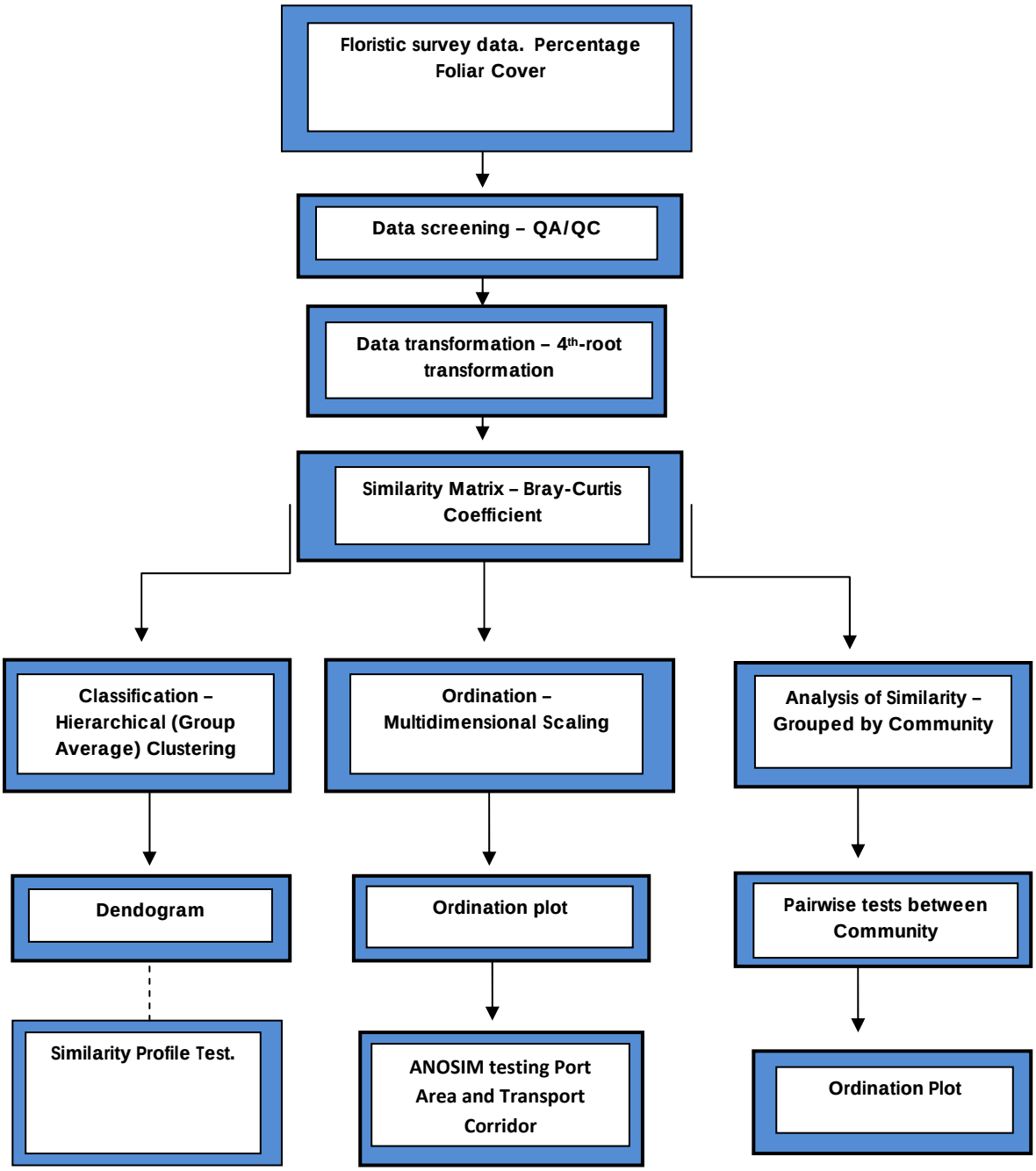

Figure 1: Flowchart of general application of non-parametric multivariate analyses (see Clarke & Warwick 2001 for descriptions of tests).

3 Results and Discussion

3.1 Differences in vegetation between the Port Area and the Transport Corridor (ANOSIM)

There is a significant difference in the survey data obtained for the Port Area and the Transport Corridor (Global R = 0.398, p<0.001). This confirms significant differences in the species occurrences, and also allows a closer examination of each part of the data set, Port Area and Transport Corridor, separately.

3.2 Classification Analysis

Classification analysis reflected this difference between the Port Area and the Transport Corridor (Figures A1 and A2). Only one Port Area sample (APQ98) was clustered within a Transport Corridor community. This was because of the occurrence of the dominant tussock grass *Eragrostis xerophila* in the quadrat samples within this numerical community.

3.3 Similarity Profile Analysis (SIMPROF) of Study Area

Twelve significant groups of quadrats that represent vegetation communities were identified within the data from the Study Area (Sample statistic Pi = 4.304, p<0.001). However, these 12 significant groupings based on the numerical analysis of the Study Area are far less than the 26 vegetation communities defined by the survey botanists on quadrat information, or the 23 communities used in the mapping and conservation assessment (Figure A3 and AECOM 2010). This indicates that the botanical field survey has applied a precautionary or conservative approach to delineating individual vegetation communities in comparison to the numerical analysis. The numerical analysis supports the communities being amalgamated. The implication for the Environmental Impact Assessment (EIA) is that the mapping used to define vegetation communities is very unlikely to have grouped vegetation communities that may be of environmental significance. A cautious approach has been adopted.

3.4 Similarity Profile Analysis (SIMPROF) of Transport Corridor

This cautious approach to field mapping is confirmed by the ANOSIM test of the groupings based on the 'field defined' vegetation communities. Botanists use field descriptions of vegetation communities coupled with aerial photography to undertake vegetation mapping. In addition, botanists will apply a vegetation code based on their field descriptions of vegetation communities to each individual survey quadrat. The purpose of this final ANOSIM test was to determine if these field descriptions of vegetation communities are significantly associated with the actual quadrat data, and examine if strong overlap between the vegetation codes exists.

This test indicates that significant associations between the field defined vegetation communities and the quadrat data occur (Global R = 0.563, p<0.001). However, in a 'pairwise test' of significant differences between each individual vegetation code, several vegetation codes are not significantly different. Several vegetation communities appear to have been split without support from numerical analyses. The 'closeness' of each of these codes is displayed as an ordination plot within

this report (Figure A4). The implication for the EIA undertaken is that a cautious approach has been used in defining individual vegetation communities, and based on the numerical analysis, inappropriate 'lumping' of vegetation communities has not occurred.

3.5 Examination of Port Area Vegetation Communities

Within the Port Area, numerical analysis confirmed three vegetation community outliers and three single quadrat outliers. The quadrat outliers were:

- Quadrat APQ97 – a community described as Closed Hummock Grassland of *Triodia wiseana* on hillslopes and ridgetops. The dominance of *T. wiseana* (70%) with 24 associated species having a cover of less than 1% was the driver for this quadrat being classified as an outlier. However, other *T. wiseana* dominated quadrats are still relatively close to this sample in ordination.
- Quadrat APQ61 – Mangroves of *Avicennia marina* spp. *marina* on brown tidal clay. This was the only mangrove survey quadrat in the data set.
- Quadrat APQ65 – Scattered *Spinifex longifolius* over **Aerva javanica* on pale brown sands on shoreline. This was the only shoreline survey quadrat in the data set.

These outliers, identified by solid black lines in the dendograms, do not represent unusual communities, and are an artefact of limited sampling within them (Figures A1 to A3).

The three numerical communities are identified as those 'quadrat groups' significantly associated with each other. Two of the three groups contains more than one field-defined vegetation community (these field-defined communities are listed in parenthesis below). The three numerical communities are:

- *Triodia wiseana* dominated (defined as Vegetation Community **Thg** in vegetation mapping);
- *Triodia* dominated communities with or without *Acacia* species (defined as **DCAT2**, **Thg**, **Atg**, **GT**, **AThg2**, **MAT**, **DCAT1** and **AThg1** in vegetation mapping)
- Tall *Acacia* shrublands with *Triodia* (defined as **MAT, Lit, MAC, Thg(c)** and **CHT** in vegetation mapping).

The relationship between all quadrats in the Study Area is provided as an ordination plot in Figure A5.

4 Conclusion

Multivariate numerical analysis was conducted of the Study Area data provided by the AECOM survey, and interpretation of data from the Port Area was undertaken. The analysis supports the cautious approach that has been used in identifying vegetation communities for the purpose of vegetation mapping and the Environmental Impact Assessment by AECOM (2010). The numerical analysis suggests that it is highly unlikely that unusual vegetation communities that may be of significance have been grouped within a more common vegetation community for the purposes of vegetation mapping.

5 References

Anderson, M.J. & Thompson, A.A. (2004) Multivariate control charts for ecological and environmental monitoring. *Ecological Applications* **14**: 1921-1935.

AECOM (2009). *API Proposed Anketell Point Transport Corridor . Level 2 Flora and Vegetation Assessment*. Unpublished Report prepared for API Management Pty Ltd. Perth, WA.

AECOM (2010) *Anketell Point and Dixon Island Proposed Port Development Area. Level 2 Flora and Vegetation Assessment.* Unpublished Report prepared for API Management Pty Ltd. Perth, WA.

Clarke, K.R. and Gorley, R.N. (2006) *Primer v6*. Primer E-Ltd. Plymouth, U.K.

Clarke, K.R. and Green, R.H. (1988) Statistical design and analysis for a 'biological effects' study. *Marine Ecology Progress Series* **92**: 205-219.

Clarke, K.R. and Warwick, R.M. (2001) *Change in Marine Communities: An Approach to Statistical Analysis and Interpretation*. 2nd Edition. Primer-E Ltd. Plymouth.

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Appendix A
Data Analysis Figures

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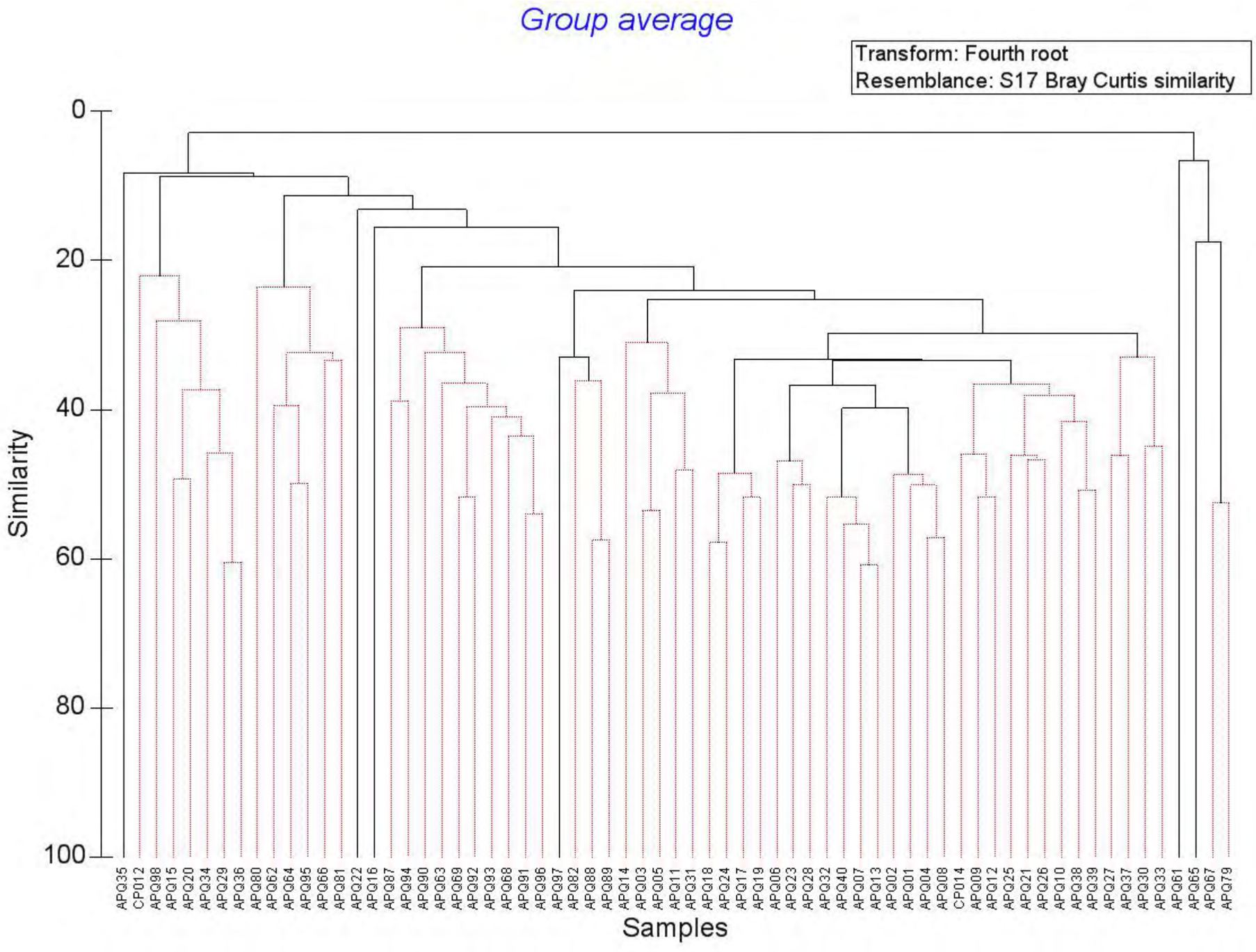
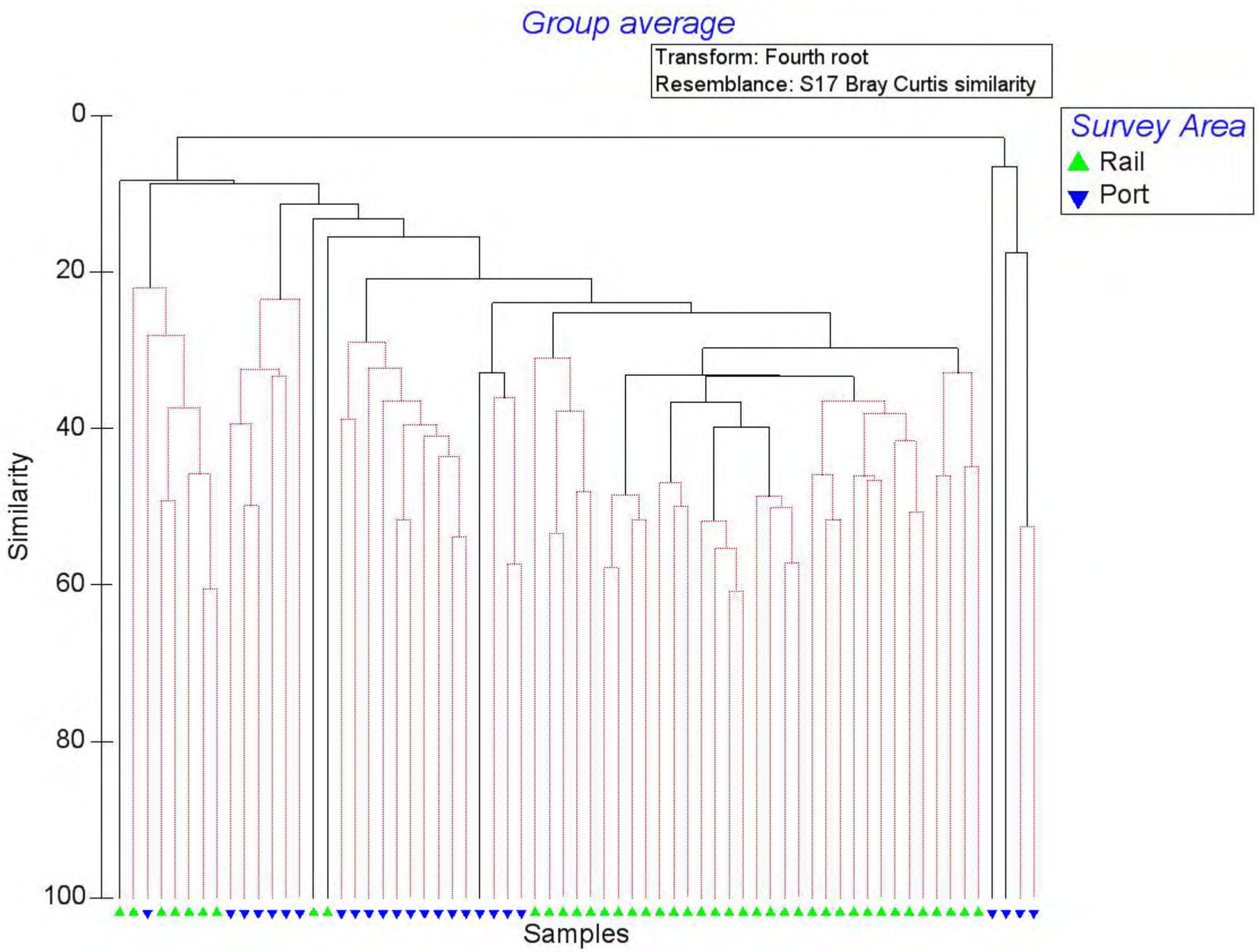


Figure A1: Dendrogram of Hierarchical Clustering analysis of AECOM (2010) quadrat data in the Study Area at Anketell Point and Dixon Island. Transformation is 4th-root, and the Similarity Profile Test is significant (p<0.001). Groups of quadrats are identified by vertical black lines splitting to red.



FigureA2: Dendrogram of Hierarchical Clustering analysis of AECOM (2010) quadrat data. The factor used to highlight patterns in this data was quadrat location; Port Area or Rail Corridor. ANOSIM for differences between vegetation communities is significant ($p<0.001$)

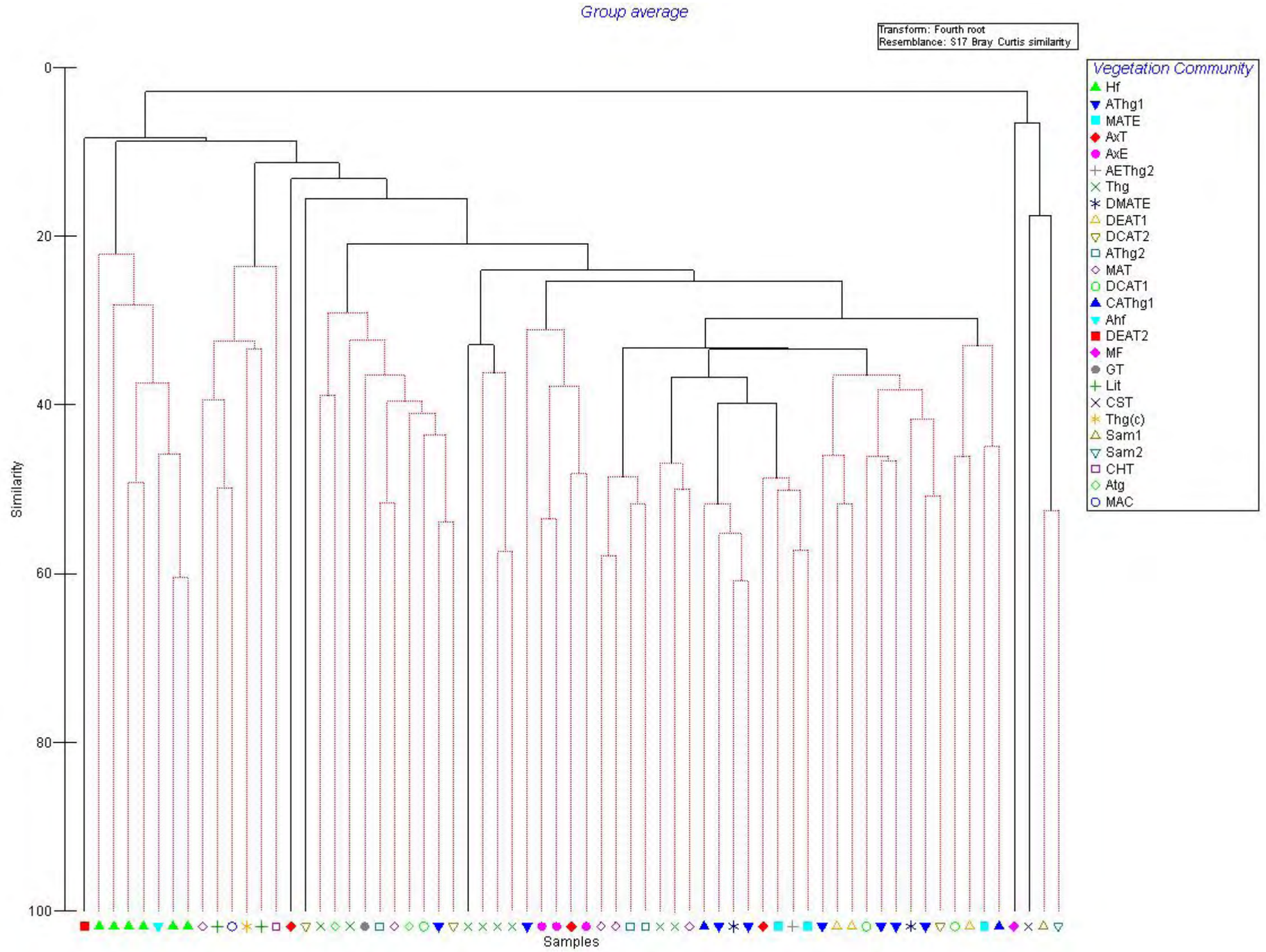


Figure A3: Dendrogram of Hierarchical Clustering analysis of AECOM (2010) quadrat data. Factors used to highlight patterns of data distribution are field delineated vegetation community. The Grouping of communities by SIMPROF is significant (p<0.001).

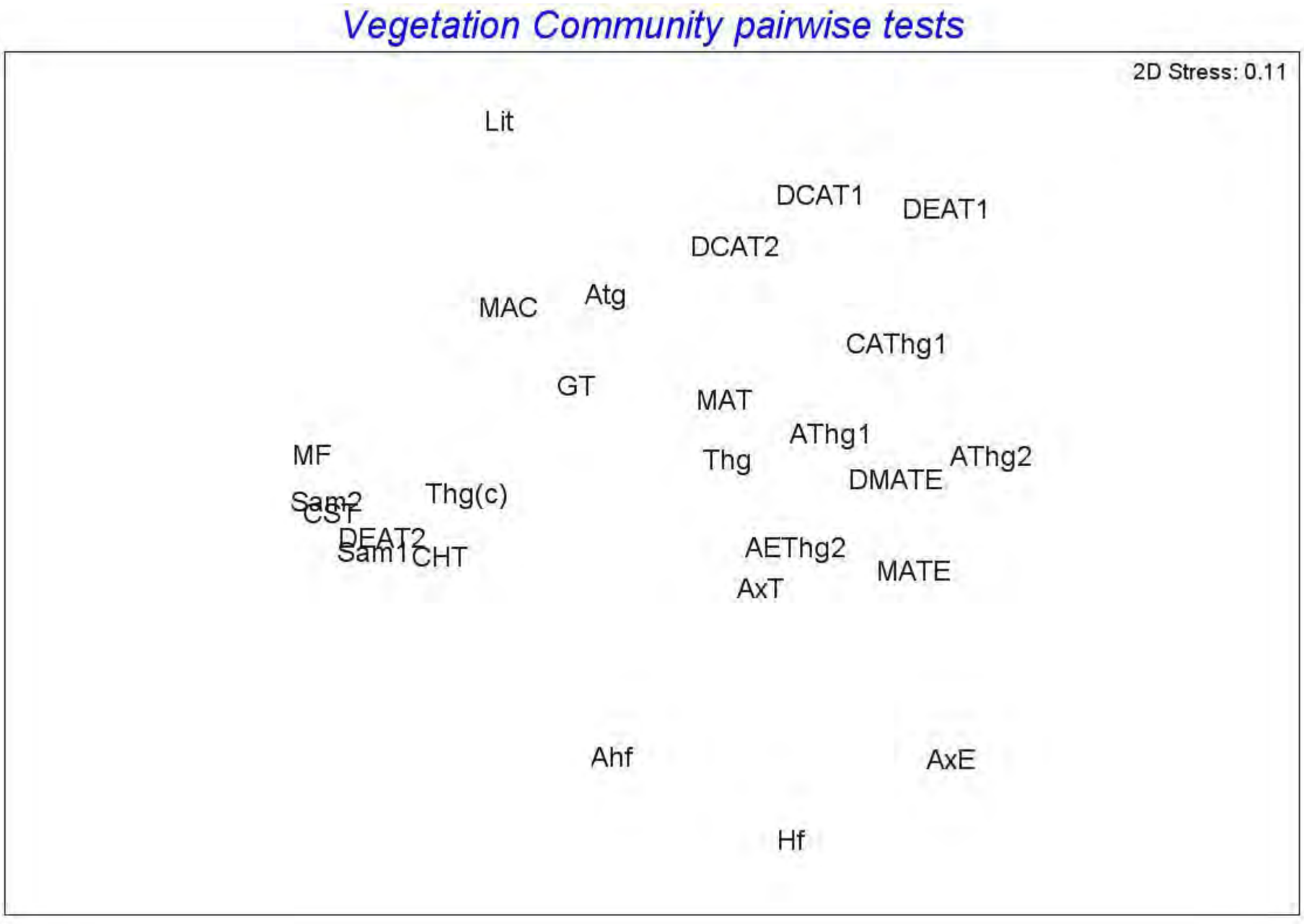


Figure A4: Ordination plot of AECOM (2010) of pairwise tests showing the close relationship between a number of vegetation communities used in vegetation mapping. For example, SAM2, CST, SAM1 and DEAT2 are very similar.

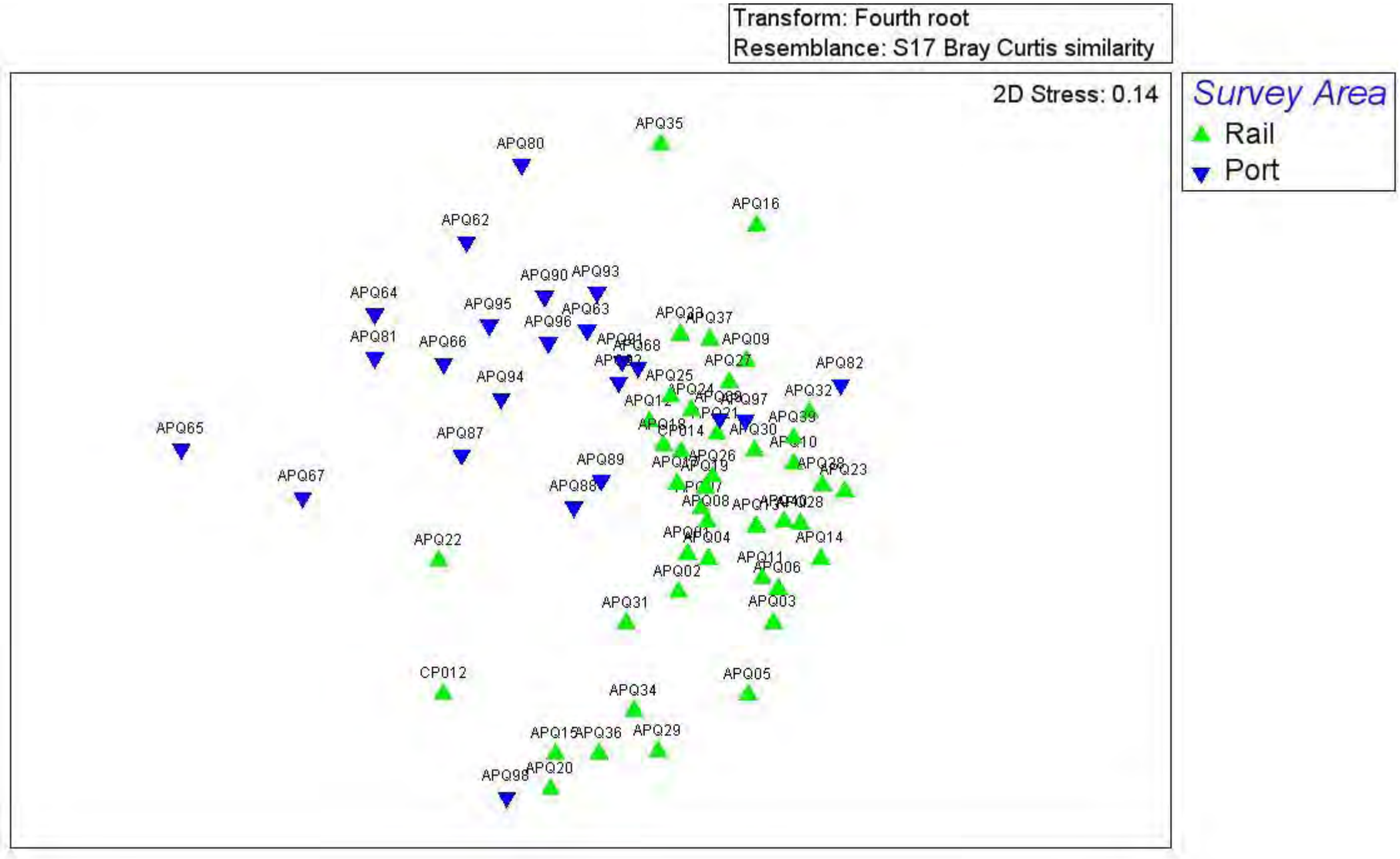


Figure A5: Ordination plot of AECOM (2010) quadrat data showing the differences in similarity between quadrats within the Port Area and those within the Rail Corridor.

Appendix B

Review of Mattiske Consulting Pty Ltd Flora and Vegetation Survey of the Cape Lambert Project Area

Memorandum

Date:	6 July 2009
To:	Michelle Carey
From:	Gabriela Martinez
File/ref number:	
Subject:	Review of Mattiske Consulting Pty Ltd Flora and Vegetation Survey of the Cape Lambert Project Area

Distribution:

Dear Michelle,

Following is our Environmental advice regarding the flora and vegetation issues associated with the Cape Lambert Project Area. The advice includes a review and assessment of the Mattiske Consulting Pty Ltd study titled *Flora and Vegetation Survey of the Cape Lambert Project Area* (Mattiske Consulting Pty Ltd, 2007).

1.0 Review of the Mattiske Consulting Pty Ltd Report

The Mattiske Consulting Pty Ltd (2007) report describes the flora, vegetation types and condition (to some degree) of the Cape Lambert project area. The methodology used is in accordance with Environmental Protection Authority's (EPA) Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004). Mattiske Consulting Pty Ltd identified the following important features within the project area:

- 36 vegetation communities;
- Six introduced species were recorded;
- 22 Priority Flora species with potential to occur within the area;
- Two Priority Ecological Communities (PECs), namely the Priority 1 *Roebourne Plains Coastal Grassland* and the Priority 1 *Stony Chenopod Association of the Roebourne Plains area;*
- One regionally significant community (G2); and
- One significant community based on restricted distribution (OW1).

We consider that the flora and vegetation survey conducted by Mattiske Consulting Pty Ltd (2007) is in accordance with EPA requirements for flora and vegetation surveys. However some inconsistencies and omission of data were observed which are discussed below.

The Mattiske report states that 204 recording sites were established within the survey area in May 2007, with additional work undertaken in the spring months of 2007. However, none of the individual site information has been provided in the report. AECOM believe that it would be beneficial to include individual site data to determine the rationale used for describing the structure, composition and therefore significance of communities within the project area. It is generally expected by the EPA that at least two-non permanent plots are sampled for each representative vegetation community within a survey area. Plot based data is particularly important when determining the

presence of Threatened Ecological Communities (TECs) and PECs within a project area. Therefore, inclusion of this data within the report will identify whether each vegetation community has at least two plots sampled and provide a comparison of data for inferred PECs within the project area. At present it is impossible to know whether Mattiske Consulting Pty Ltd has sampled at least one plot per each representative vegetation community. It is possible that the sites surveyed by Mattiske Consulting Pty Ltd were all concentrated in one location and extrapolations from these sites were used to create the vegetation mapping presented in Figure 1. This would be a limitation of the study and should be explained in the methodology section.

The Mattiske Consulting Pty Ltd (2007) report states that two of the communities defined (G2 & CS1) have similarities with Priority Ecological Communities as defined by the Department of Environment and Conservation (DEC), namely the *Roebourne Plains Coastal Grassland* and the *Stony Chenopod Association of the Roebourne Plains area* respectively. It recommends that there should be minimisation of disturbance and clearing within these areas thereby avoiding PECs. AECOM's assessment if this statement is provided below.

1.1 Priority Ecological Communities

AECOM was able to compare results from previous site visits conducted in May 2009 over the Cape Lambert project area in order to verify vegetation communities described by Mattiske Consulting Pty Ltd (2007) report.

1.1.1 Comparison of Mattiske's CS1 Community vs. DEC's *Stony Chenopod Association of the Roebourne Plains Area* Priority 1 Ecological Community Data

The vegetation community defined as CS1 by Mattiske Consulting Pty Ltd (2007) report is not considered consistent with the inferred PEC (*Stony Chenopod Association of the Roebourne Plains Area*) as stated in the report.

Based on correspondence from Jill Pryde and Stephen van Leeuwen from the DEC between May and June 2009, it was determined that it is highly unlikely that Priority 1 PEC (*Stony Chenopod Association of the Roebourne Plains Area*) mapped by Mattiske Consulting Pty Ltd is in fact the aforementioned PEC. According to the DEC, the dominant species that define the PEC (*Stony Chenopod Association of the Roebourne Plains Area*) are *Eragrostis xerophila, Sclerolaena hostilis* and *Atriplex ?bunburyana*, none of which were recorded within Mattiske's CS1 community. Therefore it is unlikely that vegetation community CS1 as described by Mattiske Consulting Pty Ltd is in actual fact the *Stony Chenopod Association of the Roebourne Plains Area* as described by the DEC.

1.1.2 Comparison of Actual Species Composition of Tidal Islet Grasslands *

**** For the purposes of this discussion the area within approximately 507086E 7716422N and other similar mapped areas (i.e. Mattiske's CS1 community) are going to be referred to Tidal islet Grasslands.***

Data received from the DEC indicates that the Priority 1 PEC (*Stony Chenopod Association of the Roebourne Plains Area*) has 'indicator species' for determining the presence of the nominated PEC. These species are *Eragrostis xerophila, Sclerolaena hostilis* and *Atriplex ?bunburyana.*

AECOM undertook a site visit of Mattiske's Tidal Islet Grassland (CS1) community on 29 June 2009 in order to verify whether the community is in actual fact the Priority 1 PEC (*Stony Chenopod Association of the Roebourne Plains Area*). Although the data and results from this field trip are still being processed and have not been finalised, it is evident from the data collected that DEC's indicator species have not been recorded. AECOM recorded a single location of samphire community which we believe to be equivalent to Mattiske's description of the CS1 community at the following location 506739E 7715793N.

Additionally the areas defined by Mattiske Consulting Pty Ltd as Tidal Islet Grasslands consists of 34 species, of which only four are classified as chenopods (i.e. *Neobassia astrocarpa, Halosarcia indica*

ssp. *leiostachya, Halosarcia halocnemoides* spp. tenuis and *Atriplex* sp) (Mattiske Consulting Pty Ltd, 2007 – Appendix B).

Based on correspondence dated 26 May 2009 from Jill Pryde, Senior Ecologist at the DEC's Species and Communities Branch, AECOM determined that it is unlikely that the Priority 1 PEC (*Stony Chenopod Association of the Roebourne Plains Area*) mapped by Mattiske Consulting Pty Ltd is in fact the aforementioned PEC.

According to the DEC the PEC (*Stony Chenopod Association of the Roebourne Plains Area*) appears to be uncommon. Only one occurrence has been located to date (Roebourne Airport/Common – Plate 1) and differs from the other Roebourne Plains Grassland communities due to the predominance of Chenopod species on clay soils.

Jill Pryde from the DEC provided AECOM with a photograph depicting PEC (*Stony Chenopod Association of the Roebourne Plains Area*) for comparison with previous areas surveyed which is shown below.

Plate 1: DEC's Pilbara survey site of the PEC (*Stony Chenopod Association of the Roebourne Plains Area*) at the Roebourne aerodrome.

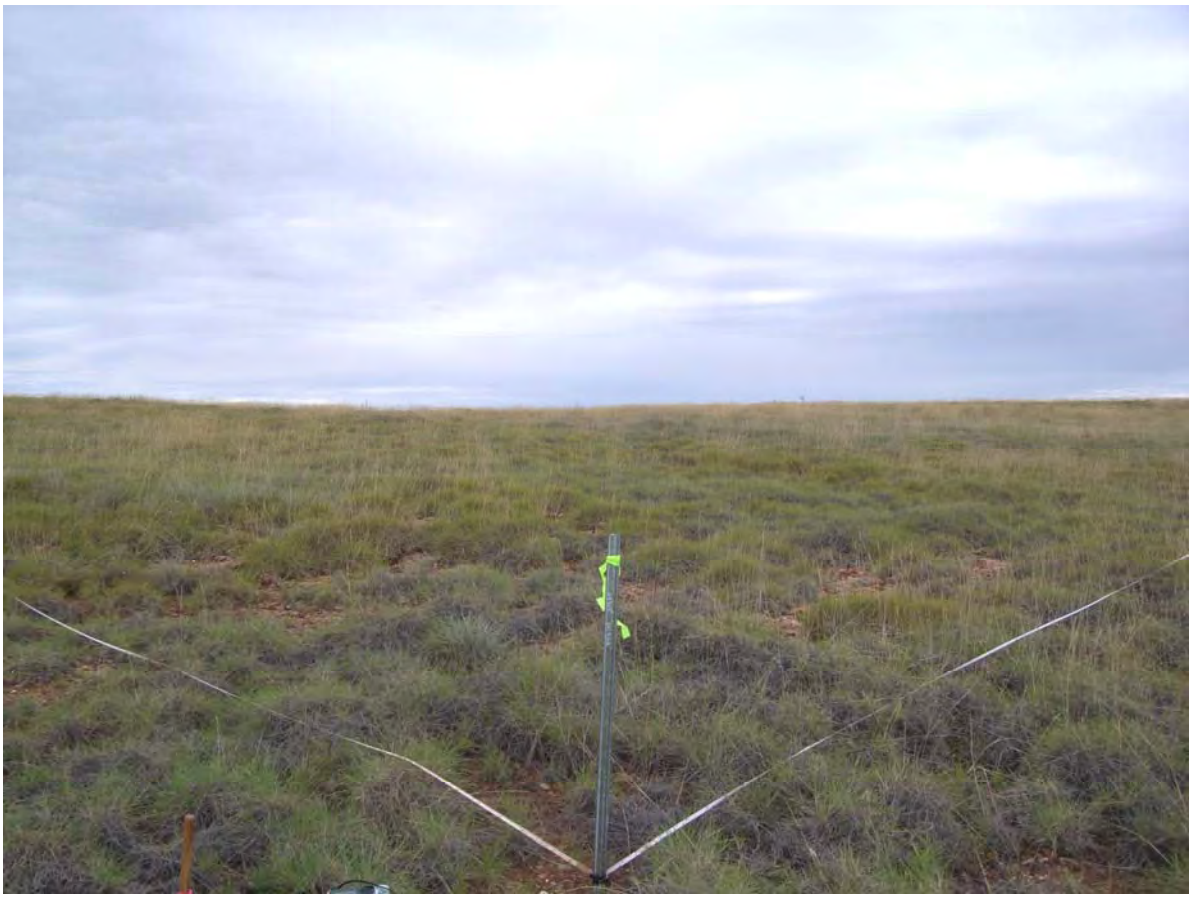


Plate 2: AECOM's 29 June 2009 survey site (507086E 7716422N) within areas mapped as CS1 by Mattiske Consulting Pty Ltd.

From Plates 1 and 2 it is evident that areas mapped by Mattiske Consulting Pty Ltd as Tidal Islet Grasslands are better defined as Triodia Hummock Grasslands. These areas are not equivalent to DEC's PEC (*Stony Chenopod Association of the Roebourne Plains Area*) as stated in the Mattiske report.

1.1.3 Comparison of Mattiske's G2 Community vs. DEC's *Roebourne Plains Coastal Grassland* Priority 1 Ecological Community Data

The vegetation community defined as G2 by Mattiske Consulting Pty Ltd (2007) report is not considered consistent with the inferred PEC (*Roebourne Plains Coastal Grassland*) as stated in the report.

Based on correspondence dated 7 April 2009 from Jill Pryde, AECOM determined that it is unlikely that the Priority 1 PEC (*Roebourne Plains Coastal Grassland*) mapped by Mattiske Consulting Pty Ltd is in fact the aforementioned PEC.

According to the DEC, the Priority 1 PEC (*Roebourne Plains Coastal Grassland*) was subject to a much more detailed assessment following results of the DEC Pilbara Biological Survey, which set up six survey sites on Roebourne Grasslands. This assisted in further defining the community and subsequently the "*Roebourne Plains Gilgai Grassland*" was nominated as a Threatened Ecological Community to the Western Australia Threatened Ecological Communities Scientific Committee in August 2008.

Based on updated information received by the DEC in April 2009, it was determined that *The Roebourne Plains Gilgai Grasslands* supports mainly Tussock grasses (*Sorghum* sp.) and ephemeral herbs dominated by Papilionaceae (*Desmodium* sp. and *Glycine* sp).

Vegetation community G2 as described by Mattiske Consulting Pty Ltd (2007) report did not record *Sorghum, Desmodium* or *Glycine* species which appear to be 'indicator species' for determining the presence of the nominated PEC (*Roebourne Plains Gilgai Grasslands*). Therefore based on species composition of the PEC, it is unlikely that vegetation community G2 as described by Mattiske Consulting Pty Ltd (2007) report is in actual fact the *Roebourne Plains Gilgai Grasslands* PEC.

1.1.4 Comparison of Actual Species Composition of Mattiske's G2 vegetation community vs. AECOM Horseflat communities (Hf)

Areas defined as vegetation community G2 by Mattiske Consulting Pty Ltd (2007) report are equivalent to AECOM's Horseflat community (Hf) (AECOM, 2008).

The *Roebourne Plains Gilgai Grassland* was originally considered by AECOM to potentially occur within the Horseflat (Hf) vegetation community (AECOM, 2008), based on its original description of it being dominated by *Eragrostis xerophila* (Roebourne Plains grass) (Mia Podesta, 2008, pers. comm.).

Based on updated information received by the DEC in April 2009, it was determined that the *Roebourne Plains Gilgai Grassland* differs from the surrounding clay flats of the Horseflat Land System which are dominated by *Eragrostis xerophila* and other perennial tussock (*Eragrostis* mostly) grass species.

The Horseflat grassland described by AECOM in 2008 is dominated by *Eragrostis xerophila* and therefore has a low probability of being the *Roebourne Plains Gilgai Grassland* as described by DEC. Additionally, vegetation community G2 as defined by Mattiske Consulting Pty Ltd (2007) report did not record *Sorghum*, *Desmodium* or *Glycine* species. Therefore based on species composition of the PEC, it is unlikely that vegetation community G2 as described my Mattiske Consulting Pty Ltd is in actual fact the *Roebourne Plains Gilgai Grassland.*

Further surveys conducted by AECOM in May 2009 (post wet) will identify many annuals (including *Sorghum* sp. and *Desmodium* sp.) that were expected to occur in particular habitats. This additional survey will definitively confirm whether the *Roebourne Plains Gilgai Grasslands* actually occurs within the Cape Lambert survey area. Data and results from this study are still being processed and will undergo statistical analysis.

2.0 General Comments on Mattiske Consulting Pty Ltd (2007) Report

2.1 Methodology

Guidance Statement 51 (EPA, 2004) states that every flora and vegetation report should contain a section describing methods used and a subsection identifying the limitations of these methods. The survey limitations are important and their influence on findings should be incorporated into the conclusions.

The sampling design is not adequately explained and justified in the methodology section. It is not clear how vegetation communities were differentiated. AECOM have assumed that floristic communities have been identified, described and mapped spatially based on changes in dominant species composition and soil types, however this should be explained in the methodology section.

The Mattiske (2007) report states that all vegetation within a 25m radius of drill holes was surveyed, however does not describe or show spatial distribution of the drill holes or why these particular areas were chosen for survey.

The methodology does not explain the sampling effort undertaken for each site visit (May & spring 2007). This section should include dates of when the survey took place in order to identify the amount of field time that was invested in the study. Additionally, it should also explain whether the

spring 2007 survey re-visited existing established sites or whether new sites were established and surveyed.

The report briefly describes the methods used however, does not describe any limitations due to the application of these methods. It does describe seasonal limitations (lack of rain and recent fire prior to spring survey, however this is not presented as a sub-section of the methodology as stated in Guidance Statement 51 (EPA, 2004).

Section 5.8 of the report describes vegetation condition within the project area. The methodology section does not describe the vegetation condition rating used to assess the vegetation. Additionally, the report does not provide spatial vegetation condition mapping of communities. According to Guidance Statement 51 a map of the vegetation condition and the condition rating should be referenced.

2.2 Results

2.2.1 Survey Effort

The report states that 204 recording sites were established within the survey area in May 2007 and additional work was undertaken in the spring months of 2007. Results from the May 2007 survey provided the majority of data.

Individual site information for the 204 recorded sites has not been provided in the report. AECOM believe that inclusion of this information would help determine the rationale used for describing the structure and composition of vegetation communities and therefore significance within the report. Any future surveys in the area would be comparable to Mattiske Consulting Pty Ltd data, provided individual site information was obtained. In any EPA assessment, individual site data would be required to verify conclusions made within the report.

2.2.2 Desktop Assessment

This section states that a search of the Department of Environment and Conservation's (DECs) Declared Rare and Priority Flora database was undertaken to generate a desktop review of flora and vegetation values in the survey area. No search co-ordinates have been provided to verify whether the search area encompassed the entire project area.

The report states that the DEC database search identified 22 Priority species that may potentially occur in the area based on habitat preference, listed in Table 3. This table however lists 23 species (not 22 as stated) and does not include habitat analysis information for individual species. This makes it difficult to identify which species actually do have the potential to occur within the survey area based on habitat and soil preference. Inclusion of an additional two columns (one for habitat preference and one for likelihood of occurrence within the project area) would make the statement more valid and auditable.

Table 3 lists *Gomphrena pusilla* as potentially occurring within the project area. This species is one that regularly comes up on a DEC search return for the Karratha locality, but does not occur in the area. The DEC staff, search the DRF and priority flora listing for species recorded from "Dampier' but these searches also return species recorded from the "Dampier Peninsula" in the Kimberly. This means you often get a totally Kimberly species appearing on your return.

Four species listed in Table 3 have been removed from the Priority listing, namely *Olearia fluvialis, Abutilon trudgenii, Hibiscus brachysiphonius* and *Ischaemum albovillosum.* One species (*Stackhousia clementii*) has been downgraded from a Priority 1 to Priority 3 whilst two other species are considered taxonomic synonyms and have therefore undergone name changes. These two species are *Mukia* sp. Barrow Island (D.W. Goodall 1264) which is now classified as *Cucumis* sp. Barrow Island (D.W. Goodall 1264) (P2) and *Sida* sp. Wittenoom (W.R. Barker 1962) now classified as *Sida arsiniata* which is not classified as Priority Flora.

Additionally *Abutilon trudgenii* and *Sida* sp. Wittenoon (W.R. Barker 1962) had changes to their classification and names in March 2007. The Mattiske report is dated December 2007, therefore these changes for the aforementioned species should have been identified in the report. The other species previously mentioned above had changes to their priority listing and classification in 2008; therefore it is valid that these inconsistencies were not identified in the report.

2.2.3 Flora

This section states that several specimens could not be confirmed to species level, however sterile specimens were checked to ensure they were not Rare or Priority Flora species. These species were only identified to genus level due to the timing on the surveys. The spring survey in 2007 would have been conducted between September – November (i.e. Spring). The Pilbara IBRA region is generally dry by September, therefore many annuals that would have been expected in particular habitats would not have been visible. Many perennial species would have been withered and difficult to identify. As a result, there are two species listed in Appendix A identified to genus level which have potential to be equivalent to species identified from the DEC Declared Rare and Priority flora search. These two species (*Eragrostis* sp. and *Goodenia* sp.) may potentially be equivalent to *Eragrostis crateriformis* (P3) or any of the three *Goodenia* species listed in Table 3 respectively. The report does not specify who undertook the flora identifications, but if unsure it would be beneficial re-checking the species identifications.

2.2.4 Vegetation

Mattiske Consulting Pty Ltd identified and mapped 36 vegetation communities for the Cape Lambert project area. These vegetation communities were defined and described after establishing 204 sites within the project area. Individual site data and spatial reference for the sampling sites from which these vegetation communities were derived is not provided in the report.

A number of Land System Units traverse the project area, namely Boolgeda, Cheerawarra, Horseflat, Littoral, Malina, Rocklea and Ruth, however without individual site data it is impossible to verify how many sites are present in different Land System Units.

Additionally 36 vegetation types for an area this size is not that many. The study area appears to be dominated by three of the seven Land System Units (Ruth, Boolgeeda and Horseflat) which do tend to only be dominated by a few vegetation types, so it could well be valid.

The scale used in Figure 1 for the vegetation community mapping makes it hard to read and interpret. It would be beneficial to make a series of detailed maps at a more appropriate scale.

2.2.5 Rare and Priority Species

Mattiske Consulting Pty Ltd states that no Declared Rare or Priority Flora was recorded during the surveys. However AECOM recorded three populations of the Priority 3 *Acacia glaucocaesia* in May 2009, approximately 4 kilometres north of North-West Coastal Highway on the road to Cleaverville. This species is a perennial shrub of considerable size (1-6m in height), which if present during the Mattiske surveys would have been easily observed and recognisable.

The fact that Mattiske Consulting Pty Ltd did not record this species during their surveys supports the claim that their survey sites may have been concentrated in one area. Therefore ground-truthing of the majority of the project area did not occur and mapping would have been extrapolated from survey sites. This may also potentially mean that Mattiske Consulting Pty Ltd have not established at least one site in each of the representative communities described. It is generally expected by the EPA that at least two-non permanent plots are sampled for each representative vegetation community within a survey area.

2.2.6 Threatened and Priority Ecological Communities

Please refer to section 1.1 above.

2.2.7 Discussion

The discussion section of the report is very brief and does not explain or expand assumptions and conclusions made. This section needs to be expanded and discussion of inferred PECs should be given more attention. As discussed previously in section 1.1 of this memo, the conclusions made by Mattiske Consulting Pty Ltd with regards to the inferred PECs within the project area are incorrect.

Overall the Mattiske Consulting Pty Ltd (2007) report meets minimum standards according to Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004). In order to withstand EPA scrutiny, additional information would be required for the report, such as inclusion of the 204 site data. Mattiske's report could be considered a Level 2 (phase 1) assessment of the Cape Lambert area.

Please feel free to contact Kellie Honczar or myself should you have any further queries.

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Appendix C

Summary of Vascular Flora Species recorded at each quadrat within the Dixon Island and Port Development areas between 2008 – 2009

APPENDIX C: SUMMARY OF VASCULAR FLORA SPECIES RECORDED AT EACH QUADRAT WITHIN DIXON ISLAND AND PORT DEVELOPMENT AREAS BETWEEN 2008, 2009 & 2010

NB: * Denotes introduced (weed) species

FAMILY CODE	FAMILY NAME	I	GENUS	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	APQ61	APQ62	APQ63	APQ64	APQ65	APQ66	APQ67	APQ68	APQ69	APQ79	APQ80	APQ81	APQ82	APQ87	APQ88	APQ89	APQ90
13	Marsileaceae		*Marsilea*		*hirsuta*																							
31	Poaceae		*Aristida*		*burbidgeae*																					+		
			Aristida		*contorta*																							
			Aristida		*hygrometrica*																							
		*	*Cenchrus*		*ciliaris*								+	+	+	+	+	+	+				+		+		+	+
			Chrysopogon		*fallax*												+		+									
			Chrysopogon		*sp.*																							
			Cymbopogon		*ambiguus*																	+					+	+
			Dactyloctenium		*radulans*									+														
			Dichanthium		*sericeum*	subsp.	*humilius*												+									
			Enneapogon		*caerulescens*	var.	*caerulescens*													+								
			Eragrostis	aff.	*eriopoda*																							
			Eragrostis	aff.	*eriopoda*				(WAS site 963)								+					+	+					
			Eragrostis		*falcata*																+							
			Eragrostis		*tenellula*																							
			Eragrostis		*xerophila*																							
			Eriachne		*aristidea*																						+	
			Eriachne		*benthamii*																							
			Eriachne		*obtusa*																					+		
			Eriachne		*pulchella*	subsp.	*dominii*												+	+								
			Eriachne		*sp.*																							
			Eulalia		*aurea*																							
			Iseilema		*dolichotrichum*														+									
			Iseilema		*macratherum*																							
			Panicum		*decompositum*																					+		
			Paraneurachne		*muelleri*															+								
			Spinifex		*longifolius*											+							+					
			Sporobolus		*australasicus*													+	+	+								+
			Sporobolus		*virginicus*																+							
			Themeda		*triandra*														+									
			Triodia	aff.	*epactia*																							
			Triodia		*angusta*													+								+	+	+	
			Triodia		*epactia*								+	+	+				+			+							+
			Triodia		*pungens*												+											
			Triodia		*schinzii*								+																
			Triodia		*wiseana*																					+		
			Triodia		*wiseana*			(fine form)						+					+	+				+		+	+	
			Xerochloa		*barbata*																							
			Yakirra		*australiensis*	var.	*australiensis*						+							+								
32	Cyperaceae		*Bulbostylis*		*barbata*									+								+						
			Fimbristylis	aff.	*dichotoma*				(M75-4)					+					+									
054P	Hemerocallidaceae		*Corynotheca*		*pungens*								+															
90	Proteaceae		*Grevillea*		*pyramidalis*	subsp.	*leucadendron*							+														
92	Santalaceae		*Santalum*		*lanceolatum*																	+	+					
105	Chenopodiaceae		*Atriplex*	aff.	*amnicola*																							
			Atriplex		*codonocarpa*																							
			Dysphania		*rhadinostachya*	subsp.	*rhadinostachya*																	+				
			Neobassia		*astrocarpa*													+			+							
			Rhagodia		*preissii*	subsp.	*obovata*								+							+	+					
			Salsola		*tragus*										+													
			Salsola		*tragus*	subsp.	*tragus*									+							+					+
			Sclerolaena		*bicornis*																							
			Sclerolaena		*diacantha*																					+		
			Sclerolaena		*glabra*																							
			Tecticornia		*halocnemoides*	subsp.	*tenuis*											+			+							
			Tecticornia		*indica*	subsp.	*bidens*									+		+			+							
			Tecticornia		*pruinosa*													+										
			Threlkeldia		*diffusa*																			+				
106	Amaranthaceae	*	*Aerva*		*javanica*										+	+	+					+	+		+			

APPENDIX C: SUMMARY OF VASCULAR FLORA SPECIES RECORDED AT EACH QUADRAT WITHIN DIXON ISLAND AND PORT DEVELOPMENT AREAS BETWEEN 2008, 2009 & 2010

NB: * Denotes introduced (weed) species

FAMILY CODE	FAMILY NAME	I	GENUS	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	APQ61	APQ62	APQ63	APQ64	APQ65	APQ66	APQ67	APQ68	APQ69	APQ79	APQ80	APQ81	APQ82	APQ87	APQ88	APQ89	APQ90
106	Amaranthaceae cont.		*Alternanthera*		*sp.*																							
			Amaranthus		*cuspidifolius*																							
			Gomphrena		*cunninghamii*									+				+		+				+	+	+	+	+
			Hemichroa		*diandra*													+			+							
			Ptilotus		*astrolasius*	var.	*astrolasius*							+								+						
			Ptilotus		*auriculifolius*															+								
			Ptilotus		*axillaris*												+											
			Ptilotus		*calostachyus*	var.	*calostachyus*																					
			Ptilotus		*clementii*								+															
			Ptilotus		*exaltatus*																							
			Ptilotus		*exaltatus*	var.	*exaltatus*													+								
			Ptilotus		*fusiformis*	var.	*fusiformis*																					+
			Ptilotus		*helipteroides*	var.	*helipteroides*													+								
			Ptilotus		*incanus*	var.	*incanus*																	+				
			Ptilotus		*polystachyus*	var.	*arthrotrichus*						+															
			Ptilotus		*polystachyus*	var.	*polystachyus*																					
107	Nyctaginaceae		*Boerhavia*		*coccinea*															+								
			Boerhavia		*gardneri*																			+		+		
110	Aizoaceae		*Trianthema*		*glossostigma*																					+		
			Trianthema		*turgidifolia*											+		+			+				+			
110A	Molluginaceae		*Mollugo*		*molluginea*																							
111	Portulacaceae	*	*Portulaca*		*oleracea*															+					+			
			Portulaca		*pilosa*																				+			
113	Caryophyllaceae		*Polycarpaea*		*longiflora*			(red form)																				
			Polycarpaea		*longiflora*			(white form)						+										+				
131	Lauraceae		*Cassytha*		*capillaris*													+						+	+			
137A	Capparaceae		*Capparis*		*spinosa*	var.	*nummularia*																					
			Cleome		*viscosa*								+					+	+			+				+		
138	Brassicaceae		*Lepidium*		*pholidogynum*													+										
163	Mimosaceae		*Acacia*		*ampliceps*																							
			Acacia		*bivenosa*									+			+		+	+					+			
			Acacia		*colei*	var.	*colei*																					
			Acacia		*coriacea*	subsp.	*coriacea*						+		+		+					+	+					
			Acacia		*coriacea*	subsp.	*pendens*																					
			Acacia		*elachantha*			(golden hairy variant)						+														
			Acacia		*gregorii*																	+	+	+				
			Acacia		*inaequilatera*															+							+	
			Acacia		*pyrifolia*	var.	*pyrifolia*							+						+								
			Acacia		*sabulosa*								+		+													
			Acacia		*stellaticeps*								+							+			+					
			Acacia		*synchronicia*																							
			Acacia		*tumida*	var.	*pilbarensis*													+								
			Neptunia		*dimorphantha*																							
			Neptunia		*monosperma*																							
164	Caesalpiniaceae		*Senna*		*artemisioides*	subsp.	*oligophylla*	(thinly sericeous)												+								
			Senna		*artemisioides*	subsp.	*oligophylla x helmsii*																	+				
			Senna		*glutinosa*	subsp.	*glutinosa*													+								
			Senna		*glutinosa*	subsp.	*luerssenii*																		+			
			Senna		*glutinosa*	subsp.	*pruinosa x glutinosa*																		+			
			Senna		*notabilis*								+							+	+							+
			Senna		*venusta*																							+
165	Papilionaceae		*Alysicarpus*		*muelleri*																							
			Canavalia		*rosea*											+												
			Crotalaria		*cunninghamii*																	+						
			Crotalaria		*medicaginea*	var.	*neglecta*							+											+		+	
			Crotalaria		*ramosissima*									+														
			Cullen		*cinereum*																					+		
			Cullen		*leucanthum*															+								
			Cullen		*leucochaites*																							+

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NB: * Denotes introduced (weed) species

FAMILY CODE	FAMILY NAME	I	GENUS	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	APQ61	APQ62	APQ63	APQ64	APQ65	APQ66	APQ67	APQ68	APQ69	APQ79	APQ80	APQ81	APQ82	APQ87	APQ88	APQ89	APQ90
165	Papilionaceae cont.		*Desmodium*		*filiforme*								+	+													
			Indigofera		*colutea*								+	+			+					+				+	
			Indigofera		*linifolia*								+	+			+						+			+	+
			Indigofera		*linnaei*																						+
			Indigofera		*monophylla*			(Burrup form)						+					+	+		+					
			Indigofera		*monophylla*			(Cape Preston form)																+			
			Indigofera		*monophylla*			(grey leaflet form)																			
			Indigofera		*monophylla*				(MJOPP-2)																		
			Indigofera		*trita*									+						+					+	+	+
			Rhynchosia		*minima*												+		+	+			+		+	+	
			Swainsona		*canescens*																		+	+			
			Swainsona		*formosa*									+					+	+							
			Swainsona		*pterostylis*																				+		
			Tephrosia	aff.	*supina*				(HD133-20)															+		+	+
			Tephrosia	aff.	*supina*				(HD205-10)																	+	
			Tephrosia	aff.	*supina*				(HD88-4)					+													
			Tephrosia	aff.	*supina*				(MET 12,357)																		
			Tephrosia		*clementii*														+								
			Tephrosia		*rosea*	var.	*clementii*																				
			Tephrosia		*sp. Bungaroo Creek*				(M.E. Trudgen 11601)																		
173	Zygophyllaceae		*Tribulus*		*hirsutus*																						
183	Polygalaceae		*Polygala*	aff.	*isingii*																		+				
185	Euphorbiaceae		*Adriana*		*tomentosa*	var.	*tomentosa*																				
			Adriana		*urticoides*	var.	*urticoides*																+				
			Euphorbia		*australis*																	+					
			Euphorbia		*coghlanii*									+	+			+		+				+		+	+
			Euphorbia		*schultzii*																		+				
			Euphorbia		*sp.*																						
			Euphorbia		*sp.*				(BPBS10-50)											+							
			Euphorbia		*tannensis*	subsp.	*eremophila*	(Burrup form)																+			
			Euphorbia		*wheeleri*																						
			Flueggea		*virosa*	subsp.	*melanthesoides*																				
			Leptopus		*decaisnei*	var.	*orbicularis*													+							
			Phyllanthus		*maderaspatensis*														+						+		
207	Sapindaceae		*Diplopeltis*		*eriocarpa*																		+	+			
220	Tiliaceae		*Corchorus*	aff.	*parviflorus*									+					+								
			Corchorus	aff.	*walcotti*				(K.J. Atkins 570)											+					+		
			Corchorus		*parviflorus*																					+	
			Corchorus		*sp.*																						
			Triumfetta		*clementii*									+					+	+		+		+		+	+
			Triumfetta		*maconochieana*																						
			Triumfetta		*sp.*																						
221	Malvaceae		*Abutilon*	aff.	*lepidum*					(4)										+						+	
			Abutilon		*lepidum*																						+	+
			Abutilon		*otocarpum*																						
			Gossypium		*australe*			(Burrup Peninsula form)																			
			Gossypium		*australe*			(Whim Creek form)																			
			Hibiscus	aff.	*platychlamys*				(MET 15,067)					+					+								
			Hibiscus		*coatesii*																						+
			Hibiscus		*leptocladus*														+								
			Hibiscus		*sturtii*	var.	*platychlamys*													+							
			Sida	aff.	*echinocarpa*				(MET 15,350)																		
			Sida	aff.	*fibulifera*				(HD200-6)										+								
			Sida	aff.	*fibulifera*			(oblong)	(MET 15,220)																+		
			Sida		*echinocarpa*																						
			Sida		*pilbarensis*			(Ferrugineous form)											+								
			Sida		*rohlenae*	subsp.	*rohlenae*						+														
			Sida		*sp.*																						
			Sida		*sp. verrucose glands*				(F.H. Mollemans 2423)																		

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223	Sterculiaceae		*Waltheria*		*indica*						+							+			+							
236	Frankeniaceae		*Frankenia*		*pauciflora*	var.	*pauciflora*							+					+	+					+			
243	Violaceae		*Hybanthus*		*aurantiacus*														+									
273	Myrtaceae		*Corymbia*		*hamersleyana*														+									
281	Apiaceae		*Trachymene*		*oleracea*																							
			Trachymene		*oleracea*	subsp.	*oleracea*							+										+				
294	Plumbaginaceae		*Muellerolimon*		*salicorniaceum*																+							
307	Convolvulaceae		*Bonamia*		*media*	var.	*villosa*							+			+		+	+						+		+
			Bonamia		*pannosa*														+									
			Evolvulus		*alsinoides*	var.	*villosicalyx*							+					+	+					+		+	
			Ipomoea		*polymorpha*								+	+								+						
310	Boraginaceae		*Ehretia*		*saligna*	var.	*saligna*																					
			Heliotropium		*ovalifolium*																							
			Heliotropium		*?cunninghamii*																							
			Trichodesma		*zeylanicum*	var.	*zeylanicum*							+					+			+		+			+
312	Avicenniaceae		*Avicennia*		*marina*	subsp.	*marina*					+				+					+							
315	Solanaceae		*Solanum*		*diversiflorum*												+		+									
			Solanum		*ellipticum*																				+			
			Solanum		*horridum*																	+		+				
			Solanum		*lasiophyllum*																					+		
316	Scrophulariaceae		*Stemodia*		*grossa*																							
326	Myoporaceae		*Myoporum*		*montanum*																							
331	Rubiaceae		*Oldenlandia*		*crouchiana*																							
337	Cucurbitaceae		*Cucumis*		*maderaspatanus*														+									+
341	Goodeniaceae		*Goodenia*		*microptera*									+			+		+	+		+			+			
			Scaevola		*spinescens*			(broad leaf form)														+						
			Scaevola		*spinescens*			(narrow form)															+					
345	Asteraceae		*Launaea*		*sarmentosa*											+												
			Pterocaulon		*sphaeranthoides*																							
			Streptoglossa		*decurrens*																						+	+

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13	Marsileaceae		*Marsilea*		*hirsuta*														+						
31	Poaceae		*Aristida*		*burbidgeae*																				
			Aristida		*contorta*													+							
			Aristida		*hygrometrica*												+								
		*	*Cenchrus*		*ciliaris*							+	+	+	+	+	+	+		+		+	+	+	+
			Chrysopogon		*fallax*										+		+								
			Chrysopogon		*sp.*																	+			
			Cymbopogon		*ambiguus*									+				+							
			Dactyloctenium		*radulans*																				
			Dichanthium		*sericeum*	subsp.	*humilius*						+												
			Enneapogon		*caerulescens*	var.	*caerulescens*								+			+							
			Eragrostis	aff.	*eriopoda*											+									
			Eragrostis	aff.	*eriopoda*				(WAS site 963)																
			Eragrostis		*falcata*																				
			Eragrostis		*tenellula*														+						
			Eragrostis		*xerophila*														+				+		
			Eriachne		*aristidea*																				
			Eriachne		*benthamii*														+						
			Eriachne		*obtusa*																				
			Eriachne		*pulchella*	subsp.	*dominii*						+												
			Eriachne		*sp.*																			+	
			Eulalia		*aurea*							+			+										
			Iseilema		*dolichotrichum*																				
			Iseilema		*macratherum*														+						
			Panicum		*decompositum*														+						
			Paraneurachne		*muelleri*																				
			Spinifex		*longifolius*																				
			Sporobolus		*australasicus*								+												
			Sporobolus		*virginicus*																				
			Themeda		*triandra*							+		+			+								
			Triodia	aff.	*epactia*												+								
			Triodia		*angusta*																				
			Triodia		*epactia*							+	+	+	+	+				+			+		
			Triodia		*pungens*																				
			Triodia		*schinzii*																				
			Triodia		*wiseana*															+	+	+		+	
			Triodia		*wiseana*			(fine form)				+						+							
			Xerochloa		*barbata*														+						
			Yakirra		*australiensis*	var.	*australiensis*																		
32	Cyperaceae		*Bulbostylis*		*barbata*								+												
			Fimbristylis	aff.	*dichotoma*				(M75-4)									+							
054P	Hemerocallidaceae		*Corynotheca*		*pungens*																				
90	Proteaceae		*Grevillea*		*pyramidalis*	subsp.	*leucadendron*					+					+				+	+			
92	Santalaceae		*Santalum*		*lanceolatum*																				+
105	Chenopodiaceae		*Atriplex*	aff.	*amnicola*																		+		
			Atriplex		*codonocarpa*														+						
			Dysphania		*rhadinostachya*	subsp.	*rhadinostachya*																		
			Neobassia		*astrocarpa*																				
			Rhagodia		*preissii*	subsp.	*obovata*																		
			Salsola		*tragus*																	+			
			Salsola		*tragus*	subsp.	*tragus*						+	+											
			Sclerolaena		*bicornis*														+						
			Sclerolaena		*diacantha*																				
			Sclerolaena		*glabra*																		+		
			Tecticornia		*halocnemoides*	subsp.	*tenuis*																		
			Tecticornia		*indica*	subsp.	*bidens*																		
			Tecticornia		*pruinosa*																				
			Threlkeldia		*diffusa*																		+		
106	Amaranthaceae	*	*Aerva*		*javanica*										+	+									

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106	Amaranthaceae cont.		*Alternanthera*		*sp.*																				+
			Amaranthus		*cuspidifolius*													+							
			Gomphrena		*cunninghamii*								+	+	+			+							
			Hemichroa		*diandra*																				
			Ptilotus		*astrolasius*	var.	*astrolasius*																		
			Ptilotus		*auriculifolius*							+													
			Ptilotus		*axillaris*																				
			Ptilotus		*calostachyus*	var.	*calostachyus*							+							+				
			Ptilotus		*clementii*																				
			Ptilotus		*exaltatus*														+						
			Ptilotus		*exaltatus*	var.	*exaltatus*					+	+		+					+				+	
			Ptilotus		*fusiformis*	var.	*fusiformis*																		
			Ptilotus		*helipteroides*	var.	*helipteroides*										+								
			Ptilotus		*incanus*	var.	*incanus*																		
			Ptilotus		*polystachyus*	var.	*arthrotrichus*																		
			Ptilotus		*polystachyus*	var.	*polystachyus*										+								
107	Nyctaginaceae		*Boerhavia*		*coccinea*								+												
			Boerhavia		*gardneri*							+		+											
110	Aizoaceae		*Trianthema*		*glossostigma*																				
			Trianthema		*turgidifolia*										+										
110A	Molluginaceae		*Mollugo*		*molluginea*												+					+			
111	Portulacaceae	*	*Portulaca*		*oleracea*								+				+		+						
			Portulaca		*pilosa*											+									
113	Caryophyllaceae		*Polycarpaea*		*longiflora*			(red form)							+										
			Polycarpaea		*longiflora*			(white form)																	
131	Lauraceae		*Cassytha*		*capillaris*											+									
137A	Capparaceae		*Capparis*		*spinosa*	var.	*nummularia*											+							
			Cleome		*viscosa*									+		+	+					+			
138	Brassicaceae		*Lepidium*		*pholidogynum*																				
163	Mimosaceae		*Acacia*		*ampliceps*																			+	
			Acacia		*bivenosa*							+	+	+	+	+	+	+		+	+	+			+
			Acacia		*colei*	var.	*colei*																	+	
			Acacia		*coriacea*	subsp.	*coriacea*					+		+		+									+
			Acacia		*coriacea*	subsp.	*pendens*							+											
			Acacia		*elachantha*			(golden hairy variant)																	
			Acacia		*gregorii*																				
			Acacia		*inaequilatera*							+	+	+							+	+			
			Acacia		*pyrifolia*	var.	*pyrifolia*					+	+	+	+	+	+				+				
			Acacia		*sabulosa*											+									
			Acacia		*stellaticeps*																	+		+	
			Acacia		*synchronicia*										+					+					
			Acacia		*tumida*	var.	*pilbarensis*					+		+			+				+	+			
			Neptunia		*dimorphantha*														+						
			Neptunia		*monosperma*																		+		
164	Caesalpiniaceae		*Senna*		*artemisioides*	subsp.	*oligophylla*	(thinly sericeous)																	
			Senna		*artemisioides*	subsp.	*oligophylla x helmsii*								+										
			Senna		*glutinosa*	subsp.	*glutinosa*								+										
			Senna		*glutinosa*	subsp.	*luerssenii*																		
			Senna		*glutinosa*	subsp.	*pruinosa x glutinosa*																		
			Senna		*notabilis*								+	+											
			Senna		*venusta*																				
165	Papilionaceae		*Alysicarpus*		*muelleri*								+												
			Canavalia		*rosea*																				
			Crotalaria		*cunninghamii*																				
			Crotalaria		*medicaginea*	var.	*neglecta*							+			+								
			Crotalaria		*ramosissima*											+									
			Cullen		*cinereum*																				
			Cullen		*leucanthum*																				
			Cullen		*leucochaites*																				

APPENDIX C: SUMMARY OF VASCULAR FLORA SPECIES RECORDED AT EACH QUADRAT WITHIN DIXON ISLAND AND PORT DEVELOPMENT AREAS BETWEEN 2008, 2009 & 2010

NB: * Denotes introduced (weed) species

FAMILY CODE	FAMILY NAME	I	GENUS	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	APQ91	APQ92	APQ93	APQ94	APQ95	APQ96	APQ97	APQ98	APQ100	APQ101	APQ102	APQ103	APQ104	APQ105
165	Papilionaceae cont.		*Desmodium*		*filiforme*																				
			Indigofera		*colutea*												+								
			Indigofera		*linifolia*							+					+								
			Indigofera		*linnaei*																				
			Indigofera		*monophylla*			(Burrup form)																	
			Indigofera		*monophylla*			(Cape Preston form)																	
			Indigofera		*monophylla*			(grey leaflet form)										+							
			Indigofera		*monophylla*				(MJOPP-2)			+	+	+			+	+							
			Indigofera		*trita*							+										+			
			Rhynchosia		*minima*							+	+	+	+	+	+	+	+			+			
			Swainsona		*canescens*							+				+									
			Swainsona		*formosa*								+	+			+								
			Swainsona		*pterostylis*																				
			Tephrosia	aff.	*supina*				(HD133-20)			+	+												
			Tephrosia	aff.	*supina*				(HD205-10)						+										
			Tephrosia	aff.	*supina*				(HD88-4)																
			Tephrosia	aff.	*supina*				(MET 12,357)			+		+			+								
			Tephrosia		*clementii*																	+			
			Tephrosia		*rosea*	var.	*clementii*					+		+											
			Tephrosia		*sp. Bungaroo Creek*				(M.E. Trudgen 11601)			+					+								
173	Zygophyllaceae		*Tribulus*		*hirsutus*										+										
183	Polygalaceae		*Polygala*	aff.	*isingii*														+						
185	Euphorbiaceae		*Adriana*		*tomentosa*	var.	*tomentosa*																		+
			Adriana		*urticoides*	var.	*urticoides*																		
			Euphorbia		*australis*								+					+							
			Euphorbia		*coghlanii*							+	+	+	+		+								
			Euphorbia		*schultzii*																+				
			Euphorbia		*sp.*																				
			Euphorbia		*sp.*				(BPBS10-50)			+													
			Euphorbia		*tannensis*	subsp.	*eremophila*	(Burrup form)																	
			Euphorbia		*wheeleri*							+		+				+							
			Flueggea		*virosa*	subsp.	*melanthesoides*											+							
			Leptopus		*decaisnei*	var.	*orbicularis*						+												
			Phyllanthus		*maderaspatensis*										+										
207	Sapindaceae		*Diplopeltis*		*eriocarpa*																				
220	Tiliaceae		*Corchorus*	aff.	*parviflorus*									+											
			Corchorus	aff.	*walcotti*				(K.J. Atkins 570)				+	+		+									
			Corchorus		*parviflorus*							+	+		+	+	+					+			
			Corchorus		*sp.*																	+			
			Triumfetta		*clementii*							+	+	+				+							
			Triumfetta		*maconochieana*									+											
			Triumfetta		*sp.*																				+
221	Malvaceae		*Abutilon*	aff.	*lepidum*					(4)															
			Abutilon		*lepidum*							+			+			+							
			Abutilon		*otocarpum*											+									
			Gossypium		*australe*			(Burrup Peninsula form)				+					+								
			Gossypium		*australe*			(Whim Creek form)										+				+			
			Hibiscus	aff.	*platychlamys*				(MET 15,067)									+							
			Hibiscus		*coatesii*							+													
			Hibiscus		*leptocladus*												+								
			Hibiscus		*sturtii*	var.	*platychlamys*																		
			Sida	aff.	*echinocarpa*				(MET 15,350)			+		+						+					
			Sida	aff.	*fibulifera*				(HD200-6)										+						
			Sida	aff.	*fibulifera*			(oblong)	(MET 15,220)						+										
			Sida		*echinocarpa*								+	+											
			Sida		*pilbarensis*			(Ferrugineous form)				+	+				+								
			Sida		*rohlenae*	subsp.	*rohlenae*									+	+								
			Sida		*sp.*																				+
			Sida		*sp. verrucose glands*				(F.H. Mollemans 2423)								+								

APPENDIX C: SUMMARY OF VASCULAR FLORA SPECIES RECORDED AT EACH QUADRAT WITHIN DIXON ISLAND AND PORT DEVELOPMENT AREAS BETWEEN 2008, 2009 & 2010

NB: * Denotes introduced (weed) species

FAMILY CODE	FAMILY NAME	I	GENUS	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	APQ91	APQ92	APQ93	APQ94	APQ95	APQ96	APQ97	APQ98	APQ100	APQ101	APQ102	APQ103	APQ104	APQ105
223	Sterculiaceae		*Waltheria*		*indica*							+													
236	Frankeniaceae		*Frankenia*		*pauciflora*	var.	*pauciflora*				+														
243	Violaceae		*Hybanthus*		*aurantiacus*							+			+		+								
273	Myrtaceae		*Corymbia*		*hamersleyana*												+					+			
281	Apiaceae		*Trachymene*		*oleracea*								+					+							
			Trachymene		*oleracea*	subsp.	*oleracea*																		
294	Plumbaginaceae		*Muellerolimon*		*salicorniaceum*																				
307	Convolvulaceae		*Bonamia*		*media*	var.	*villosa*								+						+				
			Bonamia		*pannosa*								+												
			Evolvulus		*alsinoides*	var.	*villosicalyx*						+	+	+			+							
			Ipomoea		*polymorpha*																				
310	Boraginaceae		*Ehretia*		*saligna*	var.	*saligna*											+							
			Heliotropium		*ovalifolium*											+									
			Heliotropium		*?cunninghamii*															+					
			Trichodesma		*zeylanicum*	var.	*zeylanicum*					+	+	+	+	+	+	+		+		+		+	
312	Avicenniaceae		*Avicennia*		*marina*	subsp.	*marina*																		
315	Solanaceae		*Solanum*		*diversiflorum*									+											
			Solanum		*ellipticum*																				
			Solanum		*horridum*																				
			Solanum		*lasiophyllum*																				
316	Scrophulariaceae		*Stemodia*		*grossa*							+		+											
326	Myoporaceae		*Myoporum*		*montanum*										+										
331	Rubiaceae		*Oldenlandia*		*crouchiana*										+			+							
337	Cucurbitaceae		*Cucumis*		*maderaspatanus*									+				+							
341	Goodeniaceae		*Goodenia*		*microptera*							+			+	+	+								
			Scaevola		*spinescens*			(broad leaf form)																	
			Scaevola		*spinescens*			(narrow form)																	
345	Asteraceae		*Launaea*		*sarmentosa*																				
			Pterocaulon		*sphaeranthoides*										+										
			Streptoglossa		*decurrens*									+	+										

Appendix D

Summary of Vascular Flora Species recorded at each community within the Dixon Island and Port Development areas between 2008 - 2009

APPENDIX D: SUMMARY OF VASCULAR FLORA SPECIES RECRDED AT EACH COMMUNITY WITHIN DIXON ISLAND AND PORT DEVELOPMENT AREAS BETWEEN 2008, 2009 & 2010

^ Denotes communities and/or species that are common to both areas — **VEGETATION COMMUNITIES**

 # Denotes species which are part of community but recorded in Rail quadrats and/or communities

+ Denotes species recorded in port quadrats only

NB: * Denotes introduced (weed) species

FAMILY CODE	FAMILY NAME	I	GENUS	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	Hf ^	Thg ^	AThg1^	AThg2^	MAT^	DCAT1^	DCAT2^	Thg (c)	ATg	CHT	CST	GT	Lit	MAC	MF	Sam1	Sam2	Amg^
13	Marsileaceae		*Marsilea*		*hirsuta*							+																	
31	Poaceae		*Aristida*		*burbidgeae*								+																
			Aristida		*contorta*							#	^	#	#	#													#
			Aristida		*holathera*	var.	*holathera*						#																
			Aristida		*hygrometrica*													+											
			Aristida		*latifolia*							#																	
			Aristida		*sp.*								#																
			Astrebla		*pectinata*							#																	
			Bothriochloa		*ewartiana*												#	#											
			Brachyachne		*convergens*							#																	
			Brachyachne		*prostrata*							#																	
		*	*Cenchrus*		*ciliaris*							+	^	^	#	^	^	^	+	+		+	+	+	+		+		+
			Chloris		*pectinata*							#																	
			Chrysopogon		*fallax*							#		#			+	^	+	+									#
			Chrysopogon		*sp.*																								+
			Cymbopogon		*ambiguus*								^							+	+								
			Dactyloctenium		*radulans*							#		#		#							+						
			Dichanthium		*sericeum*	subsp.	*humilius*					#	#	#	#	^	^												
			Enneapogon		*caerulescens*	var.	*caerulescens*					#	^	#	^	#	#	#		+									
			Eragrostis	aff.	*eriopoda*													+	+		+			+	+				
			Eragrostis		*falcata*							#																+	
			Eragrostis		*tenellula*							^																	
			Eragrostis		*xerophila*							^													+				
			Eriachne		*aristidea*								+																
			Eriachne		*benthamii*							^																	#
			Eriachne	aff.	*mucronata*							#																	#
			Eriachne		*obtusa*								+																
			Eriachne		*pulchella*	subsp.	*pulchella*					#	#	#		#													#
			Eriachne		*pulchella*	subsp.	*dominii*					#	#	#	^	^	+												
			Eriachne		*sp.*																				+				
			Eulalia		*aurea*									+						+									
			Iseilema		*dolichotrichum*							#	#	#	#	#	^												
			Iseilema		*macratherum*							^																	
			Panicum		*decompositum*							^	+		#	#													
			Panicum		*laevinode*							#			#														
			Paraneurachne		*muelleri*										+	#	#	#											
			Paspalidium		*clementii*								#	#		#													
			Paspalidium		*tabulatum*			(Whim Creek form)				#	#																
			Schizachyrium		*fragile*										#														
			Sorghum		*plumosum*	var.	*plumosum*											#											
			Sorghum		*timorense*							#																	
			Spinifex		*longifolius*																	+		+					
			Sporobolus		*australasicus*							#	+	#	^	^	^										+		
			Sporobolus		*virginicus*																							+	
			Themeda		*triandra*								#	+		#	^	^		+									
			Triodia		*angusta*								+			#	#										+		
			Triodia		*brizoides*										#														
			Triodia	aff.	*epactia*											#		+											
			Triodia		*epactia*							^	^	^	#	^	^	#		+	+		+	+	+				#
			Triodia		*pungens*														+										
			Triodia		*schinzii*											#													
			Triodia		*wiseana*								+												+				
			Triodia		*wiseana*			(fine form)				#	^	^	^	^	^	#					+						
			Xerochloa		*barbata*							^																	
			Xerochloa		*imberbis*							#				#													
			Yakirra		*australiensis*	var.	*australiensis*							#	+	+													
32	Cyperaceae		*Bulbostylis*		*barbata*							#		#	#	^					+		+						#
			Cyperus		*pygmaeus*							#																	
			Fimbristylis	aff.	*dichotoma*				(M75-4)			#	^	#	#	#	+						+						#
054P	Hemerocallidaceae		*Corynotheca*		*pungens*									#		+													
90	Proteaceae		*Grevillea*		*pyramidalis*									#		#													
			Grevillea		*pyramidalis*	subsp.	*leucadendron*						#	+		+	#	^					+							+
			Grevillea		*wickhamii*	subsp.	*hispidula*							#															
			Hakea		*lorea*	subsp.	*lorea*						#	#															#
92	Santalaceae		*Santalum*		*lanceolatum*																+			+					
105	Chenopodiaceae		*Atriplex*	aff.	*amnicola*							+																	
			Atriplex		*codonocarpa*							+																	
			Dysphania		*rhadinostachya*	subsp.	*rhadinostachya*						+		#		#												
			Enchylaena		*tomentosa*	var.	*tomentosa*						#																
			Neobassia		*astrocarpa*																						+	+	
			Rhagodia		*preissii*	subsp.	*obovata*														+			+					
			Salsola		*tragus*	subsp.	*grandiflora*					#		#	#														
			Salsola		*tragus*							#			#									+					+
			Salsola		*tragus*	subsp.	*tragus*					#	+	#	#	^				+		+		+					
			Sclerolaena		*bicornis*							+																	
			Sclerolaena		*costata*							#		#	#														
			Sclerolaena		*densiflora*							#	#	#															
			Sclerolaena		*diacantha*								+																
			Sclerolaena		*glabra*							+																	
			Tecticornia		*halocnemoides*	subsp.	*tenuis*																				+	+	

APPENDIX D: SUMMARY OF VASCULAR FLORA SPECIES RECRDED AT EACH COMMUNITY WITHIN DIXON ISLAND AND PORT DEVELOPMENT AREAS BETWEEN 2008, 2009 & 2010

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FAMILY CODE	FAMILY NAME	I	*GENUS*	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	Hf ^	Thg ^	AThg1^	AThg2^	MAT^	DCAT1^	DCAT2^	Thg (c)	ATg	CHT	CST	GT	Lit	MAC	MF	Sam1	Sam2	Amg^
105	Chenopodiaceae cont.		*Tecticornia*		*indica*	subsp.	*bidens*													+		+					+	+	
			Tecticornia		*pruinosa*																						+		
			Threlkeldia		*diffusa*							+												+					
106	Amaranthaceae	*	*Aerva*		*javanica*								+			#			+	+	+	+		+	+				
			Alternanthera		*nana*												#													
			Alternanthera		*sp.*																			+						
			Amaranthus		*cuspidifolius*								+																	
			Gomphrena		*affinis*	subsp.	*pilbarensis*					#		#																
			Gomphrena		*cunninghamii*								^	#	^	^				+			+				+		
			Hemichroa		*diandra*																						+	+	
			Ptilotus		*aervoides*							#				#														
			Ptilotus		*astrolasius*	var.	*astrolasius*							#		#					+		+						
			Ptilotus		*auriculifolius*								#	+	^															
			Ptilotus		*axillaris*									#					+											
			Ptilotus		*calostachyus*									#	#															
			Ptilotus		*calostachyus*	var.	*calostachyus*									^				+										
			Ptilotus		*carinatus*							#	#	#		#		#												
			Ptilotus		*clementii*									#	#	+		#												
			Ptilotus		*exaltatus*							^	#	#			#	#												
			Ptilotus		*exaltatus*	var.	*exaltatus*					#	#	^	^	^		#		+					+					
			Ptilotus		*fusiformis*	var.	*fusiformis*						+																	
			Ptilotus		*fusiformis*								#		#		#													
			Ptilotus		*gomphrenoides*	var.	*gomphrenoides*					#																		
			Ptilotus		*helipteroides*							#	#	#																
			Ptilotus		*helipteroides*	var.	*helipteroides*					#	#	#	^	#		+												
			Ptilotus		*incanus*	var.	*incanus*						+																	
			Ptilotus		*murrayi*	var.	*murrayi*					#				#														
			Ptilotus		*obovatus*	var.	*obovatus*						#	#		#	#													
			Ptilotus		*polystachyus*	var.	*arthrotrichus*									+														
			Ptilotus		*polystachyus*	var.	*polystachyus*											+												
107	Nyctaginaceae		*Boerhavia*		*burbidgeana*								#																
			Boerhavia		*coccinea*							#	#	#	+	^		#												#
			Boerhavia		*gardneri*								+	+						+										
110	Aizoaceae		*Trianthema*		*glossostigma*								+																
			Trianthema	aff.	*triquetra*				(M3.35)			#		#		#														
			Trianthema		*turgidifolia*								+							+		+						+	+	
110A	Molluginaceae		*Mollugo*		*molluginea*											#		+											^
111	Portulacaceae		*Portulaca*		*conspicua*							#	#																
		*	*Portulaca*		*oleracea*							^	^	#	^	^		+												
			Portulaca		*pilosa*								+												+					
113	Caryophyllaceae		*Polycarpaea*		*corymbosa*	var.	*corymbosa*								#															#
			Polycarpaea		*holtzei*								#	#																
			Polycarpaea		*longiflora*									#																
			Polycarpaea		*longiflora*		(red form)													+										
			Polycarpaea		*longiflora*		(Whim Creek form WC147-7)								#	#														
			Polycarpaea		*longiflora*		(white form)					#	^	#	#								+							
122	Menispermaceae		*Tinospora*		*smilacina*								^	#																
131	Lauraceae		*Cassytha*		*capillaris*								+	#		#	#	#							+			+	
137A	Capparaceae		*Capparis*		*spinosa*	var.	*nummularia*						^	#		#	#	#											
			Cleome		*viscosa*							#	+	#		+	+	+		+	+				+			+	^
138	Brassicaceae		*Lepidium*		*pedicellosum*									#															
			Lepidium		*pholidogynum*							#				#												+	
163	Mimosaceae		*Acacia*		*acradenia*								#																
			Acacia		*adsurgens*									#															
			Acacia		*ampliceps*																				+				
			Acacia		*ancistrocarpa*		*x stellaticeps*									#													
			Acacia		*ancistrocarpa*								#	#		#	#	#											
			Acacia		*bivenosa*								^	^	^	^	^	^	+	+			+	+	+				+
			Acacia		*colei*	var.	*colei*									#	#								+				
			Acacia		*coriacea*	subsp.	*pendens*													+									
			Acacia		*coriacea*	subsp.	*coriacea*						+	^		+			+	+	+			+	+				
			Acacia		*cowleana*									#			#												
			Acacia		*elachantha*		(golden hairy variant)							#									+						
			Acacia		*glaucocaesia*					3			#		#														
			Acacia		*gregorii*								+								+			+				
			Acacia		*inaequilatera*								+	^	+	^		#		+									^
			Acacia		*maitlandii*									#															
			Acacia		*pyrifolia*	var.	*pyrifolia*						^	^	^	^	^	^		+			+		+				
			Acacia		*sabulosa*											+								+	+				
			Acacia		*stellaticeps*											^	+				+				+				+
			Acacia		*synchronicia*								#	^		#				+									
			Acacia		*tenuissima*									#															
			Acacia		*trachycarpa*											#		#											
			Acacia		*trudgeniana*								#																
			Acacia		*tumida*	var.	*pilbarensis*							+		+	+	+		+									+
			Acacia		*victoriae*									#															
			Acacia		*xiphophylla*							#	#	#															
			Dichrostachys		*spicata*							#		#				#											
			Neptunia		*dimorphantha*							^																	
			Neptunia		*monosperma*							+																	

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163	Mimosaceae cont.	*	*Prosopis*		*pallida*							#					#	#											
		*	*Vachellia*		*farnesiana*												#												
164	Caesalpiniaceae		*Petalostylis*		*labicheoides*													#											
			Senna		*artemisioides*	subsp.	*oligophylla*	(thinly sericeous)					#				+												
			Senna		*artemisioides*	subsp.	*oligophylla*					#	#	#		#	#	#											
			Senna		*artemisioides*	subsp.	*oligophylla x helmsii*							#		#		#		+				+					
			Senna		*glutinosa*	subsp.	*glutinosa x luerssenii*							#		#													
			Senna		*glutinosa*	subsp.	*glutinosa x oligophylla*						+																
			Senna		*glutinosa*	subsp.	*pruinosa x glutinosa*						+																
			Senna		*glutinosa*	subsp.	*luerssenii*						+	#		#													
			Senna		*glutinosa*	subsp.	*pruinosa*						#	#		#		#											
			Senna		*glutinosa*	subsp.	*x luerssenii*							#	#	#	#	#											
			Senna		*glutinosa*	subsp.	*glutinosa*					#	#	#	+	#		#		+									
			Senna		*notabilis*							#	#	#	^	^	^			+									
			Senna		*sp. Karijini*				(M.E. Trudgen 10392)				#	#															
			Senna		*venusta*								#	#															
165	Papilionaceae		*Alysicarpus*		*muelleri*							#	^	#		^	#												
			Cajanus		*cinereus*												#												
			Canavalia		*rosea*																	+							
			Crotalaria		*cunninghamii*																+								
			Crotalaria		*dissitiflora*	subsp.	*benthamiana*					#																	
			Crotalaria		*medicaginea*	var.	*neglecta*						^	#	#	#	#	^		+			+						
			Crotalaria		*novae-hollandiae*	subsp.	*novae-hollandiae*							#															
			Crotalaria		*ramosissima*																		+		+				
			Cullen		*cinereum*								+	#															
			Cullen		*leucanthum*									#			+												
			Cullen		*leucochaites*								+																
			Desmodium		*campylocaulon*							#																	
			Desmodium		*filiforme*											+							+						
			Desmodium		*muelleri*							#																	
			Indigastrum		*parviflorum*									#															
			Indigofera		*colutea*								^	#		^	#	+	+		+		+						
			Indigofera		*linifolia*							#	^	^		^	#	+	+				+	+					
			Indigofera		*linnaei*								+																
			Indigofera	aff.	*monophylla*									#															
			Indigofera		*monophylla*			(grey/green leaflet form)					^					#											#
			Indigofera		*monophylla*			(cape Preston form)					^	#		#	#	#											
			Indigofera		*monophylla*				(MJOPP-2)				^	^		+		+											
			Indigofera		*monophylla*			(Burrup form)					#		+		+					+		+					
			Indigofera		*trita*							#	+	^	+	#	#						+						+
			Rhynchosia		*minima*							^	^	^	^	^	^	^	+	+				+	+				+
			Sesbania		*cannabina*							#	#	#															
			Swainsona		*canescens*								^	^										+	+				
			Swainsona		*formosa*										+	+	^	+		+			+						
			Swainsona		*pterostylis*								+																
			Tephrosia		*clementii*							#	#	#			+												+
			Tephrosia		*rosea*	var.	*clementii*							+						+									
			Tephrosia		*sp. Bungaroo Creek*				(M.E Trudgen 11601)					+				+											
			Tephrosia		*supina*									#															#
			Tephrosia	aff.	*supina*				(HD133-20)				+	^		^													
			Tephrosia	aff.	*supina*				(HD205-10)				+							+									
			Tephrosia	aff.	*supina*				(HD88-4)						#	#							+						
			Tephrosia	aff.	*supina*				(MET 12,357)					^	#	#	#	+		+									
			Vigna		sp. Burrup				(B18)				#		#														
			Vigna		sp. central					2				#															
173	Zygophyllaceae		*Tribulus*		*hirsutus*									#						+									
			Tribulus		*suberosus*																								#
183	Polygalaceae		*Polygala*	aff.	*isingii*							^	#	#		#	#							+					
185	Euphorbiaceae		*Adriana*		*tomentosa*	var.	*tomentosa*																	+					
			Adriana		*urticoides*	var.	*urticoides*																	+					
			Euphorbia	aff.	*australis*									#															
			Euphorbia		*australis*								^	#	#	^	#				+								#
			Euphorbia		*biconvexa*								#	#	#	#													
			Euphorbia		*boophthona*								#			#													
			Euphorbia		*coghlanii*							#	^	^	+	^		+		+			+	+			+		
			Euphorbia		*schultzii*											+													
			Euphorbia		sp.																			+					
			Euphorbia		sp.				(BPBS10-50)				#	^	^	#													
185	Euphorbiaceae (cont.)		*Euphorbia*		*tannensis*	subsp.	*eremophila*	(Burrup form)					+	#															
			Euphorbia		*wheeleri*							#	^	^	#			#		+									
			Flueggea		*virosa*	subsp.	*melanthesoides*						+																
			Leptopus		*decaisnei*									#			#												
			Leptopus		*decaisnei*	var.	*orbicularis*							#	+	^													
			Phyllanthus		*maderaspatensis*							#	+			#	+			+									
207	Sapindaceae		*Diplopeltis*		*eriocarpa*								+	#			#							+					
220	Tiliaceae		*Corchorus*		*laniflorus*									#	#	#													
			Corchorus	aff.	*parviflorus*				(JW 11-11)				#																
			Corchorus	aff.	*parviflorus*							#	#		#	#	+			+									
			Corchorus		*parviflorus*								+	+		+		+		+					+				+

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FAMILY CODE	FAMILY NAME	I	*GENUS*	aff.	SPECIES	INFRA SPECIES CLASS	INFRA SPECIES	FORM	AUTHORITY	CONS. STATUS	RANGE EXT.	Hf ^	Thg ^	AThg1^	AThg2^	MAT^	DCAT1^	DCAT2^	Thg (c)	ATg	CHT	CST	GT	Lit	MAC	MF	Sam1	Sam2	Amg^
220	Tiliaceae cont.		*Corchorus*		sp.																								+
			Corchorus		*tectus*								#	#	#	#													
			Corchorus		*tridens*							#																	
			Corchorus	aff.	*walcotti*				(K.J. Atkins 570)			#	+	#	+	^	#	#		+					+				
			Triumfetta		*appendiculata*									#															
			Triumfetta		*clementii*								^	^	^	^	^	#		+	+		+						
			Triumfetta		*maconochieana*															+									
			Triumfetta		*sp.*																				+				
221	Malvaceae		*Abutilon*		*fraseri*								+																
			Abutilon	aff.	*lepidum*				(1) (MET15,352)							#													
			Abutilon	aff.	*lepidum*				(4)				^	#	^	#													
			Abutilon		*lepidum*								+	^						+									
			Abutilon		*otocarpum*																				+				
			Abutilon		*oxycarpum*	subsp.	*prostratum*							#															
			Gossypium		*australe*			(Whim Creek form)					^																+
			Gossypium		*australe*			(Burrup Peninsula form)						^		#	#	+											
			Hibiscus		*brachysiphonius*							#																	
			Hibiscus		*coatesii*								+	+															
			Hibiscus		*leptocladus*												+	+											
			Hibiscus	aff.	*platychlamys*				(MET 15,067)				^	#		#	+					+							
			Hibiscus		*sturtii*	var.	*campylochlamys*							#															
			Hibiscus		*sturtii*	var.	*platychlamys*							#	+														#
		*	*Malvastrum*		*americanum*							#		#			#	#											
			Melhania		sp. Burrup									#															
			Sida		*clementii*									#	#	#	#	#											
			Sida	aff.	*echinocarpa*				(MET 13,350)				#	^		^				+									#
			Sida		*echinocarpa*											+				+									
			Sida	aff.	*fibulifera*				(HD200-6)			^					+												
			Sida	aff.	*fibulifera*			(oblong)	(MET 15,220)			#	+	#						+									
			Sida		*pilbarensis*			(Ferrugineous form)						+		+	+	+											
			Sida		*rohlenae*	subsp.	*rohlenae*									+		+							+				
			Sida		*sp. spiciform panicles*				(E. Leyland s.n 14/08/1990)					#															
			Sida		*sp. verrucose glands*				(F.H. Mollemans 2423)									+											
			Sida		*spinosa*							#		#				#											
223	Sterculiaceae		*Brachychiton*		*acuminatus*								#																
			Melhania		sp.				(CH15-39)					#			#												
			Waltheria		*indica*									+															
236	Frankeniaceae		*Frankenia*		*pauciflora*	var.	*pauciflora*				+									+							+	+	
243	Violaceae		*Hybanthus*		*aurantiacus*								^	^	+		^	^		+			+						
273	Myrtaceae		*Corymbia*		*hamersleyana*									#			^	^											+
281	Apiaceae		*Trachymene*		*oleracea*								+			+													
			Trachymene		*oleracea*	subsp.	*oleracea*						^	#	#	#	#						+						
294	Plumbaginaceae		*Muellerolimon*		*salicorniaceum*																							+	
301	Oleaceae		*Jasminum*		*didymum*	subsp.	*lineare*						#	#				#											
305	Asclepiadaceae		*Sarcostemma*		*viminale*	subsp.	*australe*							#		#													
307	Convolvulaceae		*Bonamia*		*media*	var.	*villosa*						^	#	^	^	+			+	+		+						
			Bonamia		*pannosa*											+	+												
			Bonamia		*rosea*									#															
			Evolvulus		*alsinoides*	var.	*villosicalyx*					#	^	#	^	^	+	#		+			+						#
			Ipomoea		*coptica*							#	#																
			Ipomoea		*costata*									#															
			Ipomoea		*muelleri*							#																	
			Ipomoea		*plebeia*							#																	
			Ipomoea		*polymorpha*									#		+					+		+						
			Operculina		*aequisepala*							#																	
			Polymeria		*ambigua*											#	#	#											
			Polymeria		sp.				(site 1365)							#													
310	Boraginaceae		*Ehretia*		*saligna*	var.	*saligna*						^	#			#	#											
			Heliotropium		*conocarpum*							#																	
			Heliotropium		*cunninghamii*									#		#													#
			Heliotropium		*?cunninghamii*									+															
			Heliotropium		*heteranthum*							#	#	#															
			Heliotropium		*inexplicitum*							#			#														#
			Heliotropium		*ovalifolium*											#	#								+				
			Trichodesma		*zeylanicum*								#			#													
			Trichodesma		*zeylanicum*	var.	*zeylanicum*						+	^	#	^	^	^		+	+		+		+				+
311	Verbenaceae		*Clerodendrum*		*tomentosum*	var.	*lanceolatum*						#																
312	Avicenniaceae		*Avicennia*		*marina*	subsp.	*marina*															+				+		+	
315	Solanaceae		*Solanum*		*diversiflorum*								#	#		#	+		+	+									
			Solanum		*ellipticum*								+																
			Solanum		*gabrielae*								#																
			Solanum		*horridum*									^	#	#		#			+								
			Solanum		*lasiophyllum*							#	+	#		#													
316	Scrophulariaceae		*Stemodia*		*grossa*									+						+									
			Stemodia		*kingii*							#																	
325	Acanthaceae		*Dicliptera*		*armata*								^																
326	Myoporaceae		*Eremophila*		*forrestii*									#															
			Eremophila		*forrestii*	subsp.	*forrestii*							#		#													
			Eremophila		*longifolia*									#															
			Myoporum		*montanum*															+									

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331	Rubiaceae		*Oldenlandia*		*crouchiana*								+							+									
337	Cucurbitaceae		*Cucumis*		*maderaspatanus*							#	^	#		#	+			+									
		*	*Cucumis*		*melo*	subsp.	*agrestis*					#			#	#													
			Trichosanthes		*cucumerina*								#																
341	Goodeniaceae		*Goodenia*		*forrestii*									#	#	#	#	#											
			Goodenia		*microptera*								+	^	+	#	+	+	+	+	+		+		+				
			Goodenia		*pascua*							#																	
			Scaevola		*spinescens*			(narrow form)																+					
			Scaevola		*spinescens*			(broad leaf form)					#	#		#		#			+								
345	Asteraceae	*	*Flaveria*		*trinervia*							#																	
			Launaea		*sarmentosa*																	+							
			Pentalepis		*trichodesmoides*									#															
			Pluchea		sp.							#																	
			Pterocaulon		*sphacelatum*									#		#													
			Pterocaulon		*sphaeranthoides*															+									
			Streptoglossa		*bubakii*							#	#	#															
			Streptoglossa		*decurrens*							#	^			#				+									#
			Streptoglossa		*liatroides*							#																	
			Streptoglossa		sp.								#																

Appendix E

Quadrat data recorded from vegetation communities within the Dixon Island and Port Development areas

API Rail Flora

Site APQ01

Described by KH **Date** 20/04/2009 **Type** Q 50 X 50

MGA Zone 50 422561 **mE** 7663448 **mN**

Soil Red sands with rocky nodules

Vegetation Tall Open Shrubland dominated by *Acacia xiphophila* and *Acacia bivenosa* over a Mid-dense Hummock Grassland of *Triodia wiseana* (fine form), *Aristida* spp and *Eriachne pulchella* ssp. *pulchella* on red sandy loam.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Name	Cover (%)	Height (m)	Specimen
Acacia bivenosa#	4	1.5	BN54
Acacia xiphophylla#	7.5	2.5	AP1.02
Alysicarpus muelleri	<1	0.2	AP1.09
Aristida contorta#	8	0.15	BN03
**Cenchrus ciliaris#*	<1	0.6	BN21
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.05	AP1.18
Crotalaria dissitiflora ssp. *benthamiana*^	<1	0.15	BN117
Cucumis maderaspatanus^	<1	Creeper	BN57
Dichanthium sericeum ssp. *humilius*^	3	0.3	BN08A
Enneapogon caerulescens var. *caerulescens*^	<1	0.2	BN04
Eremophila forrestii ssp. *forrestii*^	<1	0.8	BN100
Eriachne pulchella ssp. *pulchella*	1	0.1	AP1.05
Euphorbia biconvexa	<1	0.15	AP1.16

Name	Cover (%)	Height (m)	Specimen
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	AP1.03
Gomphrena cunninghamii	<1	0.15	AP1.23
Goodenia forrestii	<1	0.05	AP1.19
Heliotropium heteranthum	<1	0.1	AP1.21
Indigastrum parviflorum	<1	0.1	AP1.10
Indigofera colutea^	<1	0.1	BN221
Indigofera linifolia^	<1	0.2	BN07
Indigofera trita	<1	0.05	AP1.08
Iseilema dolichotrichum	<1	0.05	AP1.07
Polygala aff. *isingii*	<1	0.1	AP1.22
**Portulaca oleracea*^	<1	0.2	BN207
Ptilotus carinatus^	<1	0.1	BN111
Ptilotus helipteroides var. *helipteroides*	<1	0.2	AP1.13
Rhagodia eremaea	<1	0.2	AP1.15
Rhynchosia minima#	<1	0.1	BN148
Sclerolaena costata#	<1	0.2	BN198
Triodia wiseana (fine form)#	70	0.9	AP1.01
Triumfetta clementii	<1	0.3	AP1.04

API Rail Flora

Site APQ02

Described by KH **Date** 20/04/2009 **Type** Q 50 X 50

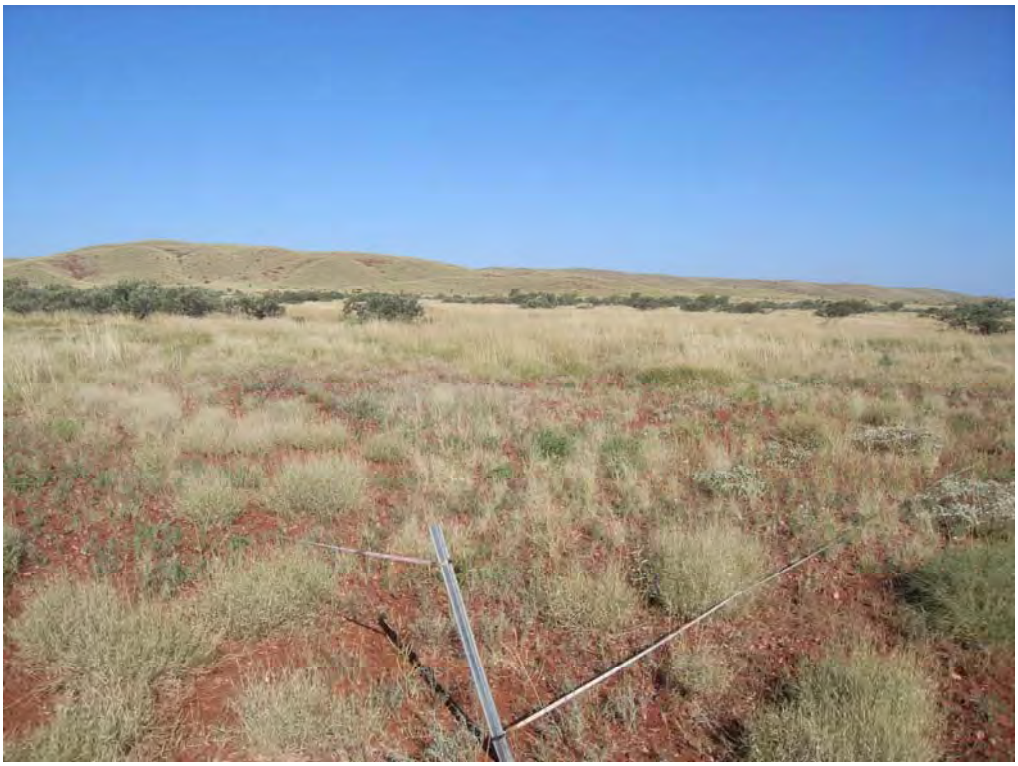
MGA Zone 50 422511 **mE** 7663569 **mN**

Soil Red rocky clayey loam

Vegetation Shrubland of *Acacia xiphophila* over a Hummock Grassland of *Triodia wiseana* (fine form) over an Open Tussock Grassland dominated by *Aristida contorta* and *Eragrostis xerophila* on red rocky clay loam

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon oxycarpum ssp. *prostratum*	<1	creeper	AP2.14
Acacia xiphophylla#	12	2	AP2.26
*Alysicarpus muelleri^*	<1	0.2	BN200
Aristida contorta#	15	0.3	AP2.10
Bonamia media var. *villosa^*	<1	0.3	BN27
Brachyachne convergens	<1	0.05	AP2.16
Bulbostylis barbata	<1	0.05	AP2.24
Chrysopogon fallax#	<1	0.8	AP2.02
Cleome viscosa	0.5	0.1	AP2.12
Corchorus aff. *walcotti* (K.J. Atkins 570)	1	0.3	AP2.03
*Corchorus laniflorus^*	<1	0.2	BN24
Crotalaria medicaginea var. *neglecta#*	<1	0.4	BN233
Dactyloctenium radulans#	<1	0.15	BN19
Dichanthium sericeum ssp. *humilius#*	1	0.3	BN13

Species	Cover (%)	Height (m)	Specimen
Ehretia saligna var. *saligna*	<1	0.3	AP2.28
Eragrostis xerophila#	12	0.15	AP2.11
Eremophila forrestii ssp. *forrestii*#	<1	0.8	BN100
Eriachne benthamii^	<1	0.4	AP07
Euphorbia biconvexa	<1	0.2	AP2.04
Gomphrena affinis ssp. *pilbarensis*#	<1	0.4	BN09
Goodenia forrestii	<1	0.15	AP2.09
Gossypium australe (Burrup Peninsula form)	<1	0.3	BN181
Heliotropium conocarpum^	<1	0.2	BN93
Hybanthus aurantiacus^	<1	0.4	BN209
Indigofera colutea	<1	0.05	AP2.13
Indigofera linifolia#	<1	0.1	BN07
Indigofera linnaei	<1	0.1	AP2.31
Ipomoea coptica	<1	0.05	AP2.36
Iseilema dolichotrichum^	1	0.3	BN14
Leptopus decaisnei^	<1	0.2	AP04
Polycarpaea longiflora^	<1	0.2	BN179
Ptilotus aervoides	<1	0.02	AP2.17
Ptilotus carinatus^	<1	0.05	BN111
Ptilotus exaltatus^	<1	0.4	
Ptilotus fusiformis var. *fusiformis*#	<1	0.2	AP05
Ptilotus helipteroides^	<1	0.3	AP06
Rhynchosia minima#	<1	0.4	BN77
Sclerolaena costata^	<1	0.1	BN198
Senna artemisioides ssp. aff. *oligophylla* (thinly sericeous)	<1	0.4	AP2.05
Sesbania cannabina^	<1	0.2	BN164
Sida aff. *fibulifera* (HD200-6)	<1	0.1	AP2.32
Sida spinosa^	<1	0.4	BN33
Solanum diversiflorum^	<1	0.2	BN69
Sporobolus australasicus	<1	0.05	AP2.23
Streptoglossa bubakii^	1	0.4	BN95
Streptoglossa decurrens	<1	0.05	AP2.07
Tephrosia aff. *supina* (MET 12,357)#	<1	0.4	BN204
Trichodesma zeylanicum var. *zeylanicum*#	<1	0.15	AP2.19
Triodia wiseana (fine form)#	25	0.4	AP2.01
Triumfetta clementii^	<1	0.2	BN29

API Rail Flora

Site APQ03

Described by KH **Date** 20/04/2009 **Type** Q 50 X 50

MGA Zone 50 422610 **mE** 7663627 **mN**

Soil Red clay with occasional stones

Vegetation Shrubland of *Acacia xiphophila* over a Tussock Grassland dominated by *Eriachne pulchella* ssp. *dominii*, *Aristida contorta* and *Eragrostis xerophila* on rocky red clay loam.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia synchronicia#	1.5	0.3	BN203
Acacia xiphophylla#	11	2	AP3.05
Aristida contorta#	20	0.2	BN03
**Cenchrus ciliaris*^	<1	0.4	BN21
Corchorus aff. *walcotti* (K.J. Atkins 570)	1	0.3	AP3.15
*Corchorus laniflorus^*	<1	0.3	BN24
Dactyloctenium radulans	<1	0.1	AP3.16
Dichanthium sericeum ssp. *humilius^*	8	0.3	BN08A
Enneapogon caerulescens var. *caerulescens^*	<1	0.2	BN04
Eragrostis xerophila	2	0.1	AP3.01
Eriachne pulchella ssp. *dominii*	70	0.1	AP3.09
Eriachne pulchella ssp. *pulchella^*	15	0.1	AP09
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.07	AP3.17

Species	Cover (%)	Height (m)	Specimen
Goodenia forrestii^	<1	0.1	BN201
Hibiscus sturtii var. *platychlamys*	<1	0.05	AP3.04
Polygala aff. *isingii*	<1	0.05	AP3.14
Ptilotus exaltatus var. *exaltatus*	<1	0.05	AP3.18
Ptilotus obovatus var. *obovatus*^	<1	0.4	AP02
Sclerolaena densiflora^	<1	0.1	AP10
Senna glutinosa ssp. *luerssenii*#	<1	0.2	AP3.07
Sporobolus australasicus	1	0.05	AP3.03
Tephrosia clementii	<1	0.1	AP3.13
Triodia aff. *pungens*	<1	0.7	AP3.11
Triodia wiseana (fine form)#	6	0.5	AP3.10
Triumfetta clementii	<1	0.1	AP3.12

API Rail Flora

Site APQ04

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

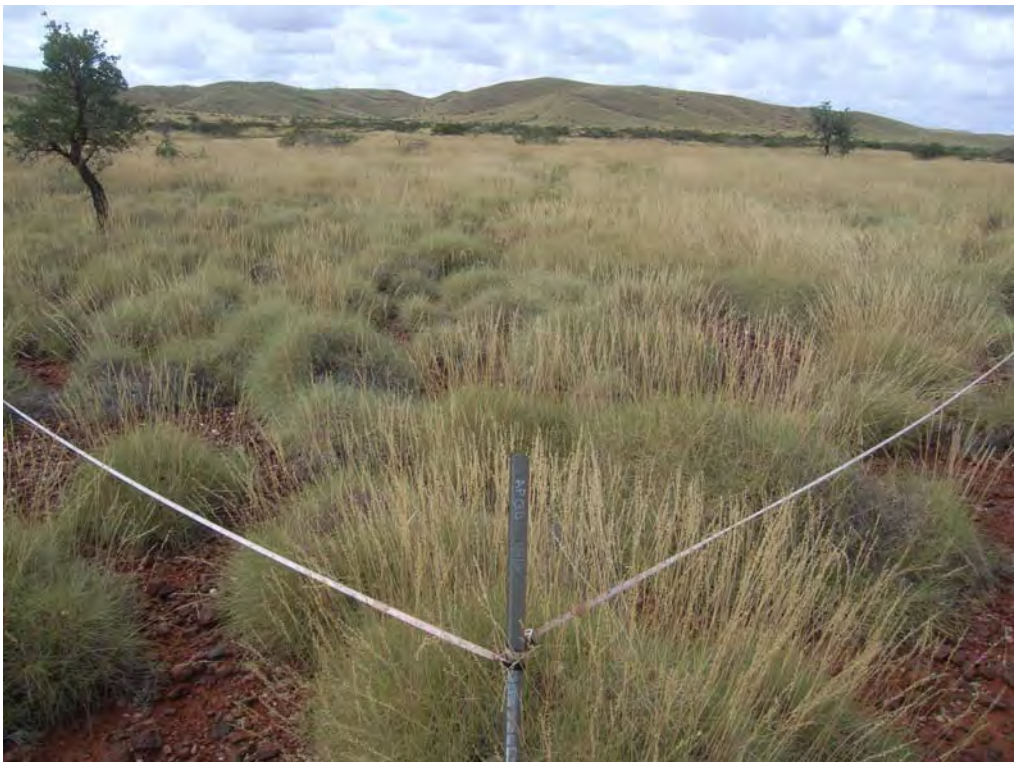
MGA Zone 50 422902 **mE** 7664026 **mN**

Soil Orange red rocky clay

Vegetation Tall Open Shrubland of *Acacia pyrifolia* var. *pyrifolia* over a Closed Hummock Grassland dominated by *Triodia wiseana* (fine form).

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (1) (MET 15 352)	<1	0.1	AP4.31
Acacia ancistrocarpa#	<1	1	BN41
Acacia inaequilatera	<1	0.9	AP4.35
Acacia pyrifolia var. *pyrifolia^*	5	2.4	BN56
Acacia synchronicia#	<1	0.9	BN203
Alysicarpus muelleri#	<1	0.2	BN200
Aristida contorta#	3	0.2	BN03
Bonamia media var. *villosa*	<1	creeper	AP4.15
Brachyachne convergens	<1	0.2	AP4.22
**Cenchrus ciliaris*	<1	0.5	AP4.07
Chloris pectinata	<1	0.2	AP4.24
Chrysopogon fallax	<1	0.8	AP4.03
Cleome viscosa	<1	0.3	AP4.17
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	AP4.16

Species	Cover (%)	Height (m)	Specimen
Corchorus laniflorus^	<1	0.2	BN24
Crotalaria medicaginea var. *neglecta*	<1	0.15	AP4.30
Cucumis maderaspatanus#	<1	creeper	AP4.33
Dactyloctenium radulans^	<1	0.05	BN19
Dichanthium sericeum ssp. *humilius*#	1	0.2	BN08A
Enneapogon caerulescens var. *caerulescens*	1	0.1	AP4.40
Eragrostis xerophila#	1	0.3	BN197
Eremophila forrestii ssp. *forrestii*#	<1	0.7	AP4.08
Eremophila longifolia^	1	1	BN184
Eriachne benthamii	<1	0.4	AP4.04
Evolvulus alsinoides var. *villosicalyx*#	<1	0.1	BN241
Gomphrena affinis ssp. *pilbarensis*#	<1	0.3	BN09
Goodenia forrestii#	<1	0.2	BN201
Heliotropium heteranthum	<1	0.20	AP4.27
Indigofera colutea	<1	0.1	AP4.43
Indigofera linifolia#	<1	0.15	BN07
Indigofera trita	<1	0.2	AP4.11
Iseilema dolichotrichum^	3	0.15	BN14
Iseilema macratherum	<1	0.6	AP4.05
**Portulaca oleracea*^	<1	0.2	BN207
Ptilotus aervoides	<1	0.05	AP4.39
Ptilotus exaltatus var. exaltatus	<1	0.1	AP4.18
Rhynchosia minima#	<1	creeper	BN148
Sclerolaena costata^	<1	0.1	BN198
Senna artemisioides aff ssp. *oligophylla* (thinly sericeous)#	<1	0.4	AP01
Solanum lasiophyllum^	<1	0.1	
Sporobolus australasicus	<1	0.1	AP4.37
Streptoglossa bubakii^	<1	0.15	BN95
Swainsona formosa^	<1	0.2	
Tephrosia aff. *supina* (MET 12,357)#	<1	0.2	BN204
Trichodesma zeylanicum var. *zeylanicum*#	<1	0.1	BN59
Triodia epactia^	1	0.6	BN153
Triodia wiseana (fine form)#	75	1.2	AP18
Triumfetta clementii#	<1	0.2	AP4.14

API Rail Flora

Site APQ05

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 423059 **mE** 7664131 **mN**

Soil Red clay with quartz nodules

Vegetation Shrubland of *Acacia xiphophila* over a Closed Tussock Grassland dominated by *Aristida contorta* and *Eriachne pulchella* ssp. *dominii* on red rocky clay loam.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia xiphophylla#	20	2	AP5.01
Alysicarpus muelleri	<1	0.2	AP5.18
Aristida contorta#	60	0.4	AP5.02
Brachyachne prostrata	<1	0.05	AP5.04
Dichanthium sericeum ssp. *humilius#*	1	0.1	BN13
Enteropogon ramosus	<1	AP5.21	
Eragrostis xerophila#	10	0.3	AP5.08
Eriachne pulchella ssp. *dominii*	30	0.15	AP5.03
Eriachne pulchella ssp. *pulchella^*	15	0.2	AP09
Gomphrena affinis ssp. *pilbarensis#*	<1	0.3	BN09
Heliotropium heteranthum	<1	0.05	AP5.09
*Iseilema dolichotrichum^*	<1	0.1	BN14
Neptunia dimorphantha	<1	0.6	AP5.07
Polygala aff. *isingii*	<1	0.05	AP5.10

Species	Cover (%)	Height (m)	Specimen
Ptilotus carinatus^	<1	0.2	BN111
Ptilotus exaltatus var. *exaltatus*#	<1	0.1	AP5.16
Sclerolaena densiflora	<1	0.1	AP10
Sclerolaena eriacantha^	<1	0.05	AP5.05
Senna glutinosa ssp. *luerssenii*	<1	0.4	AP5.19
Senna glutinosa ssp. *x luerssenii*^	<1	0.2	AP08
Senna hamersleyensis	<1	0.25	AP5.12
Sida aff. *fibulifera* (HD200-6)	<1	0.15	AP5.15
Solanum diversiflorum	<1	0.2	AP5.17
Sporobolus australasicus	<1	0.1	AP5.13
Tephrosia aff. *supina* (MET 12,357)^	<1	0.2	BN204
Tephrosia clementii	<1	0.15	AP5.20
Triodia wiseana (fine form)	1	0.5	AP5.06

API Rail Flora

Site APQ06

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 423739 **mE** 7664650 **mN**

Soil Red rocky substrate with very little soil present. Where soil is present it is sandy

Vegetation Closed Hummock Grassland dominated by *Triodia wiseana* (fine form) on hillslopes, ridgetops and stony plains.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia synchronicia	<1	0.6	AP6.16
Alysicarpus muelleri^	<1	0.4	BN200
Aristida contorta#	7	0.3	AP6.10
Boerhavia coccinea	<1	0.2	AP6.15
Bonamia media var. *villosa*	<1	0.15	AP6.13
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP6.05
Eriachne pulchella ssp. *pulchella*^	<1	0.1	AP09
Euphorbia australis	<1	0.1	AP6.06
Euphorbia boophthona	<1	0.15	AP6.14
Evolvulus alsinoides var. *villosicalyx*^	<1	0.2	BN241
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.15	AP6.03
Iseilema dolichotrichum	<1	0.1	AP6.04
Polycarpaea longiflora (white form)	<1	0.15	AP6.12
Polygala aff. *isingii*	<1	0.1	AP6.11

Species	Cover (%)	Height (m)	Specimen
**Portulaca oleracea*^	<1	0.05	BN207
Ptilotus carinatus^	<1	0.05	BN111
Ptilotus exaltatus^	<1	0.2	
Ptilotus helipteroides^	<1	0.2	AP06
Sclerolaena densiflor^*a*	<1	0.1	AP10
Senna glutinosa ssp. *pruinosa*	<1	0.8	AP6.02
Senna sp. *Karijini* (M.E. Trudgen 10392)^	<1	1.1	BN49
Sesbania cannabina^	<1	0.3	AP16
Streptoglossa bubakii^	<1	0.2	BN95
Streptoglossa decurrens	<1	0.1	AP6.07
Triodia wiseana (fine form)#	80	0.6	AP6.01
Triumfetta clementii	<1	0.2	AP6.09

API Rail Flora

Site APQ07

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 424126 **mE** 7664823 **mN**

Soil Red sandy loam

Vegetation Mixed Acacia Shrubland dominated *Acacia victoriae*, *Acacia ancistrocarpa* and *Acacia bivenosa* over a Mid-dense Hummock Grassland of *Triodia wiseana* (fine form) over a Very Open Tussock Grassland dominated by *Paraneurachne muelleri*, *Aristida contorta* and *Themeda triandr*a on red sandy loam.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum (4)*	<1	0.2	AP7.21
Acacia ancistrocarpa#	22	2	AP7.03
Acacia bivenosa#	5	0.9	BN54
Acacia inaequilatera	<1	1.8	AP7.10
Acacia victoriae	22	2	AP7.16
Alysicarpus muelleri	<1	0.1	AP7.26
Aristida contorta#	10	0.2	BN03
**Cenchrus ciliaris#*	3	0.4	BN21
*Corchorus laniflorus^*	<1	0.3	BN24
*Cucumis maderaspatanus^*	<1	BN57	
Dichanthium sericeum ssp. *humilius#*	1	0.2	BN08A
Dysphania rhadinostachya ssp. *rhadinostachya^*	<1	0.2	AP19
Enneapogon caerulescens var. *caerulescens^*	<1	0.2	BN04

Species	Cover (%)	Height (m)	Specimen
Enneapogon polyphyllus	<1	0.3	AP7.29
Euphorbia biconvexa	<1	0.1	AP7.20
Evolvulus alsinoides var. *villosicalyx#*	<1	0.3	BN241
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.3	AP7.22
Gomphrena affinis ssp. *pilbarensis#*	<1	0.2	BN09
Gomphrena cunninghamii	<1	0.02	AP7.38
Goodenia forrestii#	<1	0.3	BN201
Hibiscus sturtii var. *platychlamys*	0.2	0.25	AP7.09
Hybanthus aurantiacus#	<1	0.2	BN209
Indigofera monophylla (Cape Preston form)^	<1	0.2	BN180
Iseilema dolichotrichum#	<1	0.1	BN14
Leptopus decaisnei var. *orbicularis*	<1	0.1	AP7.34
Melhania sp. (CH15-39)	<1	0.2	AP7.23
Paraneurachne muelleri	2	0.4	AP7.33
Paspalidium clementii	<1	0.1	AP7.18
Polycarpaea longiflora (white form)#	<1	0.2	AP7.31
**Portulaca oleracea^*	<1	0.15	BN207
*Ptilotus carinatus^*	<1	0.2	BN124
Ptilotus exaltatus var. *exaltatus*	<1	0.2	AP7.28
Ptilotus helipteroides var. *helipteroides^*	<1	0.2	AP06
Rhynchosia minima	<1	0.1	AP7.01
*Sclerolaena costata^*	<1	0.2	BN198
Senna artemisioides aff. ssp. *oligophylla (thinly sericeous)^*	1	1	AP1
Senna artemisioides ssp. *oligophylla*	<1	0.5	AP7.36
Senna glutinosa ssp. *glutinosa*	<1	0.6	AP7.14
Senna glutinosa ssp. *x luerssenii^*	<1	0.4	AP08
Sida aff. *echinocarpa* (MET 15,350)	<1	1.2	AP7.15
Solanum diversiflorum#	<1	0.2	BN69
Solanum lasiophyllum	<1	0.3	AP7.12
Sporobolus australasicus	<1	0.1	AP7.32
*Stemodia kingii^*	<1	0.3	BN94
Tephrosia aff. *supina* (MET 12,357)#	<1	0.3	BN204
Themeda triandra	1	0.5	AP7.08
Trichodesma zeylanicum var. *zeylanicum#*	<1	0.5	BN59
Triodia wiseana (fine form)#	40	0.8	AP18
Triumfetta clementii#	<1	0.2	BN05

API Rail Flora

Site APQ08

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 424841 **mE** 7665277 **mN**

Soil Red rocky soil

Vegetation Tall Shrubland of *Acacia synchronicia* and *Acacia bivenosa* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) over a Very Open Tussock Grassland dominated by **Cenchrus ciliaris* and *Aristida contorta* on red sandy loam.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon fraseri	<1	0.1	AP8.29
Acacia bivenosa#	2	1.7	BN54
Acacia pyrifolia var. *pyrifolia*^	15	3	BN56
Acacia synchronicia#	9	2.5	AP8.22
Alysicarpus muelleri#	<1	0.1	BN200
Aristida contorta#	25	0.3	BN03
Bonamia media var. *villosa*	<1	0.05	AP8.23
**Cenchrus ciliaris*#	3	0.4	AP8.03
Cucumis maderaspatanus#	<1	0.05	BN57
Dactyloctenium radulans^	<1	0.05	BN19
Dichanthium sericeum ssp. *humilius*^	<1	0.1	BN08A
Digitaria ctenantha	<1	0.15	AP8.27
Duperreya commixta	<1	creeper	AP8.11
Enneapogon caerulescens var. *caerulescens*#	<1	0.15	BN04

Species	Cover (%)	Height (m)	Specimen
Eremophila forrestii ssp. *forrestii*	<1	1	AP8.12
Eremophila longifolia	<1	1.8	AP8.17
Eriachne pulchella ssp. *pulchella*^	<1	0.1	AP09
Euphorbia sp. (BPBS10-50)	<1	0.02	AP8.28
Evolvulus alsinoides var. *villosicalyx*#	<1	0.1	BN241
Indigofera linifolia^	<1	0.1	BN07
Iseilema dolichotrichum#	1	0.15	AP8.07
Leptopus decaisnei var. *orbicularis*#	<1	0.1	AP8.30
Melhania sp. (CH15-39)	<1	0.1	AP8.24
**Portulaca oleracea*^	<1	0.2	BN207
Ptilotus carinatus^	<1	0.1	BN111
Ptilotus exaltatus var. *exaltatus*^	<1	0.3	
Ptilotus helipteroides var. *helipteroides*#	1.5	0.15	AP06
Rhagodia eremaea	<1	1	AP8.13
Rhynchosia minima^	<1	0.1	BN77
Salsola tragus ssp. *grandiflora*^	<1	0.2	BN248
Scaevola spinescens (broad leaf form)#	<1	1	AP8.15
Sclerolaena costata^	<1	0.1	BN198
Sclerolaena densiflora^	<1	0.1	AP10
Senna artemisioides ssp. *oligophylla x helmsii*	<1	0.8	AP8.19
Senna glutinosa ssp. *glutinosa*	<1	0.4	AP8.08
Senna glutinosa ssp. *luerssenii*	<1	0.6	AP8.25
Senna glutinosa ssp. *pruinosa*	<1	0.6	AP8.05
Senna glutinosa ssp. *x luerssenii*^	<1	1	AP08
Senna sp. *Karijini* (M.E. Trudgen 10392)^	<1	1	BN49
Solanum lasiophyllum	<1	0.2	AP8.21
Streptoglossa bubakii^	<1	0.2	BN95
Trichodesma zeylanicum var. *zeylanicum*#	<1	0.3	BN59
Triodia wiseana (fine form)#	60	0.6	AP8.01
Triumfetta clementii#	<1	0.3	BN29

API Rail Flora

Site APQ09

Described by LC **Date** 2/09/2008 **Type** Q 50 X 50

MGA Zone 50 424677 **mE** 7665538 **mN**
Soil Red rocky soil
Vegetation
Veg Condition Very Good
Fire Age
Notes **Not rescored in 2009**

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa	25	2	BN41
Acacia pyrifolia var. *pyrifolia*	10	0.4	AP03
Acacia trachycarpa	10	2	BN222
Alternanthera angustifolia	<1	0.2	AP21
**Cenchrus ciliaris*	20	0.6	AP21
Corchorus laniflorus	<1	0.2	BN24
Eucalyptus victrix	5	15	
Indigofera monophylla (Cape Preston form)	<1	0.2	BN180
Leptopus decaisnei var. *orbicularis*	<1	0.1	AP4
Polycarpaea longiflora	<1	0.3	BN179
**Portulaca oleracea*	<1	0.1	BN207
Ptilotus clementii	<1	0.2	BN42
Senna artemisioides ssp. *oligophylla*	1	0.5	AP01
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	BN59
Triodia wiseana	20	0.2	BN178
Triumfetta clementii	<1	0.2	BN29

API Rail Flora

Site APQ10

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 425141 **mE** 7665464 **mN**

Soil Red clay

Vegetation Tall Open Scrub dominated by *Acacia bivenosa* and *Acacia xiphophila* over a Closed Hummock Grassland dominated by *Triodia wiseana* (fine form) and *Themeda triandra* on red sandy loam in drainage lines.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa#	50	2.5	BN54
Acacia pyrifolia var. *pyrifolia*^	1	3	BN56
Acacia xiphophylla#	5	0.3	
Aristida contorta#	<1	0.1	BN03
Bonamia media var. *villosa*	<1	0.04	AP10.21A
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.4	AP10.19
Cymbopogon procerus^	30	0.8	BN182
Dichanthium sericeum ssp. *humilius*^	<1	0.3	BN13
Eremophila forrestii ssp. *forrestii*#	<1	0.2	AP10.21B
Evolvulus alsinoides var. *villosicalyx*#	<1	0.1	BN241
Hakea lorea ssp. *lorea*#	1	2.5	AP22
Hybanthus aurantiacus#	<1	0.2	BN209
Indigofera monophylla (Cape Preston form)#	<1	0.3	AP10.08

Species	Cover (%)	Height (m)	Specimen
Ptilotus exaltatus var. *exaltatus*	<1	0.1	AP10.12
Ptilotus helipteroides var. *helipteroides*	<1	0.02	AP10.04
Rhagodia eremaea	<1	0.8	AP10.20
Scaevola spinescens (broad leaf form)^	<1	0.7	BN64
Senna glutinosa ssp. *glutinosa*	<1	0.5	AP10.06
Senna glutinosa ssp. *luerssenii*#	<1	0.4	AP08
Sida arsiniata^	<1	0.3	AP10.23
Solanum diversiflorum#	<1	0.2	AP10.14
Solanum lasiophyllum	<1	0.2	AP10.10
Sorghum timorense#	1	0.5	AP10.15
Sporobolus australasicus	<1	0.1	AP10.16
Tephrosia aff. *supina* (MET 12,357)^	1	0.3	BN204
Themeda triandra	30	0.4	AP10.13
Triodia wiseana (fine form)#	55	0.9	AP10.01
Triumfetta clementii#	<1	0.15	BN29
Waltheria indica	<1	0.3	AP10.22

API Rail Flora

Site APQ11

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 425766 **mE** 7665865 **mN**

Soil Orange red clay with quartz nodules

Vegetation Tall Shrubland of *Acacia xiphophila* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) and *Sorghum timorense* on red rocky clay loam.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia xiphophylla#	20	3	AP11.02
Aristida contorta	<1	0.1	AP11.15
**Cenchrus ciliaris*	<1	0.4	AP11.10
*Chrysopogon fallax^*	30	0.5	BN79
Dichanthium sericeum ssp. *humilius#*	<1	0.15	BN08A
Eragrostis xerophila	<1	0.4	AP11.06
Eriachne pulchella ssp. *dominii*	<1	0.2	AP11.21
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.2	AP11.05
Indigofera linifolia#	<1	0.2	AP11.19
Ipomoea coptica	<1	creeper	AP11.11
*Iseilema dolichotrichum^*	<1	0.15	BN14
**Malvastrum americanum*	<1	0.2	AP11.07
Neptunia dimorphantha	<1	0.05	AP11.12
Paspalidium clementii	<1	0.1	AP11.13
Phyllanthus maderaspatensis	<1	0.2	AP11.20
Ptilotus exaltatus var. *exaltatus*	<1	0.3	AP11.09A
Ptilotus helipteroides var. *helipteroides*	<1	0.1	AP11.18
Rhynchosia minima#	<1	0.05	BN148
Senna artemisioides ssp. *oligophylla^*	<1	0.4	AP01
Senna glutinosa ssp. *glutinosa*	<1	0.4	AP11.08
*Setaria dielsii^*	<1	0.1	BN18
Sida aff. *fibulifera* (HD200-6)	<1	0.4	AP11.09C
Sorghum timorense	10	0.6	AP11.03
Sporobolus australasicus	<1	0.1	AP11.04
Tephrosia clementii	<1	0.05	AP11.09B
Triodia wiseana (fine form)#	50	0.8	AP11.01
Urochloa pubigera	<1	0.1	AP11.17

API Rail Flora

Site APQ12

Described by KH **Date** 22/04/2009 **Type** Q 50 X 50

MGA Zone 50 426766 **mE** 7665983 **mN**

Soil Rocky orange loam

Vegetation Open Woodland of *Eucalyptus victrix* over an Open Heath dominated by *Acacia bivenosa*, *Acacia trachycarpa* and *Acacia sclerosperma* ssp.*sclerosperma* over a Hummock Grassland of *Triodia wiseana* (fine form), *Triodia epactia* and **Cenchrus ciliaris* in rocky drainage lines.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon fraseri	<1	0.2	AP12.21
Acacia bivenosa#	35	1.6	AP12.01
Acacia inaequilatera	<1	1.5	AP12.26
Acacia ligulata	<1	0.9	AP12.33
Acacia pyrifolia var. *pyrifolia#*	3	3	BN56
Acacia sclerosperma ssp. *sclerosperma*	1	1.7	AP12.04
Acacia trachycarpa#	15	2	BN222
**Aerva javanica*	<1	0.4	AP12.27
Boerhavia burbidgeana	<1	0.05	AP12.36
Boerhavia coccinea	<1	0.1	AP12.34A
Bonamia media var. *villosa*	<1	0.05	AP12.28
**Cenchrus ciliaris#*	20	0.6	BN21
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	AP12.20A
*Corchorus laniflorus^*	<1	0.1	BN24

Species	Cover (%)	Height (m)	Specimen
Cucumis maderaspatanus	<1	creeper	AP12.09
Dichanthium sericeum ssp. *humilius*	<1	0.1	AP12.30
Eremophila longifolia	0.5	0.4	AP12.24
Euphorbia sp. (BPBS10-50)	<1	0.05	AP12.37
Euphorbia wheeleri#	<1	0.1	BN176
Goodenia forrestii	<1	0.1	AP12.10
Gossypium australe (Burrup Peninsula form)	<1	0.2	AP12.12
Grevillea pyramidalis ssp. *leucadendron#*	<1	2.3	BN24
Hibiscus sturtii var. *platychlamys*	<1	0.2	AP12.20B
Hybanthus aurantiacus#	<1	0.2	BN209
*Indigofera linifolia^*	<1	0.1	BN07
Indigofera monophylla (Cape Preston form)^	<1	0.2	BN180
Indigofera monophylla (grey/green leaflet form)	<1	0.02	AP12.29
*Ipomoea muelleri^*	<1	AP27	
*Leptopus decaisnei^*	<1	0.1	AP04
Leptopus decaisnei var. *orbicularis*	<1	0.05	AP12.31
*Mollugo molluginea^*	<1	0.2	BN219
*Polycarpaea longiflora^*	<1	0.2	BN179
Polymeria ambigua	<1	creeper	AP12.22
**Portulaca oleracea#*	<1	0.2	BN207
Ptilotus carinatus#	<1	0.1	BN111
*Ptilotus clementii^*	<1	0.2	BN42
Ptilotus exaltatus var. *exaltatus#*	<1	0.3	
Ptilotus helipteroides var. *helipteroides*	<1	0.05	AP12.18
Rhynchosia minima#	<1	0.1	BN148
Scaevola spinescens (broad leaf form)#	<1	0.5	AP12.32
Senna artemisioides ssp. *oligophylla x helmsii*	<1	0.6	AP12.16
Senna glutinosa ssp. *pruinosa*	<1	0.4	AP12.13
Senna glutinosa ssp. *x luerssenii^*	<1	0.1	AP08
*Sesbania cannabina^*	<1	0.3	AP16
Solanum diversiflorum	<1	0.2	AP12.07
Sporobolus australasicus	<1	0.05	AP12.06
Tephrosia aff. *supina* (MET 12,357)^	<1	0.3	BN204
Tephrosia rosea var. *clementii*	<1	1	AP12.05
Tephrosia sp. *B Kimberley Flora* (C.A. Gardner 7300)^	<1	0.9	AP25
Triodia epactia#	15	0.8	BN153
Triodia wiseana (fine form)#	20	0.6	BN63
Triumfetta clementii#	<1	0.3	BN29
Waltheria indica#	<1	0.4	AP26

API Rail Flora

Site APQ13

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

MGA Zone50 427110 **mE** 7666161 **mN**

Soil Rocky red soil on hill slopes

Vegetation Open Shrubland of *Acacia ancistrocarpa* with scattered *Acacia synchronicia* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on rocky hill slopes.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.2	AP13.21
Acacia ancistrocarpa#	5	2	BN238
Acacia synchronicia	<1	0.3	AP13.13
Aristida contorta#	20	0.3	BN03
Boerhavia coccinea	<1	0.05	AP13.18
Bonamia media var. *villosa#*	<1	0.2	AP13.25
Corchorus laniflorus#	<1	0.2	AP13.06
Dichanthium sericeum ssp. *humilius*	1	0.1	AP13.04
Enneapogon caerulescens var. *caerulescens*			AP13.20
Eucalyptus camaldulensis	5	1.3	AP13.12
Euphorbia australis	<1	0.2	AP13.22
Fimbristylis aff. *dichotoma* (M75-4)	2	0.15	AP13.11
Gomphrena affinis ssp. *pilbarensis^*	<1	0.2	BN09
Gossypium australe (Burrup Peninsula form)^	<1	0.2	AP13.17A

Species	Cover (%)	Height (m)	Specimen
Heliotropium heteranthum	<1	0.2	AP13.23
Indigofera linifolia	<1	0.1	AP13.10
Indigofera monophylla	<1	0.3	AP13.28
Indigofera monophylla (Cape Preston form)^	<1	0.2	BN180
Iseilema dolichotrichum	1	0.1	AP13.03
Pentalepis trichodesmoides#	<1	0.3	AP13.26
Polycarpaea holtzei	<1	0.05	AP13.08
Polycarpaea longiflora (white form)#	<1	0.2	AP13.02
*Ptilotus carinatus^*	<1	0.05	BN111
*Ptilotus clementii^*	<1	0.2	BN42
Ptilotus exaltatus var. *exaltatus#*	<1	0.3	
Ptilotus helipteroides var. *helipteroides#*	<1	0.15	AP06
*Rhynchosia minima^*	<1	0.1	BN148
*Sclerolaena densiflora^*	<1	0.1	AP10
Senna glutinosa ssp. *luerssenii*	<1	0.2	AP13.15
Senna glutinosa ssp. *pruinosa*	<1	0.5	AP13.14
Senna sp. *Karijini* (M.E. Trudgen 10392)^	<1	0.3	BN49
Sida aff. *echinocarpa* (MET 15,350)	<1	0.5	AP13.17B
*Sida clementii^*	<1	0.3	BN208
Sida sp. *spiciform panicles* (E. Leyland s.n. 14/8/1990)			AP13.16B
*Solanum diversiflorum^*	<1	0.2	BN69
*Solanum horridum^*	<1	0.2	AP28
Tephrosia aff. *supina* (MET 12,357)^	<1	0.2	BN204
Trachymene oleracea ssp. *oleracea^*	<1	0.4	BN39
Tribulus hirsutus	<1	2	AP13.24
Trichodesma zeylanicum var. *zeylanicum#*	<1	0.3	BN59
Triodia wiseana (fine form)#	40	0.7	AP18
Triumfetta clementii#	<1	0.3	AP13.27

API Rail Flora

Site APQ14

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

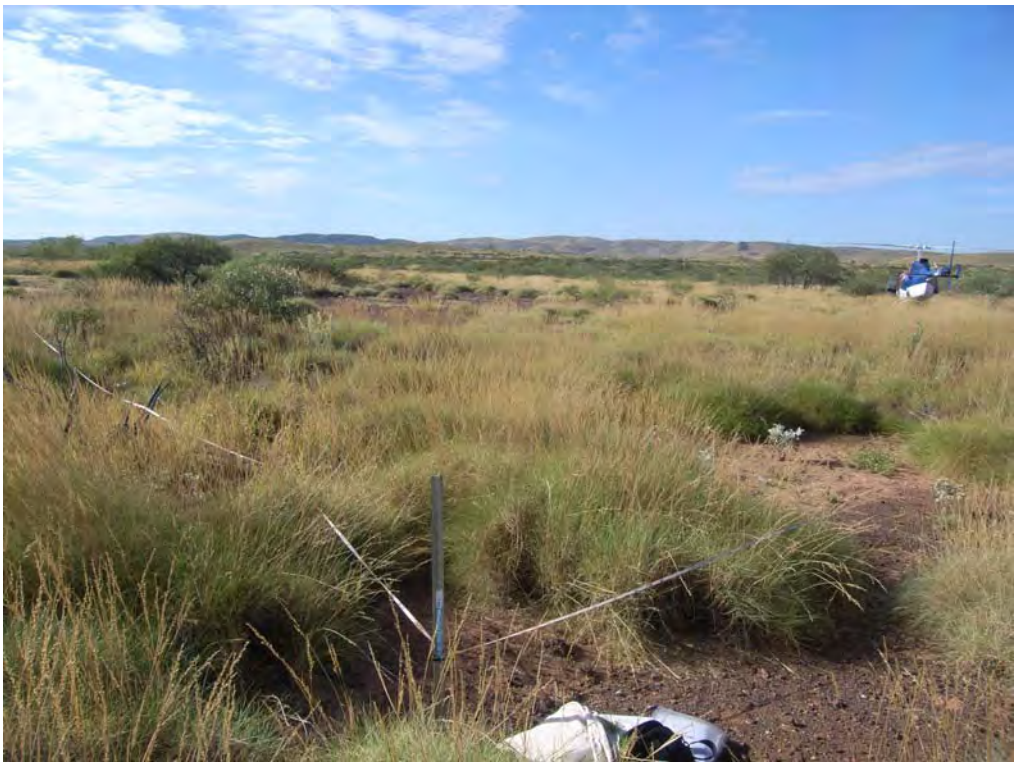
MGA Zone 50 427500 **mE** 7666206 **mN**

Soil Grey brown loam

Vegetation Tall Open Shrubland of *Acacia synchronicia* over a Hummock Grassland of *Triodia wiseana* (fine form) on rocky hill slopes

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.1	AP14.25B
Acacia synchronicia#	3	3	BN203
Acacia xiphophylla#	1	1.2	
Aristida contorta	2	0.1	AP14.09
Boerhavia coccinea	<1	0.02	AP14.21
Bonamia media var. *villosa*	<1	0.05	AP14.18
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	AP14.16
*Corchorus laniflorus^*	<1	0.3	BN239
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP14.30
Cucumis maderaspatanus	<1	creeper	AP14.27
Enneapogon caerulescens var. *caerulescens#*	3	0.1	AP14.14
Eremophila forrestii ssp. *forrestii#*	<1	1.2	AP14.02
Euphorbia aff. *australis^*	<1	0.05	BN234
Euphorbia sp. (BPBS10-50)	<1	0.05	AP14.24

Species	Cover (%)	Height (m)	Specimen
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP14.07
Goodenia forrestii	<1	0.2	AP14.31
Heliotropium heteranthum	<1	0.02	AP14.20
Indigofera linifolia	<1	0.2	AP14.28
Iseilema dolichotrichum	<1	0.05	AP14.25
Lepidium pedicellosum^	<1	0.3	AP31
Leptopus decaisnei var. *orbicularis*#	<1	0.2	AP04
Ptilotus exaltatus var. *exaltatus*#	<1	0.2	
Ptilotus helipteroides var. *helipteroides*#	<1	0.2	AP14.08
Rhynchosia minima	<1	creeper	AP14.23
Sclerolaena costata#	<1	0.1	BN198
Senna glutinosa ssp. *luerssenii*	<1	0.8	AP14.11
Senna glutinosa ssp. *x luerssenii*^	<1	0.8	AP08
Sida aff. *echinocarpa* (MET 15,350)	<1	0.2	AP14.13
Sida sp. *spiciform panicles* (E. Leyland s.n. 14/8/1990)	<1	0.2	AP14.15
Solanum lasiophyllum#	<1	0.3	
Trianthema aff. *triquetra* (M3.35)	<1	0.1	AP14.22
Trichodesma zeylanicum var. *zeylanicum*#	<1	0.2	BN59
Triodia wiseana (fine form)#	30	0.8	AP18
Triumfetta clementii	<1	0.2	AP14.04

API Rail Flora

Site APQ15

Described by KH **Date** 22/04/2009 **Type** Q 50 X 50

MGA Zone 50 504797 **mE** 7704597 **mN**

Soil Red cracking clay with occasional rocky nodules

Vegetation Horseflats dominated by *Eragrostis xerophila* and *Dichanthium sericeum* ssp. *humilius* on red clay loam

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Cleome viscosa	<1	0.2	AP15.20
**Cucumis melo ssp. agrestis*	<1	creeper	AP15.04
Dichanthium sericeum ssp. *humilius*#	15	0.3	BN13
Enneapogon caerulescens var. *caerulescens*	<1	0.1	AP15.17
Eragrostis xerophila#	30	0.15	AP15.03
Euphorbia coghlanii	<1	0.15	AP15.14
Euphorbia wheeleri^	1	0.2	BN176
Gomphrena affinis ssp. *pilbarensis*^	<1	0.2	BN09
Goodenia pascua	<1	0.15	AP15.19
Heliotropium conocarpum^	<1	0.2	BN93
Heliotropium heteranthum^	<1	0.02	BN218
Heliotropium inexplicitum	<1	0.02	AP15.15B
Indigofera trita	<1	0.2	AP15.12
Ipomoea muelleri^	<1	0.1	BN214

Species	Cover (%)	Height (m)	Specimen
Iseilema macratherum	1	0.1	AP15.06
Neptunia dimorphantha^	<1	0.15	BN17
Operculina aequisepala	<1	creeper	AP15.21
Panicum decompositum	<1	0.2	AP15.09
Panicum laevinode^	<1	0.2	BN115
Phyllanthus maderaspatensis	<1	0.2	AP15.13
Polygala aff. *isingii*	<1	0.1	AP15.22
**Portulaca oleracea*	<1	0.02	AP15.02
Ptilotus carinatus^	<1	0.2	AP17
Ptilotus exaltatus var. *exaltatus*#	<1	0.3	
Ptilotus helipteroides var. *helipteroides*#	<1	0.1	AP06
Rhynchosia minima#	<1	0.2	BN77
Salsola tragus ssp. *tragus*#	<1	0.4	
Sida aff. *fibulifera* (HD200-6)	<1	0.15	AP15.16
Sida spinosa^	<1	0.3	AP34
Sporobolus australasicus	<1	0.05	AP15.05
Stemodia kingii^	<1	0.3	BN94
Streptoglossa decurrens	<1	0.1	AP15.15A

API Rail Flora

Site APQ16

Described by KH **Date** 22/04/2009 **Type** Q 10 X 50

MGA Zone 50 504643 **mE** 7704490 **mN**

Soil Red cracking clay

Vegetation Low Open Woodland of *Corymbia hamersleyana* over a Shrubland dominated by *Acacia pyrifolia* ssp. *pyrifolia* and *Acacia inaequilatera* over a Low Shrubland of *Corchorus* aff. *walcotti* (K.J. Atkins 570) over a Tussock Grassland domianted by *Chrysopogon fallax*, *Themeda triandra* and *Bothriochloa ewartiana* in minor drainage lines.

Veg Condition Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa	<1	1.2	AP16.06
Acacia bivenosa^	1	0.8	BN54
Acacia inaequilatera	5	1.2	AP16.16
Acacia pyrifolia var. *pyrifolia*#	15	1.5	BN56
Boerhavia coccinea	<1	0.1	AP16.17A
Bothriochloa ewartiana	2	0.4	AP16.19
**Cenchrus ciliaris*#	20	0.8	BN21
Chrysopogon fallax#	5	0.8	BN79
Corchorus aff. *walcotti* (K.J. Atkins 570)	15	0.5	AP16.02
Corymbia hamersleyana#	20	8	AP38
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP16.09
Dichrostachys spicata	<1	0.7	AP16.05

Species	Cover (%)	Height (m)	Specimen
Euphorbia wheeleri^	<1	0.2	BN245
Evolvulus alsinoides var*. villosicalyx*	<1	0.1	AP16.04
Goodenia forrestii	<1	0.15	AP16.12
Hybanthus aurantiacus#	<1	0.2	BN209
Indigofera monophylla	<1	0.3	AP16.14
Indigofera monophylla (Cape Preston form)^	<1	0.3	BN180
**Malvastrum americanum*^	1	0.4	
Polymeria ambigua#	4	0.1	AP37
**Prosopis pallida*^	<1	0.4	
Senna artemisioides ssp*. oligophylla x helmsii*#	<1	0.4	AP16.08
Sida clementii^	25	0.3	BN208
Sorghum plumosum var*. plumosum*#	40	1.2	AP16.01
Themeda triandra	20	0.3	AP16.18
Triumfetta clementii#	<1	0.4	AP16.07

API Rail Flora

Site APQ17

Described by KH **Date** 22/04/2009 **Type** Q 50 X 50

MGA Zone 50 504011 **mE** 7704158 **mN**

Soil Rocky hilltop

Vegetation Open Shrubland of *Acacia pyrifolia* var. *pyrifolia* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on rocky hill slopes

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.2	AP17.07
Acacia bivenosa	2	2	AP17.24
Acacia pyrifolia var. *pyrifolia*#	2	2	
Aristida contorta^	10	0.15	BN03
Bonamia media var. *villosa*	<1	0.05	AP17.21
**Cenchrus ciliaris*#	<1	0.3	AP17.13
Corchorus aff. *parviflorus*	<1	0.3	AP17.26
Corchorus laniflorus^	<1	0.2	BN24
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP17.18
**Cucumis melo ssp. agrestis*	<1	creeper	AP17.10
Dichanthium sericeum ssp. *humilius*	<1	0.1	AP17.03
Enneapogon caerulescens var. *caerulescens*#	1	0.1	BN04
Euphorbia australis	<1	0.2	AP17.23
Euphorbia biconvexa	<1	0.3	AP17.14

Species	Cover (%)	Height (m)	Specimen
Euphorbia wheeleri	<1	0.2	BN176
Evolvulus alsinoides var. *villosicalyx*#	<1	0.1	BN241
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.1	AP17.02
Gomphrena cunninghamii	<1	0.1	AP17.08
Iseilema dolichotrichum#	<1	0.2	BN14
Polycarpaea longiflora (white form)	<1	0.2	AP17.05
Ptilotus clementii^	<1	0.2	BN42
Ptilotus fusiformis^	<1	0.3	BN216
Ptilotus helipteroides var. *helipteroides*#	<1	0.4	AP17.25
Rhynchosia minima#	<1	0.1	BN77
Senna glutinosa ssp. *x luerssenii*^	<1	0.3	AP08
Senna notabilis	<1	0.1	AP17.06
Trachymene oleracea ssp. *oleracea*#	<1	0.3	BN39
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	AP17.20
Triodia epactia^	20	0.6	BN153
Triodia wiseana (fine form)#	40	0.6	AP17.01
Triumfetta clementii#	<1	0.4	AP17.16
Vigna sp. *Burrup* (B18)	<1	creeper	AP17.11

API Rail Flora

Site APQ18

Described by KH **Date** 12/05/2009 **Type** Q 50 X 50

MGA Zone 50 503752 **mE** 7704011 **mN**

Soil Orange/brown rocky nodules on sandy soil

Vegetation Shrubland of *Acacia pyrifolia* var. *pyrifolia*, *Acacia ancistrocarpa* and *Acacia bivenosa* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on orange brown sandy soil with rocky nodules.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.2	AP18.10
Acacia ancistrocarpa#	5	1.5	AP18.28
Acacia bivenosa#	5	0.9	AP18.30
Acacia pyrifolia var. *pyrifolia#*	8	2	AP18.02
**Aerva javanica*	<1	0.4	AP18.12
Alysicarpus muelleri	<1	0.15	AP18.19
*Aristida contorta^*	<1	0.1	BN03
Boerhavia coccinea	<1	0.1	AP18.03
Bonamia media var. *villosa*	<1	0.05	AP18.06
Capparis spinosa var. *nummularia*	<1	0.5	AP18.14
**Cenchrus ciliaris#*	8	0.4	AP18.29
Corchorus aff. *walcotti* (K.J. Atkins 570)	1	0.2	AP18.04

Species	Cover (%)	Height (m)	Specimen
Corchorus laniflorus^	<1	0.3	BN24
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP18.34
**Cucumis melo ssp. agrestis*	<1	creeper	AP18.07
Dichanthium sericeum ssp. *humilius*#	2	0.2	BN13
Enneapogon caerulescens var. *caerulescens*#	<1	0.2	BN04
Eriachne pulchella ssp. *dominii*	<1	0.05	AP18.25
Euphorbia biconvexa	<1	0.1	AP18.18
Euphorbia sp. (BPBS10-50)	<1	0.15	AP18.22A
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	AP18.17
Gossypium australe (Burrup Peninsula form)^	<1	0.2	BN181
Indigofera colutea	<1	0.1	AP18.35
Indigofera linifolia	<1	0.1	AP18.31
Iseilema dolichotrichum#	<1	0.1	BN14
Leptopus decaisnei var. *orbicularis*	<1	0.1	AP18.26
Phyllanthus maderaspatensis	<1	0.2	AP18.16
Ptilotus helipteroides var. *helipteroides*	<1	0.1	AP06
Rhynchosia minima	<1	creeper	AP18.21
Salsola tragus ssp. *tragus*#	<1	0.5	
Senna notabilis	<1	0.2	AP18.13
Sida clementii^	<1	0.6	BN208
Themeda triandra	<1	0.1	AP18.08
Trichodesma zeylanicum var. *zeylanicum*	<1	0.1	AP18.05
Triodia epactia^	10	0.5	BN153
Triodia wiseana (fine form)#	35	0.7	AP18.11
Triumfetta clementii#	<1	0.3	BN109

API Rail Flora

Site APQ19

Described by KH **Date** 12/05/2009 **Type** Q 50 X 50

MGA Zone 50 503459 **mE** 7703972 **mN**

Soil Red rocky hills with occasional quartz outcrops

Vegetation Low Open Shrubland of *Acacia pyrifolia* var. *pyrifolia* with scattered *Corchorus* aff. *parviflorus* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on rocky hill slopes.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)#	<1	0.25	AP19.20
Acacia pyrifolia var. *pyrifolia*#	5	0.8	AP19.09
Aristida contorta#	<1	0.1	AP19.02
Bonamia media var. *villosa*#	<1	0.2	AP19.24
Bulbostylis barbata	<1	0.1	AP19.33
Corchorus aff. *parviflorus*	2	0.2	AP19.07
Corchorus tectus^	<1	0.2	AP41
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP19.31
**Cucumis melo ssp. agrestis*	<1	creeper	AP19.15
Dichanthium sericeum ssp. *humilius*^	<1	0.1	BN13
Dysphania rhadinostachya ssp. *rhadinostachya*	<1	0.1	AP19.28
Eriachne pulchella ssp. *dominii*#	<1	0.1	AP43
Euphorbia australis#	<1	0.03	BN234
Euphorbia biconvexa	<1	0.2	AP19.14

Species	Cover (%)	Height (m)	Specimen
Euphorbia sp. (BPBS10-50)	<1	0.2	AP19.23B
Euphorbia wheeleri^	<1	0.2	BN176
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP19.10
Gomphrena cunninghamii	<1	0.2	AP19.05
Goodenia forrestii^	<1	0.3	BN201
Heliotropium inexplicitum	<1	0.1	AP19.26
Iseilema dolichotrichum#	1	0.1	BN14
Panicum decompositum	<1	0.5	AP19.25
Panicum laevinode	<1	0.2	BN115
Polycarpaea corymbosa var. *corymbosa*	<1	0.15	AP19.22
Polycarpaea longiflora (Whim Creek form, WC147-7)	<1	0.2	AP19.15B
**Portulaca oleracea*	<1	0.1	AP19.03
Ptilotus auriculifolius	<1	0.1	AP19.11
Ptilotus calostachyus^	<1	0.3	BN65
Ptilotus exaltatus var. *exaltatus*#	<1	0.6	BN21
Ptilotus fusiformis			
Ptilotus helipteroides var. *helipteroides*#	<1	0.2	AP30
Salsola tragus^	1	0.2	
Salsola tragus ssp. *grandiflora*^	<1	0.1	BN248
Salsola tragus ssp. *tragus*	<1	0.1	AP19.17
Schizachyrium fragile#	<1	0.1	AP40
Sclerolaena costata^	<1	0.2	BN198
Senna notabilis#	<1	0.3	AP19.19
Sida clementii^	1	0.4	BN208
Solanum horridum^	<1	0.2	AP28
Sporobolus australasicus	<1	0.5	AP19.18
Tephrosia aff. *supina* (HD88-4)	<1	0.1	AP19.32
Tephrosia aff. *supina* (MET 12,357)	<1	0.1	AP19.16
Trachymene oleracea ssp. *oleracea*^	<1	0.4	BN39
Trichodesma zeylanicum var. *zeylanicum*#	<1	0.6	BN59
Triodia brizoides	<1	0.1	AP19.30
Triodia epactia^	15	0.4	BN153
Triodia wiseana (fine form)#	30	0.6	AP19.01
Triumfetta clementii#	<1	0.2	BN29

API Rail Flora

Site APQ20

Described by KH **Date** 12/05/2009 **Type** Q 50 X 50

MGA Zone 50 499335 **mE** 7703708 **mN**
Soil Red cracking clay
Vegetation Horseflats of *Eragrostis xerophila* and *Eriachne benthamii* on red clay loam.
Veg Condition Very Good - Good
Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Brachyachne convergens	<1	0.1	AP20.02
Bulbostylis barbata	<1	0.1	AP20.01
Cleome viscosa	<1	0.2	AP20.17
Corchorus aff. *parviflorus*	<1	0.3	AP20.09B
Cucumis maderaspatanus	<1	0.05	AP20.05B
**Cucumis melo ssp. agrestis*	<1	creeper	AP20.06
Dichanthium sericeum ssp. *humilius#*	<1	0.3	BN13
Eragrostis tenellula	<1	0.2	AP20.03
Eragrostis xerophila#	32	0.4	AP33
Eriachne aff. *mucronata^*	15	0.6	AP44
Eriachne benthamii	15	0.2	AP20.11
Heliotropium conocarpum	<1	0.1	AP20.07
*Heliotropium heteranthum^*	<1	0.03	BN218
Ipomoea coptica	<1	creeper	AP20.18A
*Ipomoea muelleri^*	<1	creeper	AP27

Species	Cover (%)	Height (m)	Specimen
Iseilema dolichotrichum^	2	0.3	BN14
Iseilema macratherum	<1	0.2	AP20.08
Neptunia dimorphantha	<1	0.1	AP20.19
Panicum decompositum^	<1	0.4	
Paspalidium tabulatum	<1	0.2	AP20.18B
Polycarpaea longiflora (white form)	<1	0.15	AP20.13
Portulaca conspicua	<1	0.05	AP20.09A
Ptilotus aervoides	<1	0.1	AP20.10
Ptilotus gomphrenoides var. *gomphrenoides*	<1	0.15	AP20.16
Rhynchosia minima#	<1	0.2	BN77
Sorghum timorense	<1	0.5	AP20.20
Stemodia kingii#	<1	0.5	BN94
Streptoglossa bubakii^	<1	0.3	BN95
Streptoglossa liatroides	<1	0.2	AP20.04
Trianthema aff. *triquetra* (M3.35)	<1	0.05	AP20.05A

API Rail Flora

Site APQ21

Described by KH **Date** 12/05/2009 **Type** Q 50 X 50

MGA Zone 50 497941 **mE** 7702294 **mN**

Soil Orange rocky loam

Vegetation Tall Shrubland of *Acacia bivenosa* and *Acacia inaequilatera* over a Closed Hummock Grassland of *Triodia wiseana* (fine form) and **Cenchrus ciliaris* on orange rocky sand

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.2	AP21.20
Abutilon oxycarpum ssp. *prostratum*	<1	0.1	AP21.26
Acacia ancistrocarpa#	1	2	AP21.06
Acacia bivenosa#	20	2	BN54
Acacia inaequilatera	10	3	AP21.09
Acacia pyrifolia var. *pyrifolia^*	10	3	BN56
Acacia synchronicia#	1	1.3	AP21.07
Aristida contorta	<1	0.6	AP21.29
Boerhavia coccinea	<1	0.2	AP21.16
**Cenchrus ciliaris#*	20	0.8	AP21.08
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.3	AP21.22
*Corchorus laniflorus^*	<1	0.2	BN24
Dactyloctenium radulans	<1	0.1	AP21.15
Enneapogon caerulescens var. *caerulescens*	1	0.1	AP21.05

Species	Cover (%)	Height (m)	Specimen
Euphorbia biconvexa	<1	0.1	AP21.04
Euphorbia sp. (BPBS10-50)	<1	0.2	AP21.03
Euphorbia wheeleri^	<1	0.2	BN176
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP21.18
Hibiscus sturtii var. *platychlamys*	<1	0.2	AP21.25
Indigofera colutea	<1	0.1	AP21.17
Indigofera linifolia#	<1	0.2	BN07
Iseilema dolichotrichum	<1	0.1	AP21.14
Leptopus decaisnei var. *orbicularis*	<1	0.1	AP21.13
Ptilotus helipteroides var. *helipteroides*	<1	0.1	AP21.27
Salsola tragus ssp. *tragus*	<1	0.05	AP21.24
Sclerolaena costata	<1	0.2	AP21.21
Senna glutinosa ssp. *pruinosa*	<1	0.8	AP21.11
Senna sp. *Karijini* (M.E. Trudgen 10392)^	<1	1	BN49
Sporobolus australasicus	<1	0.1	AP21.15
Swainsona canescens	<1	0.05	AP21.28
Triodia wiseana (fine form)#	70	0.8	AP21.01
Triumfetta clementii	<1	0.4	AP21.10

API Rail Flora

Site APQ22

Described by KH **Date** 12/05/2009 **Type** Q 50 X 50

MGA Zone 50 494478 **mE** 7698825 **mN**

Soil Orange clay loam

Vegetation Tall Shrubland of *Acacia xiphophila* over a Hummock Grassland of *Triodia angusta* on red rocky clay loam.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen	Notes
Acacia xiphophylla#	25	3		
Alysicarpus muelleri	<1	0.2	AP22.17	
Aristida contorta	<1	0.1	AP22.32	
Boerhavia coccinea	<1	0.2	AP22.03	
**Cenchrus ciliaris#*	30	0.6	AP22.01	
*Chrysopogon fallax^*	<1	0.5	AP45	
Cleome viscosa	<1	0.3	AP22.34	
Crotalaria medicaginea var. *neglecta*	<1	0.2	AP22.30	
**Cucumis melo ssp. agrestis*	<1	creeper	AP22.13	
Dichanthium sericeum ssp. *humilius*	<1	0.1	AP22.06	
Enchylaena tomentosa var. *tomentosa*	<1	0.3	AP22.10	
Enneapogon caerulescens var. *caerulescens*	<1	0.1	AP22.09	
Eragrostis xerophila	<1	0.1	AP22.20	
*Erodium cygnorum^*	<1	0.05	AP46	

Species	Cover (%)	Height (m)	Specimen	Notes
Euphorbia australis	<1	0.2	AP22.08	
Euphorbia biconvexa	<1	0.2	AP22.22	
Euphorbia sp. (BPBS10-50)	<1	0.1	AP22.31	
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	AP22.35	
Gomphrena affinis ssp. *pilbarensis*	<1	0.1	AP22.04	
Indigofera linifolia	<1	0.1	AP22.14	
Leptopus decaisnei var*. orbicularis*	<1	0.05	AP22.29	
Polygala aff. *isingii*	<1	0.05	AP22.37	
**Portulaca oleracea*	<1	0.1	AP22.18	
Ptilotus auriculifolius	<1	0.1	AP22.28	
Ptilotus exaltatus var. *exaltatus*	<1	0.1	AP22.25	
Ptilotus helipteroides var. *helipteroides#*	<1	0.15	AP22.33	
Ptilotus obovatus var. *obovatus#*	<1	0.8	AP22.24	
Rhynchosia minima	<1	creeper	AP22.15	
Scaevola spinescens (broad leaf form)#	5	0.5	BN64	
Sclerolaena densiflora^	<1	0.1	BN11	"Form B"
Senna artemisioides ssp. *oligophylla*^	<1	0.7	AP01	
Senna glutinosa ssp*. x luerssenii*	<1	0.8	AP22.23	
Sida aff*. fibulifera* (HD200-6)	<1	0.2	AP22.19	
Sporobolus australasicus	<1	0.2	AP22.05	
Swainsona canescens	<1	0.1	AP22.36	
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	AP22.07	
Triodia angusta#	25	0.6	AP22.21	
Triumfetta clementii	<1	0.3	AP22.12	
Xerochloa barbata	<1	0.1	AP22.16	

API Rail Flora

Site APQ23

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50 490431 **mE** 7697277 **mN**

Soil Red rocky loam

Vegetation Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on hillslopes, ridgetops and stony plains.

Veg Condition Very Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa#	1	1.5	BN41
Acacia bivenosa#	<1	1.8	AP23.02
Acacia pyrifolia var. *pyrifolia^*	<1	0.3	AP03
Aristida contorta#	<1	0.1	BN03
Bonamia media var. *villosa*	<1	0.05	AP23.11A
Corchorus aff. *parviflorus*	<1	0.15	AP23.19
*Corchorus tectus^*	<1	0.3	AP41
Eriachne pulchella ssp. *dominii*	<1	0.15	AP23.07
Eriachne pulchella ssp. *pulchella^*	1	0.1	AP09
Euphorbia australis#	<1	0.1	AP23.06
Heliotropium heteranthum	<1	0.1	AP23.09
Hybanthus aurantiacus	<1	0.1	AP23.14
Indigofera monophylla (MJOPP-2)	<1	0.3	AP23.21
Iseilema dolichotrichum	<1	0.1	AP23.05

Species	Cover (%)	Height (m)	Specimen
Polycarpaea holtzei	<1	0.1	AP23.10
Polygala aff. *isingii*	<1	0.1	AP23.11B
**Portulaca oleracea*	<1	0.05	AP23.04
Ptilotus fusiformis^	<1	0.2	AP05
Ptilotus helipteroides var. *helipteroides*#	<1	0.1	AP23.12
Senna artemisioides ssp. aff. *oligophylla* (thinly sericeous)	<1	0.7	AP23.16
Senna artemisioides ssp. *oligophylla*^	<1	0.5	AP01
Senna notabilis	<1	0.1	AP23.15
Sida aff. *echinocarpa* (MET 15,350)	<1	0.15	AP23.20
Tephrosia clementii	<1	0.05	AP23.13
Trachymene oleracea ssp. *oleracea*^	<1	0.3	BN39
Triodia wiseana (fine form)#	40	0.6	BN12
Triumfetta clementii	<1	0.2	AP23.03

API Rail Flora

Site APQ24

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50 488780 **mE** 7696482 **mN**

Soil Red clay

Vegetation Open Shrubland of *Acacia inaequilatera*, *Acacia ancistrocarpa*, *Acacia bivenosa* and *Acacia pyrifolia* var. *pyrifolia* over a Closed Hummock Grassland domianted by *Triodia angusta*, *Triodia wiseana* (fine form) and *Triodia* aff. *epactia* on orange brown sandy soil with rocky nodules

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. lepidum (1) (MET 15 352)	<1	0.4	AP24.09
Acacia ancistrocarpa#	1	1.5	BN238
Acacia bivenosa	1	1.2	AP24.05
Acacia inaequilatera	1	1.9	AP24.03
Acacia pyrifolia var. *pyrifolia#*	1	0.8	AP24.06
Alysicarpus muelleri	<1	0.2	AP24.24
Boerhavia coccinea			AP24.33B
**Cenchrus ciliaris#*	<1	0.6	BN21
Corchorus aff. *parviflorus*	<1	0.2	AP24.20
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	AP24.14
*Corchorus tectus^*	<1	0.4	AP41
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP24.28
Dactyloctenium radulans	<1	0.05	AP24.23
Dichanthium sericeum ssp. *humilius^*	<1	0.2	BN13

Species	Cover (%)	Height (m)	Specimen
Euphorbia australis	<1	0.1	AP24.18
Euphorbia biconvexa	<1	0.1	AP24.36
Euphorbia coghlanii	<1	0.2	AP24.41
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP24.29
Goodenia forrestii	<1	0.3	AP24.10
Gossypium australe (Burrup Peninsula form)#	<1	0.6	BN181
Heliotropium cunninghamii	<1	0.1	AP24.35
Indigofera colutea	<1	0.05	AP24.25
Indigofera linifolia#	<1	0.2	BN07
Indigofera trita	<1	0.2	AP24.40
Leptopus decaisnei var. *orbicularis*	<1	0.1	AP24.26
Polygala aff. *isingii*	<1	0.1	AP24.21
Polymeria ambigua	<1	0.1	AP24.33A
**Portulaca oleracea*	<1	0.1	AP24.27
Ptilotus aervoides	<1	0.05	AP24.38
Ptilotus exaltatus var. *exaltatus*	<1	0.1	AP24.12
Rhynchosia minima#	<1	0.2	BN77
Senna artemisioides ssp. *oligophylla*^	<1	0.6	AP01
Senna artemisioides ssp. *oligophylla x helmsii*	<1	0.8	AP24.16
Senna notabilis	<1	0.2	AP24.11
Sida clementii^	<1	0.3	BN208
Sporobolus australasicus	<1	0.1	AP24.07
Streptoglossa decurrens	<1	0.1	AP24.34
Themeda triandra	<1	0.1	AP24.02
Trianthema aff. *triquetra* (M3.35)	<1	0.2	AP24.13
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	AP24.30
Triodia aff. *epactia*	10	0.6	AP24.32
Triodia angusta	40	0.7	AP24.31
Triodia epactia^	40	0.8	BN153
Triodia wiseana (fine form)#	30	0.8	BN12
Triumfetta clementii	<1	0.2	AP24.17

API Rail Flora

Site APQ25

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50 486060 **mE** 7695716 **mN**

Soil Red clay

Vegetation Woodland of *Corymbia hamersleyana* over a Tall Shrubland of *Acacia bivenosa* with occasional *Grevillea pyramidalis* ssp. *leucadendron* over a Mid to Dense Hummock Grassland of *Triodia angusta* and *Triodia wiseana* (fine form) over a Tussock Grassland of **Cenchrus ciliaris* on red clay drainage lines.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa	<1	2	AP25.22
Acacia bivenosa#	30	2.2	BN54
Acacia pyrifolia var. *pyrifolia*#	<1	1.6	AP25.07
Alternanthera nana	<1	0.15	AP25.32
Alysicarpus muelleri	<1	0.1	AP25.25
Capparis spinosa var. *nummularia*#	<1	0.4	AP39
**Cenchrus ciliaris*#	65	0.3	AP25.03
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	AP25.19
Corymbia hamersleyana#	15	15	AP25.08
Crotalaria medicaginea var. *neglecta*	<1	0.2	AP25.18
Dichanthium sericeum ssp. *humilius*^	<1	0.2	BN08A
Diplopeltis eriocarpa	<1	0.1	AP25.09

Species	Cover (%)	Height (m)	Specimen
Dysphania rhadinostachya ssp. *rhadinostachya*^	<1	0.3	AP19
Ehretia saligna var. *saligna*	<1	0.7	AP25.28
Euphorbia australis^	<1	0.2	BN234
Goodenia forrestii^	<1	0.3	BN201
Gossypium australe (Burrup Peninsula form)	<1	0.5	AP25.13
Grevillea pyramidalis ssp. *leucadendron*#	1	1.2	AP24
Indigofera colutea	<1	0.05	AP25.16
Indigofera linifolia#	<1	0.3	BN07
Indigofera trita	<1	0.3	AP25.14
Iseilema dolichotrichum^	<1	0.2	BN14
Leptopus decaisnei^	<1	0.4	AP04
**Malvastrum americanum*	<1	0.2	AP25.26
Melhania sp. (CH15-39)	<1	0.10	AP25.27
Polygala aff. *isingii*	<1	0.05	AP25.30
Polymeria ambigua	<1	0.05	AP25.17
**Prosopis pallida*^	<1	0.8	
Ptilotus obovatus var. *obovatus*#	<1	0.3	AP02
Rhynchosia minima	<1	creeper	AP25.10
Senna artemisioides ssp. *oligophylla*^	<1	0.4	AP01
Sida clementii^	<1	0.3	BN208
Sporobolus australasicus	<1	0.1	AP25.04
Themeda triandra	1	0.8	AP25.12
Trachymene oleracea ssp. *oleracea*^	<1	0.3	AP47
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	AP25.21
Triodia angusta	30	0.5	AP25.02
Triodia epactia^	2	0.6	BN153
Triodia wiseana (fine form)#	45	0.8	BN12
Triumfetta clementii^	<1	0.3	BN29
**Vachellia farnesiana*	<1	0.6	AP25.15

API Rail Flora

Site APQ26

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50 485305 **mE** 7695770 **mN**

Soil Orange sandy loam

Vegetation Open Shrubland of *Acacia syncronicia* and *Acacia inaequilatera* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) with scattered *Sclerolaena costata* and *Indigofera linifolia* on orange sandy loam.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon lepidum^	<1	0.2	AP42
Acacia bivenosa^	3	1.8	BN54
Acacia inaequilatera	1	1.2	AP26.17
Acacia pyrifolia var. *pyrifolia*#	1	1.2	BN56
Acacia synchronicia#	3	1.8	AP26.16
Bonamia media var. *villosa*	<1	0.05	AP26.12
**Cenchrus ciliaris*#	<1	0.4	BN21
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	AP26.21
Cullen cinereum	<1	0.05	AP26.13
Dichanthium sericeum ssp. *humilius*#	<1	0.2	BN08A
Diplopeltis eriocarpa	<1	0.1	AP26.05
Enneapogon caerulescens var. *caerulescens*#	1	0.1	AP26.15
Euphorbia australis^	<1	0.05	BN234
Euphorbia sp. (BPBS10-50)	<1	0.1	AP26.14

Euphorbia tannensis ssp. *eremophila* (Burrup form)	<1	0.2	AP26.07
Evolvulus alsinoides var. *villosicalyx*#	<1	0.3	BN241
Gossypium australe (Burrup Peninsula form)^	<1	0.2	BN181
Indigofera colutea	<1	0.05	AP26.11
Indigofera linifolia	1	0.2	AP26.20
Indigofera trita	<1	0.2	AP26.22
Iseilema dolichotrichum^	<1	0.2	BN14
Leptopus decaisnei var. *orbicularis*#	<1	0.2	AP4
Paspalidium clementii	<1	0.2	AP26.03
Ptilotus helipteroides^	<1	0.1	AP02
Rhynchosia minima^	<1	0.2	BN77
Sclerolaena costata	1	0.2	AP26.10
Sclerolaena densiflora^	<1	0.2	AP10
Senna notabilis#	<1	0.3	BN215
Sida clementii^	<1	0.3	BN208
Sporobolus australasicus	<1	0.1	AP26.02
Trachymene oleracea ssp. *oleracea*^	<1	0.3	AP47
Triodia wiseana (fine form)#	70	0.6	BN12
Triumfetta clementii#	<1	0.3	AP26.19

API Rail Flora

Site APQ27

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50481635 **mE** 7695307 **mN**

Soil Red

Vegetation Low Woodland of *Corymbia hamersleyana* over an Open Heath of *Acacia ancistrocarpa* with scattered *Acacia bivenosa* and *Acacia colei* var. *colei* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia angusta* on red rocky soil in drainage lines.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa#	30	2	AP27.05
Acacia bivenosa#	<1	1.2	AP27.06
Acacia colei var. *colei*	<1	1.4	AP27.02
*Acacia cowleana^*	1	1.4	BN187
Bothriochloa ewartiana	2	0.8	AP27.13
Cajanus cinereus	<1	0.3	AP27.10
Cassytha capillaris#	<1	creeper	AP27.04
**Cenchrus ciliaris#*	1	0.6	BN21
Corymbia hamersleyana#	20	8	AP38
Gossypium australe (Burrup Peninsula form)^	<1	0.3	BN181
Heliotropium ovalifolium	<1	0.2	AP27.16
Hybanthus aurantiacus#	2	0.2	AP27.09
*Indigofera linifolia^*	<1	0.2	BN07

Species	Cover (%)	Height (m)	Specimen
Indigofera monophylla (Cape Preston form)^	<1	0.3	BN180
Leptopus decaisnei^	1	0.4	AP04
Paraneurachne muelleri	2	0.4	AP27.12
Polymeria ambigua	<1	0.1	AP27.14
Rhynchosia minima#	<1	0.3	BN77
Senna notabilis^	<1	0.2	BN215
Sida clementii^	<1	0.3	BN208
Swainsona formosa^	<1	0.2	
Tephrosia aff. *supina* (MET 12,357)^	<1	0.2	BN204
Triodia angusta			AP27.01B
Triodia wiseana (fine form)#	50	0.6	AP27.01A

API Rail Flora

Site APQ28

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50 481375 **mE** 7695179 **mN**

Soil Orange rocky sand

Vegetation Shrubland of *Acacia bivenosa* and *Acacia ancistrocarpa* over a Mid to Dense Hummock Grassland of *Triodia angusta* and *Triodia wiseana* (fine form) on orange rocky sand.

Veg Condition Very Good - Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa#	2	1.8	AP28.14
Acacia bivenosa#	8	1.2	AP28.11
Acacia inaequilatera	<1	1.2	AP28.06
Acacia pyrifolia var. *pyrifolia^*	<1	1.2	BN56
*Alysicarpus muelleri^*	<1	0.2	BN200
Aristida contorta#	1	0.1	BN03
*Cassytha capillaris^*	<1		BN51
Corchorus aff. *parviflorus*	<1	0.2	AP28.19
*Corchorus tectus^*	<1	0.8	AP41
*Dactyloctenium radulans^*	<1		BN19
Dichanthium sericeum ssp. *humilius^*	<1	0.3	BN08A
Eriachne pulchella ssp. *dominii*	<1	0.2	AP28.10
Euphorbia australis#	<1	0.1	AP28.09
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	AP28.08

Species	Cover (%)	Height (m)	Specimen
Heliotropium ovalifolium#	<1	0.1	AP50
Iseilema dolichotrichum	<1	0.1	AP28.03
*Lepidium pholidogynum^*	<1	0.3	AP49
Mollugo molluginea	<1	0.2	AP28.17
Paraneurachne muelleri	<1	0.1	AP28.20
**Portulaca oleracea^*	<1	0.2	BN207
Pterocaulon sphacelatum	<1	0.2	AP28.21
Ptilotus astrolasius var. *astrolasius*	<1	0.2	AP28.16
*Ptilotus carinatus^*	<1	0.3	BN124
Ptilotus exaltatus var. *exaltatus#*	<1	0.8	
Ptilotus murrayi var. *murrayi*	<1	0.05	AP28.22
Ptilotus obovatus var. *obovatus^*	<1	0.2	AP2
Scaevola spinescens (broad leaf form)^	<1	0.5	BN64
Senna artemisioides ssp. *oligophylla^*	<1	0.8	AP01
Senna notabilis	<1	0.3	AP28.12
Sida aff. *echinocarpa* (MET 15,350)	<1	0.3	AP28.07
Sporobolus australasicus	<1	0.1	AP28.05
Triodia angusta	50	0.5	AP28.01
Triodia wiseana (fine form)#	70	0.8	BN12
*Xerochloa imberbis^*	<1	0.2	

API Rail Flora

Site APQ29

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50 480464 **mE** 7694905 **mN**

Soil Red clay with rocky nodules

Vegetation Horseflats of *Eragrostis xerophila*, *Eriachne benthamii*, *Aristida contorta*, *Dichanthium sericeium* ssp. *humilis* and *Brachyachne convergens* on red clay flats with rocky nodules.

Veg Condition Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia xiphophylla^	<1	0.3	
Aristida contorta#	5	0.15	BN03
Boerhavia coccinea	<1	0.05	AP29.17
Brachyachne convergens	1	0.1	AP29.07
Cleome viscosa	<1	0.25	AP29.22
Dactyloctenium radulans^	<1	BN19	
Dichanthium sericeum ssp. *humilius*#	1	0.1	BN13
Enneapogon caerulescens var. *caerulescens*#	1	0.1	AP29.15
Eragrostis xerophila#	31	0.4	BN247
Eriachne aff. *mucronata*^	3	0.4	AP44
Eriachne benthamii	4	0.2	AP29.20
Euphorbia coghlanii	<1	0.1	AP29.26
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.15	AP29.19
Gomphrena affinis ssp. *pilbarensis*#	<1	0.2	BN09

Species	Cover (%)	Height (m)	Specimen
Heliotropium heteranthum#	<1	0.02	AP29.29
Heliotropium inexplicitum	<1	0.1	AP29.08
Indigofera linifolia	<1	0.1	AP29.28
Indigofera trita	<1	0.1	AP29.27
*Lepidium pholidogynum^*	<1	0.1	AP49
Neptunia dimorphantha	<1	0.05	AP29.06
**Portulaca oleracea#*	<1	0.2	BN207
Ptilotus aervoides	<1	0.05	AP29.23
*Ptilotus carinatus^*	3	0.05	BN111
Ptilotus exaltatus var. *exaltatus#*	<1	0.2	
*Ptilotus helipteroides^*			AP06
Rhynchosia minima#	<1	0.2	BN77
Sclerolaena costata#	<1	0.15	AP29.16
Sclerolaena densiflora#	<1	0.1	AP10
*Sesbania cannabina^*	<1	0.3	BN164
Sida aff. *fibulifera* (HD200-6)	<1	0.15	AP29.24
Sporobolus australasicus	<1	0.05	AP29.13
*Streptoglossa bubakii^*	<1	0.2	BN95
Streptoglossa liatroides#	<1	0.2	BN123
Trianthema aff. *triquetra* (M3.35)	<1	0.1	AP29.09
*Xerochloa imberbis^*	2	0.3	

API Rail Flora

Site APQ30

Described by KH **Date** 24/04/2009 **Type** Q 50 X 50

MGA Zone 50 478186 **mE** 7693764 **mN**

Soil Orange rocky soil

Vegetation Tall Shrubland of *Acacia ancistrocarpa* over an Open Shrubland of *Acacia bivenosa* with scattered *Acacia maitlandii*, *Acacia synchronicia* and *Acacia xiphophila* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) with **Cenchrus ciliaris* on orange rocky soil.

Veg Condition Good

Notes (^ denotes collections made in 2008 survey only, # denotes collections made in 2008 and 2009 surveys)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.2	AP30.07
Acacia ancistrocarpa#	20	3	BN41
Acacia bivenosa#	3	1.5	AP30.14
Acacia maitlandii#	0.2	1.5	AP30.36
Acacia synchronicia	<1	0.8	AP30.37
Acacia xiphophylla#	10	3	
Bonamia media var. *villosa*	<1	0.1	AP30.29
Cassytha capillaris	<1	creeper	AP30.31
**Cenchrus ciliaris#*	10	0.5	BN21
Corchorus aff. *parviflorus*	1	0.5	AP30.27
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	AP30.05
Corchorus tectus^	<1	0.4	AP41
Enneapogon caerulescens var. *caerulescens#*	<1	0.2	BN04

Species	Cover (%)	Height (m)	Specimen
Eragrostis xerophila	<1	0.3	AP30.34A
Eremophila longifolia	<1	0.6	AP30.32
Euphorbia sp. (BPBS10-50)	<1	0.1	AP30.26
Goodenia stobbsiana#	<1	0.5	AP30.09
Hakea lorea ssp. *lorea#*	<1	1.5	AP30.16
*Heliotropium ovalifolium^*	<1	0.2	AP50
*Hibiscus coatesii^*	<1	0.4	AP52
Indigofera monophylla (Cape Preston form)	<1	0.4	AP30.17
*Lepidium pholidogynum^*	<1	0.4	AP49
*Leptopus decaisnei^*	<1	0.2	AP04
Panicum decompositum	<1	0.4	AP30.38
Paraneurachne muelleri	<1	0.4	AP30.33
Phyllanthus maderaspatensis	<1	0.2	AP30.23
Ptilotus astrolasius var. *astrolasius*	<1	0.4	AP30.28
Ptilotus helipteroides var. *helipteroides*	<1	0.1	AP30.18
Ptilotus obovatus var. *obovatus^*	<1	0.5	AP02
Rhynchosia minima	<1	0.1	AP30.08
Senna artemisioides ssp. aff. *oligophylla* (thinly sericeous)	<1	0.7	AP30.15
Senna glutinosa ssp. *glutinosa*	<1	0.3	AP30.34B
Senna glutinosa ssp. *pruinosa*	<1	0.8	AP30.21
Senna glutinosa ssp. *x luerssenii^*	2	0.3	AP08
Senna notabilis#	<1	0.3	BN205
Senna sp. *Karijini* (M.E. Trudgen 10392)^	<1	0.3	BN49
*Sida clementii^*	5	0.4	BN208
Solanum diversiflorum	<1	0.2	AP30.25
Solanum horridum	<1	0.1	AP30.19
Sorghum timorense	<1	0.2	AP30.30
Tephrosia clementii	<1	0.1	AP30.22
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	AP30.04
Triodia wiseana (fine form)#	50	0.7	BN12
Triumfetta clementii#	<1	0.3	AP30.10

API Rail Flora

Site APQ31

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

MGA Zone 50 475247 **mE** 7693926 **mN**

Soil Red loamy clay under rocky surface layer

Vegetation Shrubland of *Acacia xiphophylla* over an Open Hummock Grassland of *Triodia wiseana* (fine form) over a Very Open Tussock Grassland of *Eriachne benathmii, Eragrostis xerophila and Xerochloa barbata* on red rocky clay flats.

Veg Condition Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.1	AP31.17
Acacia xiphophylla#	15	1.5	
Aristida contorta#	2	0.2	BN03
Boerhavia coccinea	<1	0.05	AP31.18
**Cenchrus ciliaris^*	1	0.6	BN21
Chrysopogon fallax#	5	0.8	BN79
Cleome viscosa	1	0.3	AP31.12
Crotalaria dissitiflora ssp. *benthamiana*	<1	0.1	AP31.37
Dactyloctenium radulans	<1	0.05	AP31.24
Dichanthium sericeum ssp. *humilius^*	1	0.3	BN08A
Enneapogon caerulescens var. *caerulescens#*	<1	0.15	BN04
Eragrostis xerophila#	11	0.3	AP33
Eriachne aff. *mucronata^*	5	0.5	AP44
Eriachne benthamii	4	0.2	AP31.21

Euphorbia coghlanii	<1	0.1	AP31.13
Euphorbia sp.	<1	0.1	AP31.28
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP31.14
Heliotropium heteranthum#	3	0.1	AP31.06
Heliotropium inexplicitum	<1	0.1	AP31.30
Indigofera linifolia	<1	0.1	AP31.32
Leptopus decaisnei var. *orbicularis*	<1	0.05	AP31.36
Neptunia dimorphantha#	<1	0.2	BN17
Phyllanthus maderaspatensis	<1	0.1	AP31.34
**Portulaca oleracea*	<1	0.05	AP31.10
Ptilotus aervoides	1	0.2	AP31.05
Ptilotus helipteroides var. *helipteroides*	<1	0.05	AP31.15
Rhynchosia minima#	<1	0.3	BN77
Senna notabilis	<1	0.02	AP31.07
Sida aff. *fibulifera* (HD200-6)	<1	0.1	AP31.23
Sorghum timorense	<1	0.8	AP31.27
Sporobolus australasicus	<1	0.1	AP31.31
Stemodia kingii	<1	0.2	AP31.26
Streptoglossa bubakii	<1	0.05	AP31.19
Tephrosia clementii	<1	0.05	AP31.35
Trianthema aff. *triquetra* (M3.35)	<1	0.2	AP31.29
*Triodia angusta^*	<1	0.7	BN50
Triodia wiseana (fine form)#	6	0.8	AP31.01
Xerochloa barbata	2	0.1	AP31.11

API Rail Flora

Site APQ32

Described by KH **Date** 23/04/2009 **Type** Q 10 X 50

MGA Zone 50 428271 **mE** 7666425 **mN**

Soil Loamy red clay

Vegetation Tall Open Scrub of *Acacia ancistrocarpa* and *Acacia tumida* var. *pilbarensis* over a Closed Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia epactia* on loamy red clay creeklines.

Veg Condition Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa#	30	3	BN238
Acacia cowleana^	20	3	BN187
Acacia inaequilatera^	<1	3	AP32.20
Acacia pyrifolia var. *pyrifolia*#	1	3	BN56
Acacia tumida var. *pilbarensis*	20	2.8	AP32.11
Alysicarpus muelleri^	<1	0.2	BN200
Bonamia media var. *villosa*#	<1	0.2	BN27
Corchorus laniflorus^	<1	0.3	BN24
Dysphania rhadinostachya ssp. *rhadinostachya*^	<1	0.2	AP19
Eriachne pulchella ssp. *pulchella*	<1	0.1	AP32.02
Euphorbia biconvexa	<1	0.1	AP32.22
Evolvulus alsinoides var. *decumbens*	<1	0.3	AP32.31
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP32.21
Gomphrena cunninghamii	<1	0.2	AP32.06
Goodenia microptera	<1	0.1	AP32.05
Gossypium australe (Burrup Peninsula form)	<1	0.4	AP32.13
Hibiscus sturtii var. *campylochlamys*	<1	0.2	AP32.24

Species	Cover (%)	Height (m)	Specimen
Hibiscus sturtii var. *platychlamys*	<1	0.2	AP32.32
Hybanthus aurantiacus#	<1	0.15	BN209
Indigofera monophylla	<1	0.4	AP32.17
Indigofera monophylla (Cape Preston form)^	<1	0.3	BN180
Isotropis atropurpurea	<1	0.3	AP32.25
Paraneurachne muelleri	<1	0.6	AP32.27
Polycarpaea longiflora^	<1	0.3	BN179
Pterocaulon sphaeranthoides^	<1	0.15	BN166
Ptilotus exaltatus var. *exaltatus*#	<1	0.2	AP32.30
Rhynchosia minima	<1	creeper	AP32.10
Senna artemisioides ssp. *oligophylla*#	<1	0.9	AP01
Senna glutinosa ssp. *glutinosa*	<1	0.6	AP32.16
Senna notabilis^	<1	0.3	BN215
Sida aff. *echinocarpa* (MET 15,350)	<1	0.2	AP32.18
Sida clementii^	<1	0.3	BN208
Solanum diversiflorum#	<1	0.3	AP32.19
Streptoglossa bubakii^	<1	0.2	BN95
Streptoglossa decurrens	<1	0.1	AP32.33
Swainsona formosa^	<1	0.1	
Tephrosia aff. *supina* (MET 12,357)	<1	0.1	AP32.03
Trachymene oleracea ssp. *oleracea*	<1	0.2	AP32.29
Trichodesma zeylanicum var. *zeylanicum*^	<1	0.3	BN59
Triodia epactia	40	0.6	AP32.28
Triodia wiseana (fine form)#	70	0.8	BN12
Triumfetta clementii#	<1	0.3	BN29
Waltheria indica#	<1	0.2	AP32.23

API Rail Flora

Site APQ33

Described by KH **Date** 23/04/2009 **Type** Q 10 X 50

MGA Zone 50 471368 **mE** 7693481 **mN**

Soil Red rocky loam

Vegetation Tall Open Shrubland of *Acacia ancistrocarpa*, *Acacia pyrifolia* ssp. *pyrifolia* and *Acacia elachantha* (golden hairy variant) over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) and a Tussock Grassland of *Paraneurachne muelleri* and *Cymbopogon ambiguus* on rocky hill slopes.

Veg Condition Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa#	35	3	BN41
Acacia coriacea ssp. *coriacea^*	5	2	BN146
*Acacia cowleana^*	1	1.3	BN187
Acacia elachantha (golden hairy variant)	1	2	AP33.13
Acacia pyrifolia var. *pyrifolia#*	2	2.5	AP33.11
Bonamia media var. *villosa*	<1	0.05	AP33.08
Cassytha capillaris	<1	creeper	AP33.17
**Cenchrus ciliaris^*	5	0.6	BN21
Corchorus aff. *parviflorus*	<1	0.2	AP33.10
*Corchorus tectus^*	<1	0.3	AP41
Cucumis maderaspatanus#	<1	creeper	AP33.03
Cymbopogon ambiguus	4	0.6	AP33.12
*Cymbopogon procerus^*	10	0.7	BN182

Species	Cover (%)	Height (m)	Specimen
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP33.06
Goodenia stobbsiana^	1	0.6	AP54
Hybanthus aurantiacus#	<1	0.3	BN209
Indigofera linifolia^	<1	0.2	BN07
Leptopus decaisnei^	<1	0.2	AP04
Paraneurachne muelleri	5	0.4	AP33.14A
Pterocaulon sphacelatum^	<1	0.4	BN166
Pterocaulon sphaeranthoides	<1	0.2	AP33.16
Senna glutinosassp. x luerssenii^	<1	0.2	AP08
Senna notabilis#	<1	0.3	BN215
Solanum diversiflorum	<1	0.2	AP33.09
Themeda triandra	<1	0.1	AP33.04
Trachymene oleraceassp. Oleracea^	2	0.5	BN39
Trichodesma zeylanicum var. zeylanicum#	<1	0.6	BN59
Triodia epactia^	25	0.8	BN153
Triodia wiseana (fine form)#	50	0.6	AP33.01
Triumfetta clementii#	<1	0.3	BN29

API Rail Flora

Site APQ34

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

MGA Zone 50 465508 **mE** 7693340 **mN**

Soil Red cracking clay

Vegetation Shrubland of *Acacia sclerosperma* ssp. *sclerosperma* over a Tussock Grassland of *Eragrostis xerophila*, *Eriachne benthamii*, and *Xerochloa barbata* on red cracking clay flats.

Veg Condition Good - Degraded

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia sclerosperma ssp. *sclerosperma#*	15	2	AP57
*Acacia xiphophylla^*	<1	1	
*Aristida contorta^*	1	0.1	BN03
**Cenchrus ciliaris^*	<1	0.6	
Crotalaria dissitiflora ssp. *benthamiana*	<1	0.1	AP34.25
Cullen cinereum	<1	0.05	AP34.28
Cullen graveolens	<1	0.05	AP34.26
Dactyloctenium radulans	<1	0.1	AP34.18
Dichanthium sericeum ssp. *humilius*	<1	0.1	AP34.05B
Enchylaena tomentosa var. *tomentosa*	<1	0.1	AP34.09
*Eragrostis setifolia^*	30	0.7	AP55
Eragrostis tenellula	<1	0.1	AP34.22
Eragrostis xerophila#	40	0.6	AP34.02
Eremophila longifolia#	<1	1.8	AP34.14
Eriachne benthamii#	10	0.6	AP34.01

Species	Cover (%)	Height (m)	Specimen
Euphorbia coghlanii	<1	0.1	AP34.24
Euphorbia wheeleri^	<1	0.7	BN245
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.2	AP34.11
Heliotropium heteranthum^	<1	0.1	BN218
Heliotropium inexplicitum	<1	0.1	AP34.21
Indigofera linifolia#	<1	0.2	BN07
Iseilema macratherum	<1	0.1	AP34.04
**Malvastrum americanum*	<1	0.1	AP34.06
Neptunia dimorphantha#	<1	0.3	AP34.19
Panicum decompositum	<1	0.3	AP34.03
Panicum laevinode#	3	0.5	BN115
Paspalidium tabulatum (Whim Creek form)	<1	0.1	AP34.15B
**Portulaca oleracea*^	<1	0.2	BN207
Ptilotus aervoides	<1	0.1	AP34.07
Ptilotus carinatus^	<1	0.05	BN111
Ptilotus exaltatus^	<1	0.2	
Rhynchosia minima	<1	creeper	AP34.10
Scaevola spinescens^	<1	1.2	AP58
Scaevola spinescens (narrow form)	<1	0.3	AP34.12
Sclerolaena glabra^	<1	0.2	BN61
Sesbania cannabina^	<1	0.2	BN164
Streptoglossa bubakii	<1	0.1	AP34.17
Trianthema aff. *triquetra* (M3.35)	<1	0.05	AP34.08
Triodia wiseana^	1	0.7	BN12
Xerochloa barbata	5	0.1	AP34.15A
Xerochloa imberbis^	5	0.3	

API Rail Flora

Site APQ35

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

MGA Zone 50 464766 **mE** 7692678 **mN**

Soil Red clay loam

Vegetation Open Forest of *Eucalyptus victrix* over a Tall Open Scrub of *Melaeluca glomerata and Acacia coriacea* ssp. *pendens* over an Open Hummock Grassland of *Triodia wiseana* (fine form).

Veg Condition Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia coriacea ssp. *coriacea*^	8	3	BN146
Acacia coriacea ssp. *pendens*	8	2.6	AP35.26
Acacia cowleana^	<1	0.8	BN187
Acacia pyrifolia var. *pyrifolia*^	1	1	AP03
Acacia trachycarpa^	15	3	BN222
Alternanthera angustifolia^	<1	0.2	AP21
Alternanthera nana	<1	0.2	AP35.20
Alternanthera nodiflora	<1	0.2	AP35.25
Amaranthus undulatus#	<1	0.6	BN254
Ammannia auriculata	<1	0.2	AP35.09
Ammannia baccifera	<1	0.2	AP35.22
Bergia pedicellaris	<1	0.05	AP35.31
Cucumis maderaspatanus^	<1	BN57	
Cyperus difformis	<1	0.5	AP35.06
Cyperus iria	1	0.2	AP35.18
Cyperus vaginatus#	1	0.9	AP65
Dichanthium sericeum ssp. *humilius*^	10	0.1	BN08A

Species	Cover (%)	Height (m)	Specimen
Eragrostis tenellula	1	0.4	AP35.05
Eriachne benthamii#	1	0.4	BN01
Eriachne obtusa^	35	0.4	AP59
Eucalyptus camaldulensis^	40	20	
Eucalyptus victrix	40	20	AP35.12
Euphorbia sp. (BPBS10-50)	<1	0.1	AP35.15
Goodenia lamprosperma#	5	0.5	BN255
Hybanthus aurantiacus^	<1	0.2	BN207
Indigofera monophylla (MJOPP-2)	<1	0.3	AP35.24
Marsilea hirsuta	<1	0.05	AP35.11
Melaleuca glomerata#	40	3	AP61
Passiflora foetida var. *hispida*	<1	0.2	AP35.04
Phyllanthus maderaspatensis	<1	0.3	AP35.30
Pluchea rubelliflora#	<1	0.3	AP60
Polymeria ambigua^	<1	BN211	
Pterocaulon sphaeranthoides	<1	0.1	AP35.19
Ptilotus carinatus^	<1	0.2	BN124
Scaevola spinescens (narrow form)	<1	0.6	AP35.29
Sesbania cannabina#	<1	0.9	AP62
Sporobolus virginicus^	15	0.4	AP63
Stemodia grossa#	<1	0.3	BN172
Synaptantha tillaeacea var. *tillaeacea*	<1	0.1	AP35.27
Trichodesma zeylanicum var. *zeylanicum*^	<1	0.8	BN59
Triodia epactia^	10	0.6	BN153
Triodia wiseana (fine form)	10	0.7	AP35.01
**Vachellia farnesiana*	<1	0.6	AP35.14
Vigna lanceolata var. *lanceolata*	<1	creeper	AP35.02

API Rail Flora

Site APQ36

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

MGA Zone 50 452566 **mE** 7685410 **mN**
Soil Red cracking clay
Vegetation Horseflats dominated by *Eragrostis xerophila* and *Xerochloa imberbis* on red clay loam.
Veg Condition Good - Degraded
Notes (^denotes species collected in 2008 only, #denotes species collected in 2008 and 2009)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Aristida contorta^	1	0.2	BN03
Cyperus pygmaeus	<1	0.04	AP36.11
Desmodium muelleri	<1	0.1	AP36.08
Dichanthium sericeum ssp. *humilius*#	2	0.2	BN13
Eragrostis xerophila#	50	0.8	AP36.03
Eriachne aff. *mucronata*^	10	0.6	AP44
Eriachne benthamii	1	0.2	AP36.10
Fimbristylis aff. *dichotoma* (M75-4)	1	0.1	AP36.02
Gomphrena affinis ssp. *pilbarensis*	<1	0.05	AP36.04
Heliotropium conocarpum^	<1	0.3	BN93
Heliotropium inexplicitum	<1	0.1	AP36.15
Indigofera linifolia#	<1	0.2	BN07
**Portulaca oleracea*^	<1	0.2	BN207
Ptilotus aervoides	<1	0.05	AP36.05
Ptilotus carinatus^	1	0.2	BN111

Species	Cover (%)	Height (m)	Specimen
Ptilotus exaltatus^	<1	0.3	
Ptilotus gomphrenoides var. *gomphrenoides*	<1	0.1	AP36.12
Ptilotus murrayi var. *murrayi*	<1	0.05	AP36.01
Salsola tragus^	<1	0.3	
Sclerolaena costata#	<1	0.1	BN198
Sida aff. *fibulifera* (oblong; MET 15 220)^	<1	0.2	BN149
Sida spinosa^	<1	0.3	BN33
Streptoglossa liatroides#	1	0.05	BN123
Tephrosia clementii	<1	0.1	AP36.07
Xerochloa barbata	10	0.1	AP36.13A
Xerochloa imberbis^	6	0.3	

API Rail Flora

Site APQ37

Described by KH **Date** 23/04/2009 **Type** Q 10 X 50

MGA Zone 50 441209 **mE** 7680490 **mN**

Soil Brown clay

Vegetation Low Open Forest to Low Woodland of *Eucalyptus victrix* and *Corymbia hamersleyana* over a Shrubland of *Acacia tumida* var. *pilbarensis*, *Acacia bivenosa* and *Acacia trachycarpa* X *tumida* var. *pilbarensis* over a Mid Dense Hummock Grassland of *Triodia angusta* in drainage lines.

Veg Condition Good - Degraded

Notes (^denotes species collected in 2008 only, #denotes species collected in 2008 and 2009)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon amplum#	<1	1.2	AP37.26
*Acacia ancistrocarpa^*	5	1.5	BN238
Acacia bivenosa#	2	3	BN54
Acacia coriacea ssp. *coriacea^*	1	0.8	BN146
*Acacia cowleana^*	10	3	BN187
Acacia pyrifolia var. *pyrifolia^*	0.8	1	AP03
*Acacia trachycarpa^*	5	3	BN222
Acacia trachycarpa X tumida var. *pilbarensis*	2	1.8	AP37.21
Acacia tumida var. *pilbarensis*	8	1.5	AP37.15
Alternanthera nana	<1	0.2	AP37.27
**Cenchrus ciliaris^*	10	0.3	BN21
Corymbia hamersleyana	35	8	AP37.11
Crotalaria medicaginea var. *neglecta*	<1	0.1	AP37.23

Ehretia saligna var. *saligna*	<1	1.5	AP37.16
Eremophila longifolia#	3	1.6	BN184
Eucalyptus victrix#	50	1.5	
*Euphorbia s*p.	<1	0.1	AP37.18
Gossypium australe (Burrup Peninsula form)^	<1	0.3	BN181
*Hybanthus aurantiacus^*	<1	0.3	BN209
Indigofera colutea	<1	0.3	AP37.06
*Indigofera linifolia^*	<1	0.3	BN07
Indigofera linnaei	<1	0.2	AP37.20
Indigofera monophylla	<1	0.2	AP37.25
**Malvastrum americanum#*	<1	0.3	
Melhania sp. (CH15-39)	<1	0.3	AP37.28
Phyllanthus maderaspatensis	<1	0.6	AP37.31
Polymeria ambigua	<1	creeper	AP37.05
Pterocaulon sphaeranthoides	<1	0.05	AP37.24
*Santalum lanceolatum^*	10	2.5	AP73
Scaevola spinescens (broad leaf form)	<1	0.6	AP37.13
Senna artemisioides ssp. *oligophylla#*	1	1.6	AP01
*Senna notabilis^*	<1	0.3	BN215
Swainsona canescens	<1	0.1	AP37.22
*Swainsona formosa^*	<1	0.2	
Tephrosia rosea var. clementii	<1	0.2	AP37.30
Themeda triandra	<1	0.4	AP37.08
Trichodesma zeylanicum var. *zeylanicum*	<1	0.1	AP37.07
Triodia aff. *wiseana^*	30	1.3	AP71
Triodia angusta	50	2.2	AP37.01
Triumfetta clementii#	<1	0.4	BN29
Vigna lanceolata var. *lanceolata*	<1	creeper	AP37.02

API Rail Flora

Site APQ38

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

MGA Zone 50 436587 **mE** 7676923 **mN**

Soil Red rocky

Vegetation Open shrubland to Tall Open Shrubland of *Acacia bivenosa* , *Acacia pyrifolia* var. *pyrifolia* with scattered *Acacia inaequilatera* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on rocky hill slopes.

Veg Condition Good - Degraded

Notes(^denotes species collected in 2008 only, #denotes species collected in 2008 and 2009)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa#	2	2.2	AP38.15
Acacia cowleana^	<1	1.5	BN187
Acacia elachantha (golden hairy variant)	<1	1.2	AP38.12
Acacia inaequilatera	0.2	3	AP38.10
Acacia maitlandii	<1	0.8	AP38.17
Acacia pyrifolia var. *pyrifolia*#	1.5	3	BN56
Acacia tenuissima^	<1	0.3	AP74
Aristida contorta^	<1	0.2	BN03
Bonamia media var. *villosa*	<1	0.05	AP38.18
Bonamia rosea	<1	0.05	AP38.23
Corchorus laniflorus	<1	0.2	AP38.05
Eriachne pulchella ssp. *dominii*	<1	0.1	AP38.06
Euphorbia australis	<1	0.05	AP38.24

Species	Cover (%)	Height (m)	Specimen
Gomphrena cunninghamii	<1	0.05	AP38.09
Hibiscus sturtii var. *campylochlamys*	<1	0.2	AP38.03
Indigofera monophylla	<1	0.2	AP38.16
Indigofera monophylla (Cape Preston form)^	<1	0.2	BN180
Leptopus decaisnei var. *orbicularis*^	<1	0.2	AP4
Polycarpaea holtzei#	<1	0.05	AP38.08
Polygala aff. *isingii*	<1	0.02	AP38.25
Ptilotus carinatus^	10	0.02	BN111
Ptilotus clementii^	<1	0.2	BN42
Ptilotus exaltatus var. *exaltatus*#	1	0.2	AP38.20
Senna glutinosa ssp. *luerssenii*	<1	0.6	AP38.21
Senna glutinosa ssp. *pruinosa*	<1	1.2	AP38.11
Senna notabilis	<1	0.1	AP38.22
Senna sp. *Karijini* (M.E. Trudgen 10392)^	1	1.5	BN49
Sida clementii^	<1	0.9	BN208
Solanum horridum	<1	0.2	AP38.07
Streptoglossa bubakii^	<1	0.1	BN95
Trachymene oleracea ssp. *oleracea*	<1	0.2	AP38.14
Triodia wiseana (fine form)#	60	0.7	BN12
Triumfetta clementii	<1	0.1	AP38.19

API Rail Flora **Site APQ39**

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

MGA Zone 50 434817 **mE** 7674709 **mN**

Soil Rocky red

Vegetation Low Open Woodland of *Corymbia hamersleyana* over a Tall Open Scrub of *Acacia bivenosa* over a Low Open Shrubland of *Acacia pyrifolia* var. *pyrifolia* over a Closed Hummock Grassland of *Triodia wiseana* (fine form) in creeklines on rocky hillslopes.

Veg Condition Very Good

Notes (^denotes species collected in 2008 only, #denotes species collected in 2008 and 2009)

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa#	60	3	BN54
Acacia pyrifolia var. *pyrifolia*#	6	0.9	BN56
Corymbia hamersleyana#	10	3	AP38
Ehretia saligna var. *saligna*#	1	0.8	AP76
Enneapogon caerulescens var. *caerulescens*^	1	0.2	BN04
Grevillea pyramidalis ssp. *leucadendron*#	<1	1.2	AP24
Hybanthus aurantiacus	<1	0.1	AP39.12
Indigofera monophylla	<1	0.3	AP39.16
Indigofera monophylla (Cape Preston form)^	<1	0.3	BN180
Paraneurachne muelleri	<1	0.3	AP39.08
Petalostylis labicheoides	<1	0.8	AP39.14
Ptilotus carinatus^	<1	0.05	BN111
Ptilotus exaltatus^	<1	0.3	

Species	Cover (%)	Height (m)	Specimen
Rhynchosia minima	<1	creeper	AP39.02
Scaevola spinescens (broad leaf form)#	1	0.6	AP39.06
Senna artemisioides ssp. *oligophylla*#	1	0.9	AP01
Senna glutinosa ssp. *x luerssenii*^	<1	0.8	AP08
Sida spinosa^	<1	0.6	BN33
Trichodesma zeylanicum var. *zeylanicum*^	<1	0.6	BN59
Triodia wiseana (fine form)#	76	0.9	AP39.01
Triumfetta clementii	<1	0.2	AP39.03

API Rail Flora

Site APQ40

Described by KH **Date** 23/04/2009 **Type** Q 50 X 50

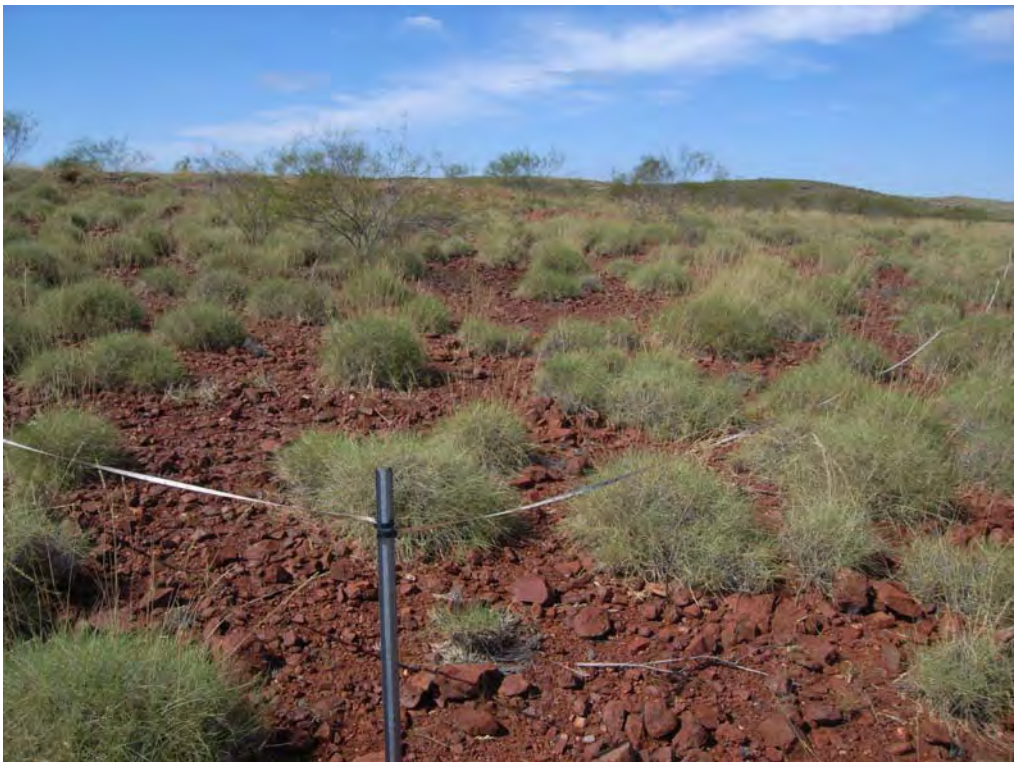
MGA Zone 50 433113 **mE** 7670885 **mN**

Soil Rocky red

Vegetation Shrubland of *Acacia ancistrocarpa* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on rocky hillslopes.

Veg Condition Very Good

Notes (^denotes species collected in 2008 only, #denotes species collected in 2008 and 2009)



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.3	AP40.14
Acacia ancistrocarpa#	15	2.5	BN238
*Aristida contorta^*	<1	0.2	BN03
Bonamia media var. *villosa#*	<1	0.05	BN27
*Corchorus tectus^*	<1	0.3	AP41
Eriachne pulchella ssp. *dominii*	<1	0.05	AP40.03
Eriachne pulchella ssp. *pulchella^*	<1	0.1	AP09
Euphorbia australis#	<1	0.05	BN234
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	AP40.05
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.1	AP40.02
Gomphrena affinis ssp. *pilbarensis^*	<1	0.3	BN09
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.1	AP40.10
*Indigofera linifolia^*	<1	0.2	BN07
Indigofera monophylla (Cape Preston form)#	<1	0.3	BN180

Species	Cover (%)	Height (m)	Specimen
Polycarpaea longiflora^	1	0.3	BN179
Polycarpaea longiflora (white form)	1	0.2	AP40.13
Polygala aff. *isingii*	<1	0.05	AP40.08
Ptilotus carinatus^	<1	0.02	BN111
Ptilotus exaltatus^	<1	0.3	
Senna glutinosa ssp. *glutinosa x luerssenii*	<1	0.8	AP40.06
Senna glutinosa ssp. *x luerssenii*^	<1	0.5	AP08
Sesbania cannabina^	0.3	BN164	
Sida sp. *spiciform panicles* (E. Leyland s.n. 14/8/1990)	<1	0.1	AP40.09
Sida spinosa^	<1	0.3	BN33
Solanum lasiophyllum^	<1	0.2	
Streptoglossa bubakii^	<1	0.3	BN95
Trachymene oleracea ssp. *oleracea*^	<1	0.4	BN39
Trichodesma zeylanicum var. *zeylanicum*^	<1	0.6	BN59
Triodia wiseana (fine form)#	50	0.6	BN12
Triumfetta clementii#	<1	0.2	BN29

API Rail Flora

Site APQ41

Described by LC **Date** 5/09/2008 **Type** V

MGA Zone 50 475175 **mE** 7693877 **mN**

Soil Red clay loam

Vegetation Tall Shrubland of *Acacia inaequilatera* over a Grassland dominated by *Triodia wiseana*, *Eriachne* aff. *mucronata* and *Chrysopogon fallax* in drainage lines.

Veg Condition Good

Fire Age

Notes **Description only, not relocated in 2009**

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia inaequilatera	20	4	
Chrysopogon fallax	30	0.6	BN79
Eriachne aff. *mucronata*	30	0.6	AP44
Eriachne benthamii	10	0.6	BN01
Hakea lorea ssp. *lorea*	2	2	AP22
Triodia wiseana	5	0.6	

API Rail Flora

Site APQ42.1

Described by **Date** 1/09/2008 **Type** V

MGA Zone 50423649 **mE** 7664410 **mN**

Vegetation Tall Open Shrubland of *Acacia inaequilatera* with scattered *Acacia bivenosa* over a Mid Dense Hummock Grassland of *Triodia wiseana* on orange rocky sand.

Veg Condition Very Good

Notes DESCRIPTION ONLY NOT RELOCATED IN 2009

SPECIES LIST

Species	Cover (%)	Height (m)
Acacia bivenosa	1	1.1
Acacia inaequilatera	5	2.1
Citrullus colocynthis	<1	
Corchorus sp.	<1	
Evolvulus alsinoides var. *villosicalyx*	<1	
Gomphrena canescens ssp. *canescens*	<1	
Goodenia lamprosperma	<1	
Indigofera monophylla	<1	
Iseilema dolichotrichum	<1	
Ptilotus helipteroides	<1	
Rhynchosia minima	<1	
Senna artemisioides ssp. *oligophylla*	<1	
Senna glutinosassp. x luerssenii	<1	
Sida echinocarpa	<1	
Solanum diversiflorum	<1	
Solanum lasiophyllum	<1	
Stemodia kingii	<1	
Trachymene oleracea ssp. *oleracea*	<1	
Trichodesma zeylanicum	<1	
Triodia wiseana	70	0.8
Triumfetta clementii	<1	

API Rail Flora

Site APQ43

Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 423460 **mE** 7664235 **mN**

Soil Red rocky loam

Vegetation Scattered *Acacia syncronicia*, *Acacia bivenosa* and *Acacia inaquilatera* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on red rocky loam occuring at the base of hills.

Veg Condition Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	<1	2	BP31.17
Acacia inaequilatera	<1	2.2	BP31.04
Acacia synchronicia	1	1.8	BP31.18
Aristida contorta	<1	0.1	BP31.15
Cucumis maderaspatanus	<1	creeper	BP31.03
Eriachne pulchella ssp. *pulchella*	<1	0.05	BP31.16
Euphorbia australis	<1	0.1	BP31.02
Euphorbia boophthona	<1	0.1	BP31.19
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.2	BP31.11
Indigofera monophylla (Cape Preston form)	<1	0.1	BP31.01
Iseilema dolichotrichum	<1	0.1	BP31.06
Polygala aff. *isingii*	<1	0.1	BP31.07
Sarcostemma viminale ssp. *australe*	<1	0.3	BP31.08
Senna glutinosa ssp. *luerssenii*	1	0.6	BP31.09
Sida aff. echinocarpa (MET 15,350)	<1	0.3	BP31.05

Species	Cover (%)	Height (m)	Specimen
Sporobolus australasicus	<1	0.2	BP31.14
Triodia wiseana (fine form)	45	0.8	BP31.13
Triumfetta clementii	<1	0.3	BP31.10

API Rail Flora

Site **APQ44**

Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 428253 **mE** 7666344 **mN**

Soil Red rocky sand

Vegetation Tall Open Shrubland of *Acacia inaequilatera* and *Acacia bivenosa* over very Open Tussock Grassland of *Eriachne pulchella* ssp. *pulchella* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on red rocky sand lower slopes.

Veg Condition Very Good - Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa	<1	2.5	BP30.1.08
Acacia bivenosa	3	2.8	BP30.1.10
Acacia inaequilatera	5	2.5	BP30.1.14
Acacia synchronicia	<1	2.2	BP30.1.02
Cassytha capillaris	<1	creeper	BP30.1.07
Corchorus laniflorus	<1	0.5	BP30.1.03
Cucumis maderaspatanus	<1	creeper	BP30.1.20
Enneapogon caerulescens var. *caerulescens*	<1	0.1	BP30.1.18
Eremophila forrestii ssp. *forrestii*	<1	0.6	BP30.1.21
Eriachne pulchella ssp. *pulchella*	5	0.1	BP30.1.12
Euphorbia sp. (BPBS10-50)	<1	0.05	BP30.1.24
Hakea lorea ssp. *lorea*	<1	2.6	BP30.1.26
Hybanthus aurantiacus	<1	0.2	BP30.1.05
Pterocaulon sphacelatum	<1	0.3	BP30.1.16

Ptilotus clementii	<1	0.2	BP30.1.04
Ptilotus exaltatus var. *exaltatus*	<1	0.4	BP30.1.17
Ptilotus helipteroides var. *helipteroides*	<1	0.2	BP30.1.15
Rhynchosia minima	<1	creeper	BP30.1.11
Scaevola spinescens (broad leaf form)	<1	0.6	BP30.1.25
Senna glutinosa ssp. *luerssenii*	1	0.6	BP30.1.09
Senna glutinosa ssp. *pruinosa*	<1	2.2	BP30.1.13
Tephrosia aff. *supina* (HD133-20)	<1	0.1	BP30.1.23
Tephrosia clementii	<1	0.05	BP30.1.19B
Trichodesma zeylanicum var. *zeylanicum*	<1	0.1	BP30.1.22
Triodia wiseana (fine form)	50	0.7	BP30.1.01
Triumfetta clementii	<1	0.2	BP30.1.06

API Rail Flora

Site APQ45

Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 434063 **mE** 7671868 **mN**

Soil Red rocky loam

Vegetation Scattered *Acacia bivenosa* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on red rocky ridgetops.

Veg Condition Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.2	BP29.1.02
Acacia adsurgens	<1	2	BP29.1.06
Acacia ancistrocarpa	<1	2	BP29.1.05
Acacia bivenosa	1	2.2	BP29.1.09
Acacia pyrifolia var. *pyrifolia*	<1	1.8	BP29.1.14
Crotalaria novae-hollandiae ssp. *novae-hollandiae*	<1	0.3	BP29.1.13
Cucumis maderaspatanus	<1	creeper	BP29.1.15
Cullen leucanthum	<1	0.4	BP29.1.07
Euphorbia biconvexa	<1	0.05	BP29.1.20
Euphorbia wheeleri	<1	0.05	BP29.1.21
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.2	BP29.1.16
Indigofera monophylla (MJOPP-2)	<1	0.2	BP29.1.03
Ipomoea costata	<1	1.8	BP29.1.17
Pentalepis trichodesmoides	<1	0.6	BP29.1.12
Polycarpaea longiflora (white form)	<1	0.2	BP29.1.18

Species	Cover (%)	Height (m)	Specimen
Senna glutinosa ssp*. glutinosa*	<1	0.7	BP29.1.04
Senna venusta	<1	0.6	BP29.1.11
Tinospora smilacina	<1	creeper	BP29.1.08
Trichodesma zeylanicum var*. zeylanicum*	<1	0.05	BP29.1.23
Triodia wiseana (fine form)	40	0.4	BP29.1.01
Triumfetta appendiculata	<1	0.2	BP29.1.22
Triumfetta clementii	<1	0.2	BP29.1.19

API Rail Flora

Site APQ46

Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 434963 **mE** 7674686 **mN**

Soil Red stony loam with quartz

Vegetation Low Open Woodland of *Corymbia hamersleyana* over a Tall Shrubland of *Acacia bivenosa* and *Acacia inaequilatera* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on red stony loam lower slopes with quartz nodules.

Veg Condition Very Good - Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	15	2.5	BP26.1.10
Acacia inaequilatera	5	1.8	BP26.1.17
Cassytha capillaris	<1	creeper	BP26.1.12
Corymbia hamersleyana	2	2.8	BP26.1.3
Indigofera monophylla (grey leaflet form)	<1	0.8	BP26.1.9
Jasminum didymum ssp. *lineare*	<1	creeper	BP26.1.15
Paraneurachne muelleri	<1	0.4	BP26.1.14
Petalostylis labicheoides	<1	0.8	BP26.1.5
Ptilotus clementii	<1	0.3	BP26.1.13
Ptilotus exaltatus var. *exaltatus*	<1	0.2	BP26.1.18
Rhynchosia minima	<1	creeper	BP26.1.11
Scaevola spinescens (broad leaf form)	<1	0.9	BP26.1.16
Senna glutinosa ssp. *glutinosa*	<1	1.2	BP26.1.8
Senna glutinosa ssp. *pruinosa*	<1	1.2	BP26.1.7

Species	Cover (%)	Height (m)	Specimen
Solanum horridum	<1	0.05	BP26.1.4
Triodia wiseana (fine form)	60	0.7	BP26.1.2

API Rail Flora

Site APQ47

Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 436153 **mE** 7676569 **mN**

Soil Red brown stony loam

Vegetation Shrubland of *Acacia xiphophylla* over a Mid - Dense Hummock Grassland of *Triodia wiseana* (fine form) on lower brown sandy loam slopes.

Veg Condition Very Good - Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia xiphophylla	20	1	BP25.1.3
Brachyachne prostrata	<1	0.02	BP25.1.13
Bulbostylis barbata	<1	0.05	BP25.1.12
Eragrostis xerophila	<1	0.2	BP25.1.5
Eriachne pulchella ssp. *pulchella*	<1	0.1	BP25.1.9
Paspalidium clementii	<1	0.2	BP25.1.7
Ptilotus exaltatus var. *exaltatus*	<1	0.2	BP25.1.2
Ptilotus helipteroides var. *helipteroides*	<1	0.05	BP25.1.8
Rhynchosia minima	<1	creeper	BP25.1.14
Senna artemisioides ssp. *oligophylla x helmsii*	<1	0.5	BP25.1.15
Senna glutinosa ssp. *x luerssenii*	<1	0.5	BP25.1.6
Senna hamersleyensis	<1	0.1	BP25.1.4
Sida aff. *fibulifera* (HD200-6)	<1	0.2	BP25.1.11
Triodia wiseana (fine form)	40	0.5	BP25.1.1

API Rail Flora

Site APQ48

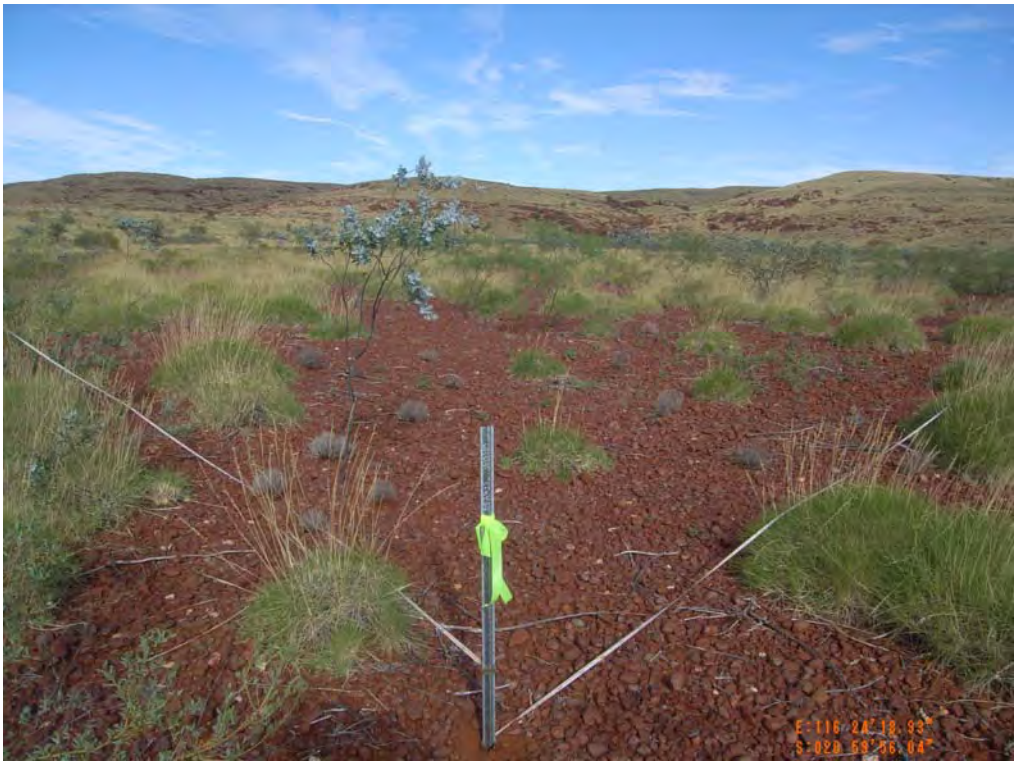
Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 438187 **mE** 7677860 **mN**

Soil Red rocky loam with quartz

Vegetation Shrubland of *Senna glutinosa* ssp. *pruinosa* , *Senna glutinosa* ssp. *glutinosa x luerssenii* and *Acacia bivenosa* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on red rocky loam with quartz nodules on midslopes.

Veg Condition Very Good



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	1	1.8	24.1.10
Acacia synchronicia	<1	2	24.1.15
Aristida contorta	<1	0.2	24.1.11
Bulbostylis barbata	<1	0.05	24.1.13
Corchorus laniflorus	<1	0.1	24.1.16
Euphorbia australis	<1	0.1	24.1.3
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.15	24.1.14
Indigastrum parviflorum	<1	0.2	24.1.8
Ptilotus exaltatus var. *exaltatus*	<1	0.1	24.1.5
Senna glutinosa ssp. *glutinosa x luerssenii*	3	1.6	24.1.7
Senna glutinosa ssp. *pruinosa*	4	1.5	24.1.4
Sida aff. echinocarpa (MET 15,350)	<1	0.4	24.1.9
Trachymene oleracea ssp. *oleracea*	<1	0.2	24.1.2
Triodia wiseana (fine form)	35	0.7	24.1.1

Species	Cover (%)	Height (m)	Specimen
Triumfetta clementii	<1	0.3	24.1.6
Yakirra australiensis var. *australiensis*	<1	0.1	24.1.12

API Rail Flora

Site APQ49

Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 443397 **mE** 7682219 **mN**

Soil Brown red stony loam

Vegetation Tall Shrubland of *Acacia bivenosa* with scattered *Acacia pyrifolia* var. *pyrifolia* and *Acacia inaequilatera* over a Mid - Dense Hummock Grassland of *Triodia wiseana* (fine form) on brown stony loam midslopes.

Veg Condition Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	12	2.2	BP21.1.5
Acacia inaequilatera	1	1.8	BP21.1.20
Acacia pyrifolia var. *pyrifolia*	1	1.8	BP21.1.19
Acacia victoriae	<1	1.4	BP21.1.16
Cleome viscosa	<1	0.2	BP21.1.11
Corchorus laniflorus	<1	0.8	BP21.1.8
Corymbia hamersleyana	1	2.8	BP21.1.13
Eremophila longifolia	<1	1.2	BP21.1.9
Euphorbia sp. (BPBS10-50)	<1	0.1	BP21.1.12
Goodenia microptera	<1	0.8	BP21.1.14
Hakea lorea ssp. *lorea*	<1	2.5	BP21.1.2
Jasminum didymum ssp. *lineare*	<1	0.6	BP21.1.17
Leptopus decaisnei var. *orbicularis*	<1	0.2	BP21.1.15
Ptilotus exaltatus var. *exaltatus*	<1	0.2	BP21.1.4

Species	Cover (%)	Height (m)	Specimen
Scaevola spinescens (broad leaf form)	<1	0.6	BP21.1.6
Senna artemisioides ssp. *oligophylla x helmsii*	<1	0.7	BP21.1.3
Sida aff. echinocarpa (MET 15,350)	<1	0.5	BP21.1.18
Triodia wiseana (fine form)	62	0.7	BP21.1.1
Triumfetta clementii	<1	0.4	BP21.1.10

API Rail Flora

Site APQ50

Described by KG **Date** 13/05/2009 **Type** Q 50 x 50

MGA Zone 50 445119 **mE** 7683947 **mN**

Soil Red rocky soil

Vegetation Hummock Grassland of *Triodia wiseana* (fine form) with scattered *Brachychiton acuminatus* on red rocky ridge tops.

Veg Condition Excellent - Very Good

SPECIES LIST

Species	Cover (%)	Specimen
Acacia acradenia	<1	BP20.1.8
Brachychiton acuminatus	1	BP20.1.15
Corchorus aff. *parviflorus* (JW 11 -11)	<1	BP20.1.9B
Cucumis maderaspatanus	<1	BP20.1.5
Cymbopogon ambiguus	<1	BP20.1.14
Gomphrena cunninghamii	<1	BP20.1.6
Gossypium australe (Whim Creek form)	<1	BP20.1.2
Hakea lorea ssp. *lorea*	<1	BP20.1.17
Indigofera monophylla (Cape Preston form)	<1	BP20.1.12
Ipomoea coptica	<1	BP20.1.18A
Jasminum didymum ssp. *lineare*	<1	BP20.1.4
Paspalidium tabulatum	<1	BP20.1.18B
Polycarpaea longiflora (white form)	<1	BP20.1.13
Portulaca conspicua	<1	BP20.1.9A
Scaevola spinescens (broad leaf form)	<1	BP20.1.10

Species	Cover (%)	Specimen
Senna glutinosa ssp. *glutinosa*	<1	BP20.1.11
Solanum gabrielae	<1	BP20.1.3
Tinospora smilacina	<1	BP20.1.7
Trichosanthes cucumerina	<1	BP20.1.16
Triodia wiseana (fine form)	20	BP20.1.1

API Rail Flora

Site APQ51

Described by KG **Date** 15/05/2009 **Type** Q 50 X 50

MGA Zone 50 463867 **mE** 7693320 **mN**

Soil Red stony loam

Vegetation Low Open Woodland of *Corymbia hammersleyana* over a Shrubland of *Acacia trudgeniana* and *Acacia bivenosa* over a Closed Tussock Grassland of *Triodia wiseana* (fine form) on lower red stony loam slopes.

Veg Condition Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	8		18.1.2
Acacia trudgeniana	10		18.1.14
Bonamia media var. *villosa*	<1		18.1.11
Cleome viscosa	<1		18.1.15
Corchorus aff. *parviflorus* (JW 11 -11)	<1		18.1.7
Corymbia hamersleyana	6		18.1.21
Eremophila longifolia	<1		18.1.13
Eriachne pulchella ssp. *dominii*	<1		18.1.18
Euphorbia australis	<1		18.1.12
Euphorbia sp.	<1		18.1.25
Goodenia forrestii	<1		18.1.17
Hakea lorea ssp. *lorea*	<1		18.1.19
Hibiscus sturtii var. *platychlamys*	<1	0.2	18.1.27
Hybanthus aurantiacus	<1		18.1.20

Species	Cover (%)	Height (m)	Specimen
Leptopus decaisnei var. *orbicularis*	<1		18.1.22
Phyllanthus maderaspatensis	<1	0.2	18.1.26
Ptilotus exaltatus var. *exaltatus*	<1		18.1.3
Senna notabilis	<1	0.05	18.1.28
Sida pilbarensis (Ferrugineous form)	<1		18.1.16
Tephrosia aff. *clementii* (4) (M35-14)	<1		18.1.24
Tephrosia aff. *supina* (HD88-4)	<1		18.1.23
Triodia wiseana (fine form)	70		18.1.1
Triumfetta clementii	<1		18.1.4

API Rail Flora

Site APQ52

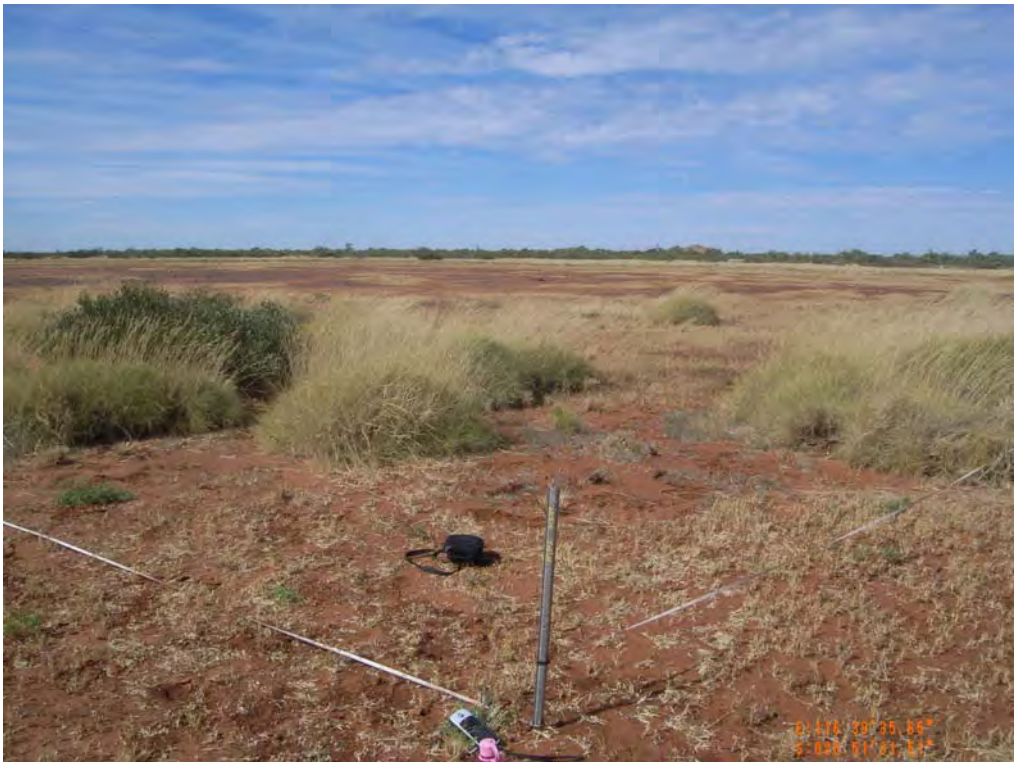
Described by KG **Date** 14/05/2009 **Type** Q 50 X 50

MGA Zone 50 464631 **mE** 7693408 **mN**

Soil Red sandy clay

Vegetation Open Shrubland of *Acacia xiphophylla* over an Open Hummock Grassland of *Triodia wiseana* (fine form) with scattered *Xerochloa imberbis* on red sandy clay flats.

Veg Condition Good - Degraded



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia xiphophylla	2	1.2	18.2.05
Bulbostylis barbata	<1	0.05	18.2.11
**Cenchrus ciliaris*	<1	0.3	18.2.16
Crotalaria medicaginea var. *neglecta*	<1	0.1	18.2.07
Dactyloctenium radulans	<1	0.05	18.2.02
Eragrostis xerophila	<1	0.15	18.2.14
Gomphrena affinis ssp. *pilbarensis*	<1	0.3	18.2.09
Indigofera colutea	<1	0.1	18.2.15
Indigofera linifolia	<1	0.1	18.2.04
Portulaca conspicua	<1	0.02	18.2.12
Ptilotus murrayi var. *murrayi*	<1	0.05	18.2.13
Rhynchosia minima	<1	creeper	18.2.06
Sclerolaena bicornis	<1	0.15	18.2.10
Sclerolaena glabra	<1	0.1	18.2.18
Sesbania cannabina	<1	0.5	18.2.17

Triodia wiseana (fine form)	5	0.4	18.2.03
Xerochloa barbata	2 (dead)	0.1	18.2.01

API Rail Flora

Site **APQ53**

Described by KG **Date** 14/05/2009 **Type** Q 50 X 50

MGA Zone 50 469210 **mE** 7693830 **mN**

Soil Orange stony sandy clay

Vegetation Open shrubland of *Acacia xiphophylla* and *Acacia pyrifolia* var. *pyrifolia* over a Low Open Shrubland of *Corchorus* aff. *parviflorus* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) on orange stony and sandy clay midslopes.

Veg Condition Good

Fire Age <1 year

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	<1	1	BP17.1.14
Acacia maitlandii	<1	0.2	BP17.1.28
Acacia pyrifolia var. *pyrifolia*	1	1.5	BP17.1.09
Acacia xiphophylla	3	1.5	BP17.1.19
Aristida contorta	<1	0.15	BP17.1.25
Bonamia media var. *villosa*	<1	0.05	BP17.1.29
Corchorus aff. *parviflorus*	10	0.4	BP17.1.06
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	BP17.1.18
Goodenia microptera	<1	0.5	BP17.1.15
Gossypium australe (Whim Creek form)	<1	0.8	BP17.1.20
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.1	BP17.1.23B
Indigofera monophylla (Cape Preston form)	<1	0.4	BP17.1.07
Paraneurachne muelleri	<1	0.4	BP17.1.26

Species	Cover (%)	Height (m)	Specimen
Ptilotus astrolasius var. astrolasius	<1	0.2	BP17.1.12
Ptilotus auriculifolius	<1	0.2	BP17.1.04
Ptilotus calostachyus var. *calostachyus*	<1	0.3	BP17.1.22
Ptilotus exaltatus var. *exaltatus*	<1	0.3	BP17.1.08
Scaevola spinescens (broad leaf form)	<1	0.4	BP17.1.21
Senna notabilis	<1	0.2	BP17.1.05
Sida aff. *echinocarpa* (MET 15,350)	<1	0.3	BP17.1.10
Sida arsiniata	<1	0.2	BP17.1.23A
Solanum diversiflorum	<1	0.3	BP17.1.11
Solanum horridum	<1	0.3	BP17.1.02
Tephrosia aff. *supina* (HD205-10)	<1	0.05	BP17.1.24
Trachymene oleracea ssp. *oleracea*	<1	0.2	BP17.1.16
Trianthema sp. *Python Pool*	<1	0.05	BP17.1.17
Trichodesma zeylanicum var. *zeylanicum*	<1	0.3	BP17.1.27
Triodia wiseana (fine form)	40	0.5	BP17.1.01
Triumfetta clementii	<1	0.2	BP17.1.03

API Rail Flora

Site APQ54

Described by KG **Date** 14/05/2009 **Type** Q 50 x 50

MGA Zone 50 470829 **mE** 7693721 **mN**

Soil Orange clay with stones

Vegetation Low Open Shrubland of *Acacia xiphophylla* over a Very Open Tussock Grassland of *Eragrostis xerophila*, *Xerochloa imberbis* with scattered *Dactyloctenum radulans* on orange stony clay flats.

Veg Condition Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia xiphophylla	9	1	AQ1.3
Dactyloctenium radulans	1	0.8	AQ1.5
Enchylaena tomentosa	<1	0.2	AQ1.15
Eragrostis xerophila	3	0.2	AQ1.13
Heliotropium inexplicitum	<1	0.15	AQ1.11
Ptilotus astrolasius var. *astrolasius*	<1	0.2	AQ1.12
Ptilotus exaltatus var. *exaltatus*	<1	0.1	AQ1.6
Senna hamersleyensis	<1	0.5	AQ1.14
Sida aff. *fibulifera* (HD200-6)	<1	0.2	AQ1.7
Sporobolus australasicus	<1	0.1	AQ1.2
Trianthema aff. *triquetra* (M3.35)	<1	0.05	AQ1.1
Xerochloa barbata	3	0.1	AQ1.4

API Rail Flora

Site APQ55

Described by KG **Date** 14/05/2009 **Type** Q 50 x 50

MGA Zone 50 479785 **mE** 7695836 **mN**

Soil Orange sand

Vegetation Tall Shrubland of *Acacia inaequilatera* over a Closed Hummock Grassland of *Triodia epactia* on orange sand midslopes.

Veg Condition Excellent - Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia inaequilatera	15	2.5	BP12.1.6
Aristida contorta	<1	0.1	BP12.1.15
Boerhavia coccinea	<1	0.1	BP12.1.7
Bulbostylis barbata	<1	0.05	BP12.1.12
Cleome viscosa	<1	0.3	BP12.1.16
Eriachne pulchella ssp. *pulchella*	<1	0.1	BP12.1.11
Euphorbia australis	<1	0.05	BP12.1.10
Evolvulus alsinoides var. *villosicalyx*	<1	0.15	BP12.1.9
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.2	BP12.1.3
Heliotropium cunninghamii	<1	0.1	BP12.1.13
Heliotropium inexplicitum	<1	0.15	BP12.1.14
Hibiscus sturtii var. *platychlamys*	<1	0.2	BP12.1.17A
Indigofera monophylla (grey/green leaflet form)	<1	0.3	BP12.1.18
Mollugo molluginea	<1	0.15	BP12.1.5
Polycarpaea corymbosa var. corymbosa	<1	0.1	BP12.1.4

Species	Cover (%)	Height (m)	Specimen
Sida aff. *echinocarpa* (MET 15,350)	<1	0.3	BP12.1.8
Streptoglossa decurrens	<1	0.15	BP12.1.21
Tephrosia supina	<1	0.1	BP12.1.17B
Tribulus suberosus	<1	0.4	BP12.1.19
Triodia epactia	70	0.6	BP12.1.1

API Rail Flora

Site APQ56

Described by KG **Date** 14/05/2009 **Type** Q 50 x 50

MGA Zone 50 493252 **mE** 7698468 **mN**
Soil Pale orange clay
Vegetation Closed Hummock Grassland of *Triodia wiseana* (fine form) on pale orange clay midslopes.
Veg Condition Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.1	7.1.20
Acacia bivenosa	<1	1.5	7.1.09
Bonamia media var. *villosa*	<1	0.05	7.1.06
**Cenchrus ciliaris*	<1	0.2	7.1.11
Corchorus aff. *parviflorus*	<1	0.4	7.1.08
Dichanthium sericeum ssp. *humilius*	<1	0.1	7.1.12
Enneapogon caerulescens var. *caerulescens*	<1	0.05	7.1.03
Euphorbia biconvexa	<1	0.05	7.1.15
Euphorbia sp. (BPBS10-50)	<1	0.05	7.1.16
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	7.1.14
Indigofera colutea	<1	0.05	7.1.17
Indigofera linifolia	<1	0.05	7.1.19
Iseilema dolichotrichum	<1	0.05	7.1.04
Polygala aff. *isingii*	<1	0.05	7.1.21A
Ptilotus auriculifolius	<1	0.25	7.1.07
Ptilotus helipteroides var. *helipteroides*	<1	0.2	7.1.13

Species	Cover (%)	Height (m)	Specimen
Rhynchosia minima	<1	creeper	7.1.18
Senna notabilis	<1	0.1	7.1.10
Swainsona canescens	<1	0.1	7.1.21B
Triodia wiseana (fine form)	100	0.7	7.1.01

API Rail Flora

Site APQ57

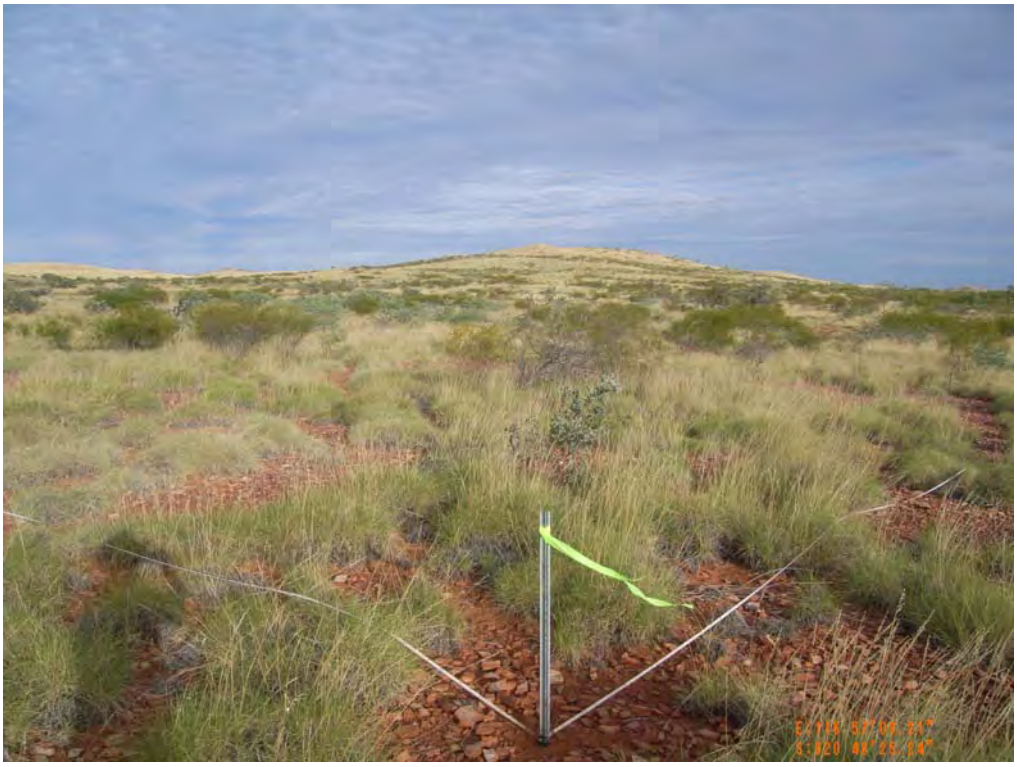
Described by KG **Date** 14/05/2009 **Type** Q 50 x 50

MGA Zone 50 495064 **mE** 7699216 **mN**

Soil Red stony clay

Vegetation Tall Open Shrubland of *Acacia ancistrocarpa* with scattered *Acacia inaequilatera* over a Closed Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia* aff. *epactia* on red stony clay.

Veg Condition Very Good



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.3	6.1.34
Acacia ancistrocarpa	8	2.2	6.1.06
Acacia bivenosa	<1	1.8	6.1.19
Acacia inaequilatera	1	1.8	6.1.10
Acacia pyrifolia var. *pyrifolia*	<1	2	6.1.20
Acacia synchronicia	<1	2	6.1.21
Alysicarpus muelleri	<1	0.1	6.1.22
Aristida contorta	<1	0.1	6.1.07
Bonamia media var. *villosa*	<1	0.1	6.1.14
**Cenchrus ciliaris*	<1	0.3	6.1.27
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	6.1.12
Eriachne pulchella ssp. *dominii*	<1	0.1	6.1.08
Euphorbia australis	<1	0.05	6.1.26
Evolvulus alsinoides var. *villosicalyx*	<1	0.15	6.1.35
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.15	6.1.18

Species	Cover (%)	Height (m)	Specimen
Indigofera colutea	<1	0.1	6.1.24
Indigofera trita	<1	0.3	6.1.23
Iseilema dolichotrichum	<1	0.1	6.1.04
Polymeria sp. (site 1365)	<1	0.05	6.1.33
**Portulaca oleracea*	<1	0.02	6.1.31
Ptilotus aervoides	<1	0.2	6.1.11
Ptilotus astrolasius var. *astrolasius*	<1	0.2	6.1.09
Ptilotus calostachyus var. *calostachyus*	<1	0.3	6.1.05
Ptilotus helipteroides var. *helipteroides*	<1	0.05	6.1.17
Rhynchosia minima	<1	creeper	6.1.29
Senna artemisioides ssp. *oligophylla*	<1	0.1	6.1.13
Senna glutinosa ssp. *x luerssenii*	<1	1	6.1.28
Senna notabilis	<1	0.2	6.1.30
Tephrosia aff. *supina* (HD88-4)	<1	0.05	6.1.32
Trichodesma zeylanicum var. *zeylanicum*	<1	0.1	6.1.16
Triodia aff. *epactia*	35	0.7	6.1.01
Triodia wiseana (fine form)	35	0.6	6.1.02

API Rail Flora

Site APQ58

Described by KG **Date** 15/05/2009 **Type** Q 50 x 50

MGA Zone 50 503122 **mE** 7703760 **mN**

Soil Orange stony clay

Vegetation Horseflats of *Eragrostis xerophila* over an Open Hummock Grassland of *Triodia epactia* & *Triodia wiseana* (fine form) on red stony cracking clay

Veg Condition Good - Degraded

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Alysicarpus muelleri	<1	0.2	1.1.21
Bulbostylis barbata	<1	0.1	1.1.31
Cleome viscosa	<1	0.2	1.1.8
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.1	1.1.29
Corchorus tridens	<1	0.05	1.1.26
**Cucumis melo ssp. agrestis*	<1	creeper	1.1.12
Desmodium campylocaulon	<1	creeper	1.1.25
Dichanthium sericeum ssp. *humilius*	<1	0.15	1.1.35
Eragrostis tenellula	<1	0.1	1.1.18
Eragrostis xerophila	40	0.2	1.1.15
Eriachne benthamii	<1	0.2	1.1.32
Eriachne pulchella ssp. *dominii*	<1	0.1	1.1.17
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	1.1.4
Indigofera linifolia	<1	0.1	1.1.11
Indigofera trita	<1	0.1	1.1.34

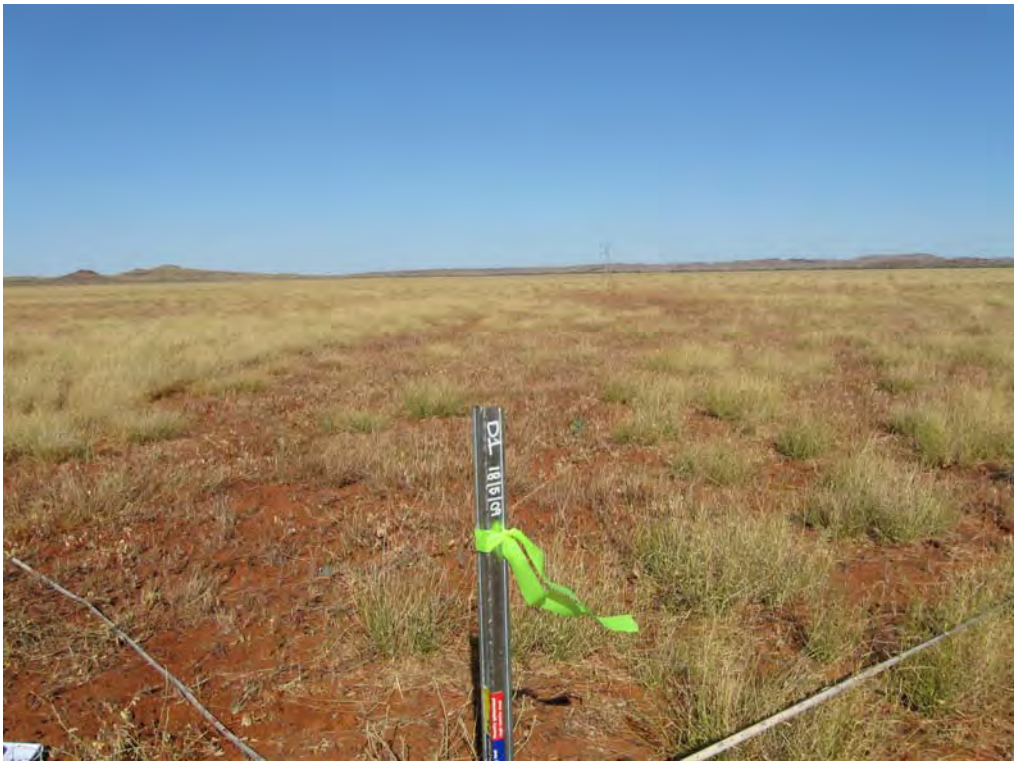
Species	Cover (%)	Height (m)	Specimen
Ipomoea coptica	<1	0.1	1.1.10
Iseilema macratherum	1	0.1	1.1.5
**Malvastrum americanum*	<1	0.05	1.1.33
Panicum decompositum	<1	0.3	1.1.9
Phyllanthus maderaspatensis	<1	0.2	1.1.20
Pluchea sp.	<1	0.05	1.1.28
**Portulaca oleracea*	<1	0.05	1.1.6
Ptilotus aervoides	<1	0.05	1.1.3
Ptilotus exaltatus var. *exaltatus*	<1	0.1	1.1.2
Ptilotus gomphrenoides var. *gomphrenoides*	1	0.25	1.1.30
Rhynchosia minima	<1	creeper	1.1.13
Salsola tragus ssp. *tragus*	<1	0.2	1.1.23
Senna artemisioides ssp. *oligophylla*	<1	0.1	1.1.24
Senna notabilis	<1	0.05	1.1.22
Sida aff. *fibulifera* (HD200-6)	<1	0.2	1.1.19
Streptoglossa bubakii	<1	0.15	1.1.7
Tephrosia clementii	<1	0.1	1.1.14
Triodia epactia (Form A)	7	0.3	1.1.16
Triodia wiseana (fine form)	5	0.3	1.1.1

API Rail Flora

Site **APQ59**

Described by KG **Date** 18/05/2009 **Type** Q 50 x 50

MGA Zone 50 507987 **mE** 7703471 **mN**
Soil Orange cracking clay
Vegetation Horseflats of *Eragrostis xerophila* and *Dichanthium sericeum* ssp. *humilis* on orange clay flats.
Veg Condition Good



SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Aristida latifolia	<1	0.7	D1.10
Dactyloctenium radulans	<1	0.1	D1.15
Dichanthium sericeum ssp. *humilius*	15	0.1	D1.01
Eragrostis xerophila	45	0.3	D1.11
Heliotropium conocarpum	<1	0.1	D1.02
Indigofera trita	<1	0.3	D1.08
Iseilema macratherum	<1	0.3	D1.12
Neptunia dimorphantha	<1	0.05	D1.07
Operculina aequisepala	<1	0.2	D1.04
Panicum decompositum	<1	0.6	D1.03
Phyllanthus maderaspatensis	<1	0.1	D1.13
Polygala aff. *isingii*	<1	0.1	D1.14
Rhynchosia minima	<1	creeper	D1.05
Salsola tragus ssp. *tragus*	<1	0.2	D1.06
Sida aff. *fibulifera* (HD200-6)	<1	0.4	D1.09

API Rail Flora **Site** APQ60

Described by KG **Date** 18/05/2009 **Type** Q 50 x 50

MGA Zone 50 508736 **mE** 7704740 **mN**

Soil Red stony clay over rock

Vegetation Mixed Shrubland of *Acacia* spp. dominated by *Acacia pyrifolia* var. *pyrifolia* over a Hummock Grassland of *Triodia wiseana* (fine form) on red stony clay.

Veg Condition Good

Fire Age <2 years

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum* (4)	<1	0.2	D2.8
Acacia ancistrocarpa x stellaticeps	<1	0.1	D2.19
Acacia bivenosa	<1	0.2	D2.21
Acacia colei var. *colei*	<1	1.2	D2.15
Acacia inaequilatera	2	3	D2.24
Acacia pyrifolia var. *pyrifolia*	30	2	D2.16
Acacia stellaticeps	<1	0.4	D2.18
Bulbostylis barbata	<1	0.05	D2.23
Eriachne pulchella ssp. *dominii*	<1	0.1	D2.11
Euphorbia australis	<1	0.05	D2.2
Euphorbia coghlanii	<1	0.2	D2.22
Gomphrena cunninghamii	<1	0.2	D2.4
Goodenia microptera	<1	0.3	D2.13
Panicum decompositum	<1	0.5	D2.5

Species	Cover (%)	Height (m)	Specimen
Paraneurachne muelleri	<1	0.3	D2.14
Ptilotus exaltatus var. *exaltatus*	<1	0.3	D2.17
Ptilotus helipteroides var. *helipteroides*	<1	0.2	D2.3
Salsola tragus ssp. *tragus*	<1	0.2	D2.9
Senna notabilis	<1	0.2	D2.7
Solanum lasiophyllum	<1	0.3	D2.6
Sporobolus australasicus	<1	0.1	D2.1
Triodia epactia (Form B)	5	0.3	D2.12
Triodia wiseana (fine form)	25	0.3	D2.20
Triumfetta clementii	<1	0.4	D2.10

API Rail Flora

Site **APQ61**

Described by KG **Date** 19/05/2009 **Type** Q 50 x 50

MGA Zone 50 512563 **mE** 7716148 **mN**
Soil Brown tidal clay
Vegetation Mangroves of *Avicennia marina* ssp. *marina* on brown tidal clay.
Veg Condition Excellent - Very Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Avicennia marina ssp. *marina*	80	3.5	D3.1

API Rail Flora

Site **APQ62**

Described by KG **Date** 19/05/2009 **Type** Q 50 x 50

MGA Zone 50 512111 **mE** 7715692 **mN**

Soil Orange sand

Vegetation Tall shrubland of *Acacia sabulosa* and *Acacia coriacea* ssp. coriacea over a Low Open Shrubland of *Acacia stellaticeps* over a Mid-Dense Hummock Grassland of *Triodia schinzii* and *Triodia epactia* over a Tussock Grassland of **Cenchrus ciliaris* on orange sand midslopes.

Veg Condition Good - Degraded

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia coriacea ssp. *coriacea*	2	2.8	D4.17
Acacia sabulosa	15	2.2	D4.16
Acacia stellaticeps	8	0.8	D4.13
**Cenchrus ciliaris*	50	0.5	D4.11
Cleome viscosa	<1	0.3	D4.14
Desmodium filiforme	<1	creeper	D4.07
Indigofera colutea	<1	0.1	D4.19
Indigofera linifolia	<1	0.1	D4.18
Ipomoea polymorpha	<1	0.1	D4.15
Ptilotus clementii	<1	0.1	D4.12
Ptilotus polystachyus var. *arthrotrichus*	<1	0.1	D4.01
Senna notabilis	<1	0.2	D4.06
Sida rohlenae ssp. *rohlenae*	<1	0.2	D4.05
Tricoryne corynothecoides	<1	0.3	D4.02

Species	Cover (%)	Height (m)	Specimen
Triodia epactia	20	0.7	D4.04
Triodia schinzii	40	1.5	D4.03
Yakirra australiensis var. *australiensis*	<1	0.1	D4.08

API Rail Flora

Site APQ63

Described by KG **Date** 19/05/2009 **Type** Q 50 x 50

MGA Zone 50 511852 **mE** 7715452 **mN**

Soil Orange sand with rocks on upper slopes

Vegetation Tall shrubland of *Grevillea pyramidalis* ssp. *leucadendron* over a Tussock Grassland of *Cenchrus ciliaris* with scattered *Triodia wiseana* (fine form) on rocky mid to upper slope sand.

Veg Condition Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	<1	0.5	D5.11
Acacia elachantha (golden hairy variant*)*	<1	1.2	D5.29
Acacia pyrifolia var. *pyrifolia*	<1	0.4	D5.33
Bonamia media var. *villosa*	<1	0.05	D5.28
Bulbostylis barbata	<1	0.05	D5.22
**Cenchrus ciliaris*	10	0.4	D5.38
Corchorus aff. parviflorus	<1	0.3	D5.01
Crotalaria medicaginea var. *neglecta*	<1	0.3	D5.02
Crotalaria ramosissima	<1	0.2	D5.31
Dactyloctenium radulans	<1	0.05	D5.12
Desmodium filiforme	<1	creeper	D5.19
Euphorbia coghlanii	<1	0.2	D5.35
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	D5.24
Fimbristylis aff. dichotoma (M75-4)	<1	0.3	D5.13
Gomphrena cunninghamii	<1	0.1	D5.18

Species	Cover (%)	Height (m)	Specimen
Goodenia microptera	<1	0.3	D5.08
Grevillea pyramidalis ssp. *leucadendron*	12	2.5	D5.32
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.2	D5.06
Hybanthus aurantiacus	<1	0.15	D5.34
Indigofera colutea	<1	0.1	D5.26
Indigofera linifolia	<1	0.2	D5.16
Indigofera monophylla (Burrup form)	<1	0.3	D5.15
Indigofera trita	<1	0.2	D5.25
Ipomoea polymorpha	<1	0.1	D5.36
Polycarpaea longiflora (white form)	<1	0.2	D5.09
Ptilotus astrolasius var. *astrolasius*	<1	0.05	D5.04
Swainsona formosa	<1	0.2	D5.21
Tephrosia aff. *supina* (HD88-4)	<1	0.05	D5.23
Trachymene oleracea ssp. *oleracea*	<1	0.2	D5.14
Trichodesma zeylanicum var. *zeylanicum*	*<1*	*0.2*	*D5.10*
Triodia epactia	<1	0.3	D5.27
Triodia wiseana (fine form)	1	0.3	D5.37
Triumfetta clementii	0.2	D5.30	D5.30

API Rail Flora **Site APQ64**

Described by KG **Date** 19/05/2009 **Type** Q 50 x 50

MGA Zone 50 511242 **mE** 7716066 **mN**

Soil Pale brown sand

Vegetation Tall Open Scrub of *Acacia sabulosa* with scattered *Acacia coriacea* ssp. *coriacea* over a Herbland of **Aerva javanica* over a Tussock Grassland of **Cenchrus ciliaris* on pale brown sandy midslopes.

Veg Condition Degraded

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia coriacea ssp. *coriacea*	<1	2	D6.9
Acacia sabulosa	35	2.5	D6.1
**Aerva javanica*	40	1.2	D6.2
**Cenchrus ciliaris*	60	1.5	D6.3
Euphorbia coghlanii	<1	0.4	D6.5
Rhagodia preissii ssp. *obovata*	<1	0.5	D6.4
Salsola tragus	<1	0.4	D6.8
Triodia epactia	<1	0.6	D6.6

API Rail Flora

Site APQ65

Described by KG **Date** 19/05/2009 **Type** Q 50 x 50

MGA Zone 50 511327 **mE** 7716119 **mN**
Soil Pale brown sand
Vegetation Scattered Spinifex *longifolius* over **Aerva javanica* on pale brown sands on shoreline.
Veg Condition Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
**Aerva javanica*	1	0.6	D7.4
Avicennia marina ssp. *marina*	<1	1.2	D7.9
Canavalia rosea	<1	0.2	D7.3
**Cenchrus ciliaris*	<1	0.4	D7.8
Launaea sarmentosa	<1	Creeper	D7.7
Salsola tragus ssp. *tragus*	<1	0.5	D7.5
Spinifex longifolius	2	0.4	D7.1
Tecticornia indica ssp. *bidens*	<1	0.4	D7.2
Trianthema turgidifolia	<1	0.3	D7.6

API Rail Flora

Site APQ66

Described by KG **Date** 21/05/2009 **Type** Q 50 x 50

MGA Zone 50 509566 **mE** 7718701 **mN**

Soil Pale orange sandy clay

Vegetation Mid to Dense Hummock Grassland of *Triodia pungens* over an Open Tussock Grassland of **Cenchrus ciliaris* and *Eragrostis aff. eriopoda* (WAS site 963) on pale orange sandy clay midslopes.

Veg Condition Good

SPECIES LIST:

Species	**Cover (%)**	**Height (m)**	**Specimen**
Acacia bivenosa	1	1	D8.9
Acacia coriacea ssp. *coriacea*	<1	0.5	D8.13
**Aerva javanica*	2	0.5	D8.12
Bonamia media var. *villosa*	<1	0.05	D8.7
**Cenchrus ciliaris*	20	0.4	D8.4
Chrysopogon fallax	1	1.2	D8.8
Eragrostis aff. *eriopoda* (WAS site 963)	4	0.4	D8.10
Goodenia microptera	<1	0.3	D8.11
Indigofera colutea	<1	0.1	D8.1
Indigofera linifolia	<1	0.1	D8.5
Ptilotus axillaris	<1	0.1	D8.6
Rhynchosia minima	<1	creeper	D8.3
Solanum diversiflorum	<1	0.3	D8.14
Triodia pungens	60	0.5	D8.2

API Rail Flora

Site APQ67

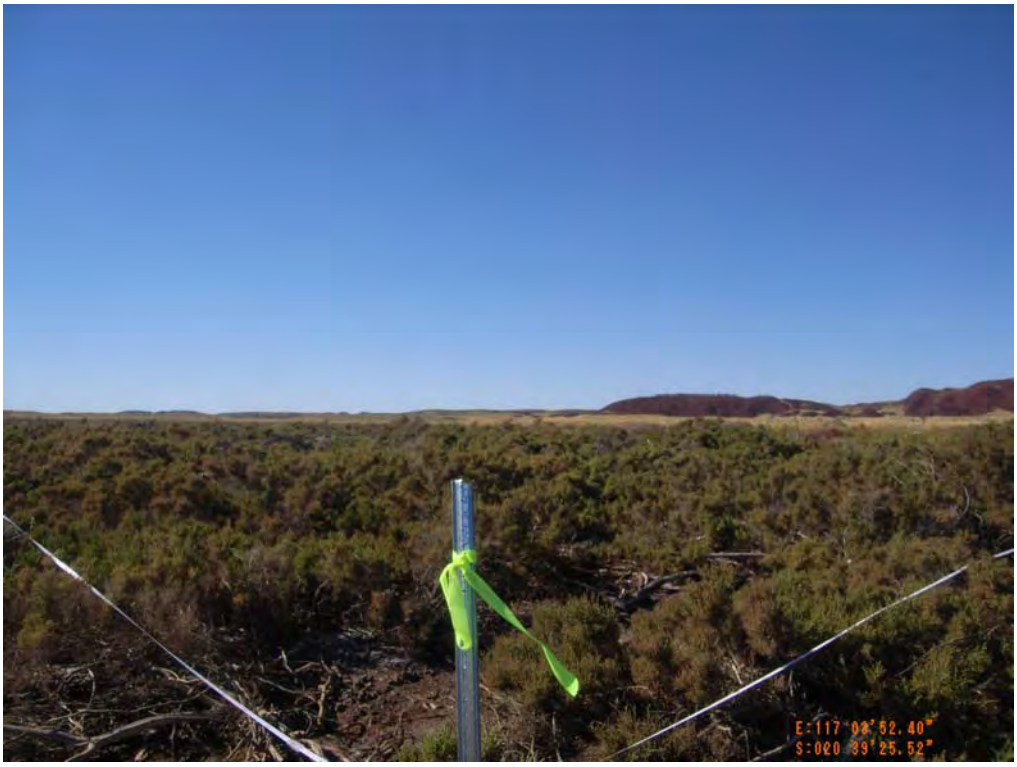
Described by KG **Date** 21/05/2009 **Type** Q 50 x 50

MGA Zone 50 506725 **mE** 7715803 **mN**

Soil Brown clayey loam

Vegetation Low Shrubland dominated by Tecticornia halocnemoidesssp. tenuis with scattered Trianthema turgidifolia and Tecticornia pruinosa on brown clayey loam.

Veg Condition Very Good - Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Cassytha capillaris	<1	creeper	D9.18
**Cenchrus ciliaris*	1	0.3	D9.06
Cleome viscosa	<1	0.2	D9.07
Euphorbia coghlanii	<1	0.1	D9.09
Frankenia pauciflora var. *pauciflora*	2	0.2	D9.16
Gomphrena cunninghamii	<1	0.1	D9.12
Hemichroa diandra	1	0.2	D9.03
Lepidium pholidogynum	<1	0.05	D9.08
Neobassia astrocarpa	<1	0.2	D9.10
Sporobolus australasicus	<1	0.2	D9.11
Tecticornia halocnemoides ssp. *tenuis*	30	0.2	D9.02
Tecticornia indica ssp. *bidens*	1	0.2	D9.14
Tecticornia pruinosa	3	0.2	D9.05
Trianthema turgidifolia	3	0.2	D9.01
Triodia angusta	<1	0.4	D9.15

API Rail Flora

Site APQ68

Described by KG **Date** 21/05/2009 **Type** Q 30 x 50

MGA Zone 50 502884 **mE** 7713085 **mN**

Soil Orange stony clay

Vegetation Low Open Woodland of *Corymbia hammersleyana* over Tall Open Scrub of Acacia *bivenosa* and *Acacia tumida* var. *pilbarensis* over a Mid to Dense Hummock Grassland of *Triodia epactia* and *Triodia wiseana* (fine form) woth scattered **Cenchrus ciliaris* on orange stony clay drainage lines.

Veg Condition Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	40	3.5	D10.03
Acacia pyrifolia var. *pyrifolia*	<1	2	D10.04
Acacia stellaticeps	<1	0.5	D10.22
Acacia tumida var. *pilbarensis*	3	1.8	D10.08
Bonamia media var. *villosa*	<1	0.1	D10.26
Bonamia pannosa	<1	creeper	D10.23
**Cenchrus ciliaris*	3	0.3	D10.46
Chrysopogon fallax	<1	0.9	D10.34
Cleome viscosa	<1	0.3	D10.13
Corchorus aff. *parviflorus*	<1	0.2	D10.07
Corymbia hamersleyana	6	2.8	D10.29
Cucumis maderaspatanus	<1	creeper	D10.05
Cullen leucanthum	<1	0.3	D10.11
Dichanthium sericeum ssp. *humilius*	<1	0.1	D10.31
Eriachne pulchella ssp. *dominii*	<1	0.1	D10.17

Species	Cover (%)	Height (m)	Specimen
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	D10.33
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.2	D10.38
Goodenia microptera	<1	0.4	D10.42
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.3	D10.20
Hibiscus leptocladus	<1	0.3	D10.12
Hybanthus aurantiacus	<1	0.3	D10.24
Indigofera monophylla (Burrup form)	<1	0.1	D10.06
Iseilema dolichotrichum	<1	0.1	D10.30
Phyllanthus maderaspatensis	<1	0.3	D10.43
Rhynchosia minima	<1	creeper	D10.21
Senna artemisioides ssp. aff. *oligophylla* (thinly sericeous)	<1	0.5	D10.25
Senna notabilis	<1	0.1	D10.36
Sida aff. fibulifera (HD200-6)	<1	0.3	D10.19
Sida pilbarensis (Ferrugineous form)	<1	0.2	D10.41
Solanum diversiflorum	<1	0.3	D10.10
Sporobolus australasicus	<1	0.1	D10.32
Swainsona formosa	<1	0.3	D10.14
Tephrosia clementii	<1	0.1	D10.37
Themeda triandra	1	0.6	D10.15
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	D10.28
Triodia epactia	20	0.4	D10.01
Triodia wiseana (fine form)	10	0.4	D10.02
Triumfetta clementii	<1	0.4	D10.09

API Rail Flora

Site APQ69

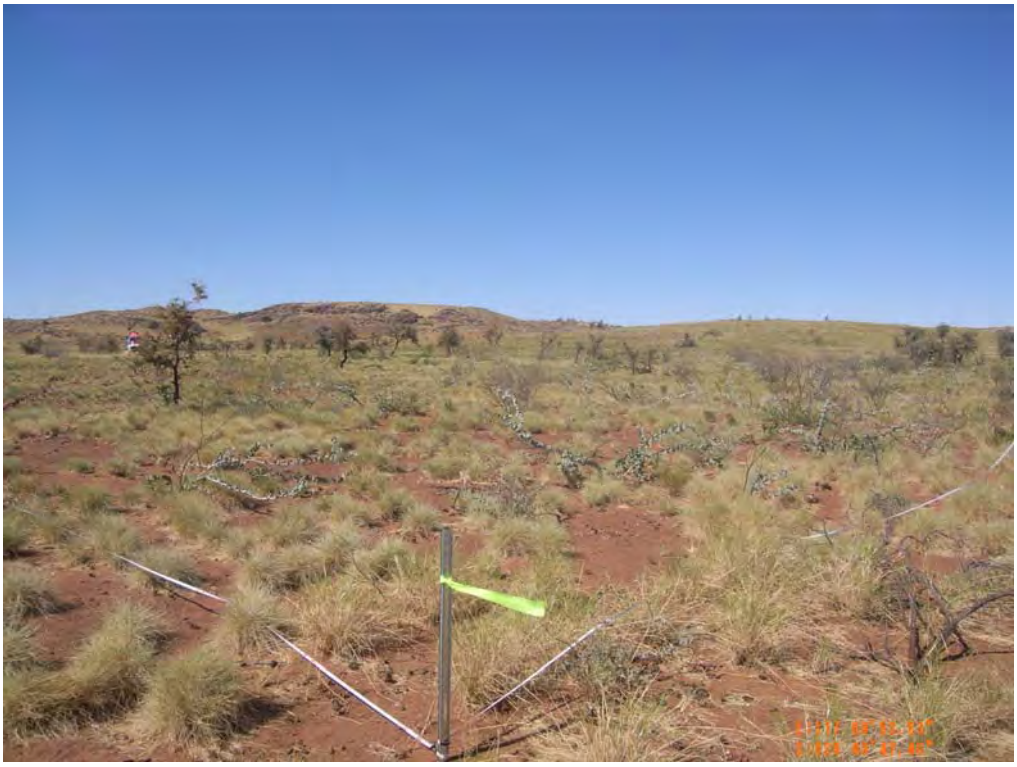
Described by KG **Date** 21/05/2009 **Type** Q 50 X 50

MGA Zone 50 501559 **mE** 7713280 **mN**

Soil Orange stony clay

Vegetation Tall Shrubland of *Acacia bivenosa*, *Acacia inaequilatera* and *Acacia pyrifoliassp. pyrifolia* over a Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on orange stony clay flats.

Veg Condition Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum (4)*	<1	0.2	D11.28
Acacia bivenosa	2	1.2	D11.8
Acacia inaequilatera	5	3	D11.9
Acacia pyrifolia var. *pyrifolia*	6	1	D11.32
Boerhavia coccinea	<1	0.1	D11.6
Bonamia media var. *villosa*	<1	0.1	D11.25
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.3	D11.24
Enneapogon caerulescens var. *caerulescens*	<1	0.1	D11.27
Eriachne pulchella ssp. *dominii*	<1	0.1	D11.17
Euphorbia coghlanii	<1	0.05	D11.30
Euphorbia sp. (BPBS10-50)	<1	0.3	D11.16
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	D11.10
Gomphrena cunninghamii	<1	0.1	D11.23
Goodenia microptera	<1	0.3	D11.29

Species	Cover (%)	Height (m)	Specimen
Hibiscus sturtii var. *platychlamys*	<1	0.3	D11.33
Hybanthus aurantiacus	<1	0.3	D11.14
Indigofera monophylla (Burrup form)	<1	0.2	D11.26
Indigofera trita	<1	0.1	D11.31
Leptopus decaisnei var. *orbicularis*	<1	0.1	D11.11
Paraneurachne muelleri	<1	0.4	D11.35
**Portulaca oleracea*	<1	0.05	D11.15
Ptilotus auriculifolius	<1	0.2	D11.18
Ptilotus exaltatus var. *exaltatus*	<1	0.3	D11.4
Ptilotus helipteroides var. *helipteroides*	<1	0.2	D11.19
Rhynchosia minima	<1	creeper	D11.21
Senna glutinosa ssp. *glutinosa*	<1	0.6	D11.22
Senna notabilis	<1	0.1	D11.13
Sporobolus australasicus	<1	0.1	D11.1
Swainsona formosa	<1	0.1	D11.2
Triodia wiseana (fine form)	40	0.3	D11.34
Triumfetta clementii	<1	0.3	D11.7
Yakirra australiensis var. *australiensis*	<1	0.1	D11.12

API Rail Flora

Site APQ70

Described by KG **Date** 21/05/2009 **Type** Q 50 x 50

MGA Zone 50 500692 **mE** 7709480 **mN**
Soil Orange stony cracking clay
Vegetation Horseflats domianted by *Eragrostis xerophila* and *Eriachne benthamii* on stony clay flats.
Veg Condition Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Aristida contorta	<1	0.15	D12.11
Brachyachne prostrata	<1	0.2	D12.15
Dichanthium sericeum ssp. *humilius*	<1	0.1	D12.6
Eragrostis xerophila	45	0.3	D12.3
Eriachne benthamii	2	0.3	D12.2
Eriachne pulchella ssp. *pulchella*	<1	0.1	D12.13
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.2	D12.14
Heliotropium inexplicitum	<1	0.1	D12.10
Indigofera linifolia	<1	0.2	D12.4
Indigofera trita	<1	0.1	D12.9
Rhynchosia minima	<1	creeper	D12.1
Sida aff. *fibulifera* (HD200-6)	D12.7B		
Stemodia kingii	<1	0.15	D12.12
Streptoglossa liatroides	<1	0.1	D12.8
Trianthema aff. *triquetra* (M3.35)	<1	0.1	D12.5

API Rail Flora

Site APQ71

Described by KG **Date** 21/05/2009 **Type** Q 50 X 50

MGA Zone 50 501484 **mE** 7708267 **mN**

Soil Brown orange clay

Vegetation Woodland of *Eucalyptus victrix* over a Low Open Woodland *of Corymbia hammersleyana* over Tall Open Shrubland to Open Shrubland of *Acacia colei* var. *colei* and *Acacia bivenosa* over a Closed Tussock Grassland of **Cenchrus ciliaris* on brown clay in association with drainage lines.

Veg Condition Degraded

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	2	1.5	D13.03
Acacia colei var. colei	3	2.5	D13.16
Acacia coriacea ssp. *coriacea*	<1	1.8	D13.18
Acacia coriacea ssp. *pendens*	<1	2.5	D13.15
**Cenchrus ciliaris*	90	0.4	D13.08
Chrysopogon fallax	<1	0.7	D13.05
Corchorus aff. *parviflorus*	<1	0.2	D13.07
Corymbia hamersleyana	5	3.5	D13.04
Dichrostachys spicata	<1	1	D13.17
Eragrostis tenellula	<1	0.1	D13.26
Eucalyptus victrix	25	16	D13.27
Goodenia forrestii	<1	0.4	D13.24
Indigofera monophylla (Burrup form)	<1	0.2	D13.09
Indigofera trita	<1	0.3	D13.25
Iseilema eremaeum	<1	0.1	D13.28
Jasminum didymum ssp. *lineare*	<1	0.3	D13.21

Species	Cover (%)	Height (m)	Specimen
**Malvastrum americanum*	<1	0.5	D13.23
Panicum decompositum	<1	0.4	D13.01
Pluchea rubelliflora	<1	0.5	D13.19
Pterocaulon sphaeranthoides	<1	0.3	D13.13
Sesbania cannabina	<1	0.5	D13.22
Solanum diversiflorum	<1	0.3	D13.14
Stemodia kingii	<1	0.3	D13.20
Themeda triandra	<1	0.6	D13.12
Triodia angusta	<1	0.5	D13.10
Triumfetta clementii	<1	0.3	D13.06
Vigna lanceolata var. *lanceolata*	<1	creeper	D13.02

API Rail Flora

Site APQ72

Described by KG **Date** 12/05/2009 **Type** Q 50 X 50

MGA Zone 50 505262 **mE** 7703710 **mN**

Soil Orange stony clayey loam

Vegetation Open Shrubland of *Acacia pyrifolia* var. *pyrifolia* and *Acacia synchronicia* over a Tall Shrubland of *Acacia ancistrocarpa*, *Acacia inaequilatera* and *Acacia ancistrocarapa* over a Hummock Grassland of *Triodia epactia* with **Cenchrus ciliaris* on orange stony clayey loam midslopes.

Veg Condition Very Good - Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa	15	2.5	D14.12
Acacia bivenosa	3	2.5	D14.9
Acacia inaequilatera	3	2.8	D14.8
Acacia pyrifolia var. *pyrifolia*	5	1.5	D14.4
Acacia synchronicia	1	1.5	D14.13
Aristida contorta	<1	0.1	D14.19
Capparis spinosa var. *nummularia*	<1	1	D14.11
**Cenchrus ciliaris*	5	0.4	D14.10
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.3	D14.5
Dichrostachys spicata	<1	1	D14.16
Euphorbia coghlanii	<1	0.2	D14.18
Hybanthus aurantiacus	<1	0.2	D14.7
Iseilema dolichotrichum	<1	0.1	D14.17
Leptopus decaisnei var. *orbicularis*	<1	0.3	D14.1

Species	Cover (%)	Height (m)	Specimen
Ptilotus astrolasius var. *astrolasius*	<1	0.3	D14.15
Sporobolus australasicus	<1	0.1	D14.3
Tephrosia supina	<1	0.1	D14.6
Triodia epactia	30	0.4	D14.2
Triumfetta clementii	<1	0.3	D14.14

API Rail Flora

Site APQ73

Described by KG **Date** 19/05/2009 **Type** Q 50 X 50

MGA Zone 50 501201 **mE** 7703593 **mN**

Soil Rocky clay loam

Vegetation Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia epactia* on red rocky ridge.

Veg Condition Very Good - Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. lepidum (4)	<1	0.8	VQ01.09A
Acacia bivenosa			VQ01.09B
Acacia pyrifolia var. *pyrifolia*	<1	1	VQ01.08
Alysicarpus muelleri	<1	0.2	VQ01.30
Boerhavia coccinea	<1	0.1	VQ01.27
**Cenchrus ciliaris*	<1	0.2	VQ01.05
Crotalaria medicaginea var. *neglecta*	<1	0.15	VQ01.26
Cucumis maderaspatanus	<1	Creeper	VQ01.15
Cymbopogon ambiguus	<1	0.7	VQ01.13
Dicliptera armata	<1	0.2	VQ01.01
Euphorbia australis	<1	0.05	VQ01.28
Euphorbia coghlanii	<1	0.1	VQ01.17
Evolvulus alsinoides var. *villosicalyx*	<1	0.15	VQ01.03
Gomphrena cunninghamii	<1	0.1	VQ01.25
Gossypium australe (Whim Creek form)	<1	0.8	VQ01.21

Species	Cover (%)	Height (m)	Specimen
Grevillea pyramidalisssp. leucadendron	<1	0.9	VQ01.20
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.5	VQ01.23
Hybanthus aurantiacus	<1	0.4	VQ01.02
Indigofera monophylla (Burrup form)	<1	0.5	VQ01.22
Paspalidium tabulatum (Whim Creek form)	<1	0.1	VQ01.18
Polycarpaea longiflora (white form)	<1	0.15	VQ01.04
Ptilotus auriculifolius	<1	0.1	VQ01.24
Rhynchosia minima	<1	Creeper	VQ01.06
Senna glutinosa ssp. *pruinosa*	<1	1.2	VQ01.16
Senna venusta	<1	0.2	VQ01.12
Solanum diversiflorum	<1	0.3	VQ01.14
Trachymene oleracea ssp. *oleracea*	<1	0.1	VQ01.07
Triodia epactia	20	0.5	VQ01.31
Triodia wiseana (fine form)	60	0.5	VQ01.11
Triumfetta clementii	<1	0.2	VQ01.29

API Rail Flora

Site APQ74

Described by KG **Date** 19/05/2009 **Type** Q 50 X 20

MGA Zone 50 502781 **mE** 7704920 **mN**

Soil Clayey loam

Vegetation Low woodland of *Eucalyptus victrix* and *Corymbia hammersleyana* over a Tall Open Shrubland of *Acacia trachycarpa and Acacia coriacea* ssp. *pendens* over a Tussock Grassland of **Cenchrus ciliaris*, *Themeda triandra* and *Chrysopogon fallax* on brown, clayey loam in association with drainage lines.

Veg Condition Very Good

SPECIES LIST:

Species	Cover (%)	Height (m)s	Specimen
Acacia coriacea ssp. *pendens*	2	1.5	VQ02.14
Acacia pyrifolia var. *pyrifolia*	<1	1.5	VQ02.25
Acacia trachycarpa	2	3	VQ02.05
Alysicarpus muelleri	<1	0.4	VQ02.38
Bonamia media var. *villosa*	<1	Creeper	VQ02.34
**Cenchrus ciliaris*	25	0.5	
Chrysopogon fallax	5	1	VQ02.01
Corchorus aff. *parviflorus*	<1	0.4	VQ02.22
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.4	VQ02.36
Corymbia hamersleyana	5	6	VQ02.11
Cucumis maderaspatanus	<1	Creeper	VQ02.26
Dichanthium sericeum ssp. *humilius*	<1	0.2	VQ02.07

Species	Cover (%)	Height (m)s	Specimen
Dichrostachys spicata	<1	0.9	VQ02.16
Eucalyptus victrix	15	10	VQ02.10
Eulalia aurea	2	0.5	VQ02.03
Euphorbia biconvexa	<1	0.1	VQ02.27
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	VQ02.19
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.4	VQ02.29
Hybanthus aurantiacus	<1	0.3	VQ02.33
Indigofera colutea	<1	0.05	VQ02.35
Indigofera linifolia	<1	0.1	VQ02.30
Indigofera monophylla (Burrup form)	<1	0.6	VQ02.37
Indigofera trita	<1	0.15	VQ02.28
**Malvastrum americanum*	<1	0.3	VQ02.32
Operculina aequisepala	<1	Creeper	VQ02.13
Polymeria ambigua	<1	Creeper	VQ02.02
Ptilotus auriculifolius	<1	0.1	VQ02.15
Rhynchosia minima	<1	Creeper	VQ02.09
Salsola tragus ssp. *tragus*	<1	0.4	VQ02.21
Senna artemisioides ssp. *oligophylla x helmsii*	<1	0.3	VQ02.08
Senna glutinosa ssp. *glutinosa*	<1	0.5	VQ02.06
Solanum diversiflorum	<1	0.2	VQ02.12
Sporobolus australasicus	<1	0.05	VQ02.18
Themeda triandra	15	0.5	VQ02.17
Trichodesma zeylanicum var. *zeylanicum*	<1	0.5	VQ02.23
Triodia aff. *epactia*	<1	0.2	VQ02.04
Triumfetta clementii	<1	0.5	VQ02.24
Vigna lanceolata var. *lanceolata*	<1	Creeper	VQ02.31

API Rail Flora

Site APQ75

Described by KG **Date** 19/05/2009 **Type** Q 50 X 50

MGA Zone 50 503366 **mE** 7704385 **mN**

Soil Loamy clay

Vegetation Open Shrubland of *Acacia xiphophylla* over a Mid to Dense Hummock Grassland of *Triodia angusta* and *Triodia wiseana* (fine form) over a Very Open Tussock Grassland of *Aristida contorta* on red loamy clay flats.

Veg Condition Good

SPECIES LIST:

Species	Cover (%)	Height (m)s	Specimen
Abutilon aff. *lepidum (4)*	<1	0.8	VQ03.17
Acacia bivenosa	<1	1	VQ03.04
Acacia xiphophylla	3	2	VQ03.18
Aristida contorta	5	0.2	VQ03.29
Boerhavia coccinea	<1	0.1	VQ03.20
Bonamia media var. *villosa*	<1	0.1	VQ03.19
**Cenchrus ciliaris*	<1	0.5	VQ03.08
Chrysopogon fallax	<1	0.9	VQ03.25
Corchorus aff. *walcotti* (K.J. Atkins 570)	2	0.8	VQ03.24
Dichanthium sericeum ssp. *humilius*	<1	0.25	VQ03.30
Enneapogon caerulescens var. *caerulescens*	<1	0.05	VQ03.23
Eriachne pulchella ssp. *dominii*	<1	0.15	VQ03.26
Euphorbia sp. (BPBS10-50)	3	0.1	VQ03.22

Species	Cover (%)	Height (m)s	Specimen
Goodenia microptera	<1	0.2	VQ03.06
Heliotropium heteranthum	<1	0.05	VQ03.21
Indigofera colutea	<1	0.15	VQ03.14
Iseilema dolichotrichum	<1	0.05	VQ03.27
**Portulaca oleracea*	<1	0.05	VQ03.07
Ptilotus ?exaltatus var. *exaltatus*	<1	0.2	VQ03.13
Ptilotus exaltatus var. *exaltatus*	<1	0.2	VQ03.09
Ptilotus helipteroides var. *helipteroides*	<1	0.1	VQ03.05
Salsola tragus ssp. *tragus*	<1	0.4	VQ03.12
Senna glutinosa ssp. *x luerssenii*	<1	1	VQ03.15
Senna notabilis	<1	0.1	VQ03.11
Triodia angusta	40	1.5	VQ03.02
Triodia wiseana (fine form)	20	0.5	VQ03.01
Triumfetta clementii	<1	0.2	VQ03.28

API Rail Flora

Site **APQ76**

Described by KG **Date** 18/05/2009 **Type** R

MGA Zone 50 506923 **mE** 7713754 **mN**
Habitat Ridge tops - vegetation confined to small flat tops
Soil Red rocky soils
Vegetation Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia epactia* on rocky ridge tops.
Veg Condition Very Good - Good
Notes No quadrat put in due to large % of rocks. All species present were collected.

SPECIES LIST:

Species	Cover (%)	Height (m)s	Specimen
Abutilon aff. lepidum (4)	<1	0.1	CT01.03B
Acacia xiphophylla	1	4	CT01.03
Aristida holathera var. *holathera*	<1	0.1	CT01.08C
Aristida sp.	<1	0.4	CT01.06
Boerhavia burbidgeana	<1	Creeper	CT01.12
Capparis spinosa var. *nummularia*	<1	0.5	CT01.07
Clerodendrum tomentosum var. *lanceolatum*	<1	2.5	CT01.09
Cucumis maderaspatanus	<1	Creeper	CT01.04
Ehretia saligna var. *saligna*	<1	2	CT01.13
Enchylaena tomentosa var. *tomentosa*	<1	0.4	CT01.05
Euphorbia biconvexa	<1	0.2	CT01.08B
Gomphrena cunninghamii	<1	0.2	CT01.01
Ptilotus obovatus var. *obovatus*	2	0.4	CT01.02

Species	Cover (%)	Height (m)s	Specimen
Streptoglossa sp.	<1	0.15	CT01.14
Tinospora smilacina	<1	Creeper	CT01.08A
Triodia epactia	10	0.4	CT01.10
Triodia wiseana (fine form)	10	0.4	CT01.11
Vigna sp. *Burrup* (B18)	<1	Creeper	CT01.15

API Rail Flora

Site APQ77

Described by KG **Date** 18/05/2009 **Type** Q 50 X 50

MGA Zone 50 503988 **mE** 7707986 **mN**

Soil Rocky clay loam

Vegetation Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) over a Very Open Tussock Grassland of *Iseilema dolichotrichum* and *Eriachne pulchella ssp. dominii* over a Low Open Shrubland dominated by *Euphorbia* sp. (BPBS10-50), *Euphorbia wheeleri* and *Corchorus aff. parviflorus* on rocky ridgetops.

Veg Condition Very Good - Good

Fire Age < 2 years

Notes Burnt in Late 2007

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon aff. *lepidum (4)*	<1	0.3	CQ01.03
Acacia pyrifolia var. *pyrifolia*	<1	0.12	CQ01.11
Bonamia media var. *villosa*	<1	0.1	CQ01.09
**Cenchrus ciliaris*	<1	0.3	CQ01.07
Corchorus aff. *parviflorus*	3	0.4	CQ01.12
Cymbopogon ambiguus	<1	0.5	CQ01.17
Enneapogon caerulescens var. *caerulescens*	<1	0.1	CQ01.15
Eriachne pulchella ssp. *dominii*	5	0.1	CQ01.05
Euphorbia boophthona	<1	0.2	CQ01.08
Euphorbia sp. (BPBS10-50)	2	0.05	CQ01.06
Euphorbia wheeleri	5	0.25	CQ01.13

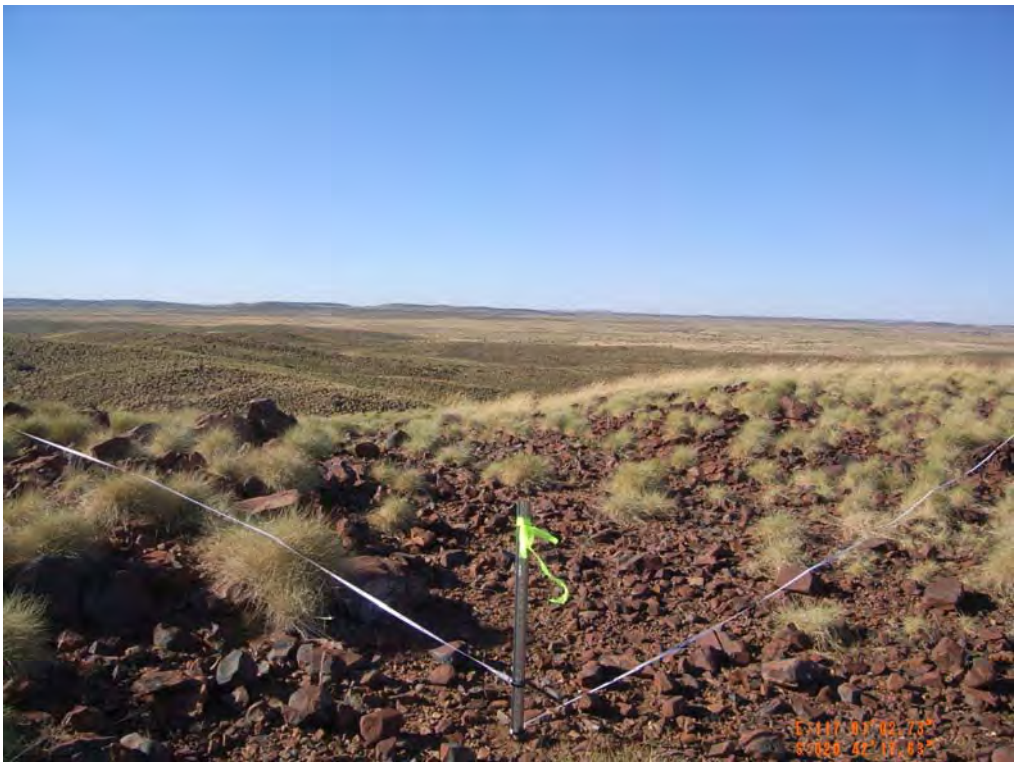
Species	Cover (%)	Height (m)	Specimen
Evolvulus alsinoides var. *villosicalyx*	<1	0.15	CQ01.20
Gomphrena cunninghamii	<1	0.05	CQ01.23
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.2	CQ01.21
Hybanthus aurantiacus	<1	0.3	CQ01.19
Indigofera monophylla (grey/green leaflet form)	1	0.4	CQ01.24
Iseilema dolichotrichum	3	0.1	CQ01.02
Paspalidium clementii	<1	0.1	CQ01.01
Senna notabilis	<1	0.08	CQ01.22
Solanum diversiflorum	<1	0.4	CQ01.10
Solanum horridum	<1	0.3	CQ01.18
Triodia wiseana (fine form)	40	0.4	CQ01.25
Triumfetta clementii	<1	0.3	CQ01.16
Vigna sp. *Burrup* (B18)	<1	Creeper	CQ01.04

API Rail Flora

Site APQ78

Described by KG **Date** 19/05/2009 **Type** 50 X 50

MGA Zone 50 501814 **mE** 7710511 **mN**
Soil Clayey loam
Rock Type ironstone rocks
Vegetation Closed Hummock Grassland of *Triodia wiseana* (fine form) on rocky hilltops.
Veg Condition Very Good - Good
Notes Partly burnt in 2007, small **Cenchrus ciliaris* invasion in NE corner of quadrat.



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia trudgeniana	<1	0.5	CQ02.08
**Cenchrus ciliaris*	1	0.4	CQ02.13
Corchorus aff. *parviflorus*	<1	0.3	CQ02.23
Crotalaria medicaginea var. *neglecta*	<1	0.1	CQ02.18
Cucumis maderaspatanus	<1	Creeper	CQ02.19
Dichanthium sericeum ssp. *humilius*	<1	0.1	CQ02.01
Euphorbia coghlanii	<1	0.2	CQ02.06
Euphorbia wheeleri	2	0.2	CQ02.11
Grevillea pyramidalis ssp. *leucadendron*	<1	1.5	CQ02.20
Indigofera aff. *monophylla*	<1	0.4	CQ02.14
Paspalidium clementii	<1	0.2	CQ02.04
Ptilotus exaltatus var. *exaltatus*	<1	0.2	CQ02.07
Rhynchosia minima	<1	Creeper	CQ02.21

Species	Cover (%)	Height (m)	Specimen
Senna notabilis	<1	0.1	CQ02.09
Solanum horridum	<1	0.3	CQ02.17
Themeda triandra	8	0.4	CQ02.03
Trachymene oleracea ssp. *oleracea*	2	0.4	CQ02.10
Trichodesma zeylanicum	<1	0.15	CQ02.15
Triodia wiseana (fine form)	90	0.5	CQ02.05
Triumfetta clementii	<1	0.3	CQ02.22
Vigna sp. *Burrup* (B18)	<1	0.1	CQ02.16

API Rail Flora

Site APQ79

Described by KG **Date** 18/05/2009 **Type** Q 10 X 50

MGA Zone 50 506842 **mE** 7719247 **mN**

Soil Orangey brown sandy loam under rock and shell fragments

Vegetation Low Open Heath dominated by *Hemichroa diandra*, *Tecticornia halocnemoides* ssp*. tenuis* and *Tecticornia indica* ssp. *bidens* with scattered *Avicennia marina* ssp. *marina* on edges of tidal mudflats.

Veg Condition Very Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Avicennia marina ssp*. marina*	<1	0.5	DQ3.3
Eragrostis falcata	<1	0.15	DQ3.1
Frankenia pauciflora var. *pauciflora*	5	0.25	DQ3.7
Hemichroa diandra	10	0.3	DQ3.8
Muellerolimon salicorniaceum	2	0.3	DQ3.12
Neobassia astrocarpa	5	0.2	DQ3.13
Sporobolus virginicus	<1	0.2	DQ3.2
Tecticornia halocnemoides ssp. *tenuis*	15	0.3	DQ3.5
Tecticornia indica ssp*. bidens*	12	0.3	DQ3.10
Trianthema turgidifolia	2	0.2	DQ3.6

API Rail Flora

Site APQ80

Described by KG **Date** 18/05/2009 **Type** Q 50 X 50

MGA Zone 50 506664 **mE** 7719152 **mN**

Soil Fine orange sand

Vegetation Shrubland of *Acacia stellaticeps*, *Acacia coriacea* ssp. *coriacea* and *Crotalaria cunninghamii* over a Very Open Herbland of *Ptilotus astrolasius* var. *astrolasius* over a Hummock Grassland of *Triodia epactia* and *Cymbopogon ambiguus* on sands.

Veg Condition Very Good - Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia coriacea ssp. *coriacea*	6	1.5	DQ4.21
Acacia gregorii	<1	0.6	DQ4.23
Acacia stellaticeps	10	1	DQ4.11
**Aerva javanica*	<1	0.5	DQ4.17
Bulbostylis barbata	<1	0.05	DQ4.22
Cleome viscosa	<1	0.15	DQ4.03
Crotalaria cunninghamii	5	2	DQ4.12
Cymbopogon ambiguus	5	0.5	DQ4.06
Eragrostis aff. *eriopoda* (WAS site 963)	8	0.4	DQ4.05
Euphorbia australis	<1	0.3	DQ4.13
Goodenia microptera	<1	0.3	DQ4.02
Indigofera colutea	<1	0.15	DQ4.15
Indigofera monophylla (Burrup form)	<1	0.5	DQ4.18
Ipomoea polymorpha	<1	0.2	DQ4.20

Species	Cover (%)	Height (m)	Specimen
Ptilotus astrolasius var. *astrolasius*	5	0.2	DQ4.01
Rhagodia preissii ssp. *obovata*	<1	0.4	DQ4.14
Santalum lanceolatum	2	1.5	DQ4.08
Scaevola spinescens (broad leaf form)	1	1	DQ4.09
Solanum horridum	<1	0.2	DQ4.24
Trichodesma zeylanicum var. *zeylanicum*	2	0.6	DQ4.19
Triodia epactia	25	0.4	DQ4.04
Triumfetta clementii	<1	0.3	DQ4.16

API Rail Flora

Site APQ81

Described by KG **Date** 15/05/2009 **Type** Q 50 x 50

MGA Zone 50 508546 **mE** 7719437 **mN**

Soil Pale brown sand

Vegetation Tall Shrubland of *Acacia coriacea* ssp. *coriacea* with scattered *Santalum lanceolatum* and *Senna artemisioides* ssp. *oligophylla* x *helmsii* over a Closed Tussock Grassland of ***Cenchrus ciliaris* on shorelines.

Veg Condition Degraded

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia coriacea ssp. *coriacea*	12	2.2	D1.14A
Acacia gregorii	<1	0.2	D1.2
Adriana urticoides var. *urticoides*	<1	0.7	D1.9
**Aerva javanica*	<1	0.9	D1.15
**Cenchrus ciliaris*	70	0.4	D1.11
Diplopeltis eriocarpa	<1	0.2	D1.3
Eragrostis aff. *eriopoda* (WAS site 963)	<1	0.2	D1.12
Euphorbia sp.	<1	0.05	D1.17
Indigofera linifolia	<1	0.1	D1.18
Polygala aff. *isingii*	<1	0.1	D1.14B
Rhagodia preissii ssp. *obovata*	<1	0.5	D1.10
Rhynchosia minima	<1	creeper	D1.5B
Salsola tragus ssp. *tragus*	<1	0.2	D1.8
Santalum lanceolatum	2	1.5	D1.1

Species	Cover (%)	Height (m)	Specimen
Scaevola spinescens (narrow form)	<1	0.6	D1.6
Senna artemisioides ssp. *oligophylla x helmsii*	2	1.5	D1.13
Spinifex longifolius	<1	0.9	D1.4
Swainsona canescens	<1	0.2	D1.16
Threlkeldia diffusa	<1	0.3	D1.7

API Rail Flora

Site APQ82

Described by KG **Date** 15/05/2009 **Type** Q 50 x 50

MGA Zone 50 508445 **mE** 7719529 **mN**
Soil Orange stony clay loam
Vegetation Closed Hummock Grassland of *Triodia wiseana* (fine form) on orange stony clayey loam midslopes.
Veg Condition Degraded

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Acacia gregorii	<1	0.05	D2.11
Boerhavia gardneri	<1	0.1	D2.14
Cassytha capillaris	<1	creeper	D2.23
Crotalaria medicaginea var. *neglecta*	<1	0.2	D2.13
Diplopeltis eriocarpa	1	0.2	D2.07
Dysphania rhadinostachya ssp. *rhadinostachya*	<1	0.2	D2.16
Euphorbia coghlanii	<1	0.2	D2.21
Euphorbia tannensis ssp. *eremophila* (Burrup form)	<1	0.2	D2.10
Gomphrena cunninghamii	<1	0.05	D2.24
*Indigofera monophylla (*Cape Preston form)	<1	0.2	D2.03
Polycarpaea longiflora (white form)	<1	0.3	D2.09
Ptilotus incanus var. *incanus*	<1	0.3	D2.05
Senna glutinosa ssp. *luerssenii*	<1	0.9	D2.08
Senna glutinosa ssp. *pruinosa x glutinosa*	<1	1.5	D2.22
Solanum horridum	<1	0.1	D2.15
Swainsona canescens	<1	0.1	D2.20

Species	Cover (%)	Height (m)	Specimen
Tephrosia aff. *supina* (HD133-20)	<1	0.1	D2.18
Trachymene oleracea ssp. *oleracea*	<1	0.3	D2.02
Trichodesma zeylanicum var. *zeylanicum*	1	0.2	D2.04
Triodia wiseana (fine form)	70	0.4	D2.01
Triumfetta clementii	<1	0.2	D2.17

API Rail Flora

Site APQ83

Described by GM **Date** 4/06/2009 **Type** Q 50 X 50

Location Campsite 2

MGA Zone 50 428716 **mE** 7672340 **mN**

Soil Rocky loam

Vegetation Low Open Woodland of *Eucalyptus victrix* with scattered *Corymbia hammersleyana* over an Open Shrubland of *Melaleuca glomerata* and *Acacia bivenosa* over a Closed Hummock Grassland of *Triodia epactia* and *Triodia angusta* on orange rocky loam drainage lines.

Veg Condition Very Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	3	160	APQ83.02
Acacia coriacea ssp. *pendens*	<1	200	APQ83.22
Acacia pyrifolia var. *pyrifolia*	<1	0.5	APQ83.21
Adriana urticoides var. *urticoides*	<1	100	APQ83.18
Aristida contorta	<1	0.1	APQ83.27
Cassytha capillaris	<1	Creeper	APQ83.11
**Cenchrus ciliaris*	1	0.4	APQ83.30
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.3	APQ83.17
Corymbia hamersleyana	2	300	APQ83.05
Cucumis maderaspatanus	<1	Creeper	APQ83.25
Cyperus vaginatus	1	0.5	APQ83.10
Enneapogon caerulescens var. *caerulescens*	<1	0.1	APQ83.28
Eremophila forrestii ssp. *forrestii*	<1	0.4	APQ83.31

Species	Cover (%)	Height (m)	Specimen
Eucalyptus victrix	<1	600	APQ83.04
Goodenia microptera	<1	0.1	APQ83.03
Heliotropium ovalifolium	<1	0.1	APQ83.23
Hybanthus aurantiacus	<1	0.3	APQ83.12
Indigofera monophylla (Cape Preston form)	<1	0.2	APQ83.16
Leptopus decaisnei var. *orbicularis*	<1	0.1	APQ83.32
**Malvastrum americanum*	<1	0.6	APQ83.34
Melaleuca glomerata	2	150	APQ83.01
Phyllanthus maderaspatensis	<1	0.3	APQ83.29
Polymeria ambigua	<1	Creeper	APQ83.13
Ptilotus exaltatus var. *exaltatus*	<1	0.1	APQ83.08
Scaevola spinescens (broad leaf form)	1	0.5	APQ83.33
Senna glutinosa ssp. *glutinosa*	<1	100	APQ83.26
Sida aff. *fibulifera* (HD200-6)			APQ83.07A
Solanum diversiflorum	<1	0.2	APQ83.06
Solanum lasiophyllum	<1	0.3	APQ83.24
Stemodia grossa	1	0.3	APQ83.15
Tephrosia aff. *supina* (MET 12,357)	<1	0.3	APQ83.35
Themeda triandra	<1	0.5	APQ83.14
Triodia angusta	5	100	APQ83.20
Triodia epactia	80	0.7	APQ83.19
Waltheria indica	<1	0.4	APQ83.07B

API Rail Flora

Site APQ84

Described by GM **Date** 4/06/2009 **Type** Q

Location Campsite 2

MGA Zone 50 429289 **mE** 7672454 **mN**

Soil Rocky loam

Rock Type ironstsone and quartz

Vegetation Open Shrubland of *Acacia ancistrocarpa, Acacia pyrifolia* var. *pyrifolia,* and *Acacia trachycarpa* with scattered *Senna glutinosa* ssp*. pruinosa* over a Closed Hummock Grassland of *Triodia wiseana* (fine form) on ridgetop with with quartz and ironstone nodules.

Veg Condition Very Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon aff*. lepidum* (4)	<1	0.4	APQ84.22
Acacia ancistrocarpa	1	200	APQ84.7
Acacia pyrifolia var. *pyrifolia*	<1	120	APQ84.17
Acacia trachycarpa	<1	150	APQ84.20
Aristida contorta	<1	0.4	APQ84.13
Boerhavia coccinea	<1	0.4	APQ84.9
Bonamia media var*. villosa*	<1	0.1	APQ84.6
Corchorus laniflorus	<1	0.4	APQ84.3
Dichanthium sericeum ssp*. humilius*	1	0.2	APQ84.10
Enneapogon caerulescens var*. caerulescens*	<1	0.1	APQ84.18
Eriachne pulchella ssp*. pulchella*	<1	0.1	APQ84.21
Evolvulus alsinoides var*. villosicalyx*	<1	0.3	APQ84.12
Fimbristylis aff*. dichotoma* (M75-4)	1	0.2	APQ84.11

Species	Cover (%)	Height (m)	Specimen
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.2	APQ84.4
Iseilema dolichotrichum	<1	0.1	APQ84.19
Senna glutinosa ssp. *glutinosa*	<1	120	APQ84.8
Senna glutinosa ssp. *pruinosa*	1	200	APQ84.1
Sida aff. *echinocarpa* (MET 15,350)	1	0.3	APQ84.15
Solanum diversiflorum	<1	0.2	APQ84.2
Tephrosia aff. *supina* (HD133-20)	<1	0.1	APQ84.23
Trachymene oleracea ssp. *oleracea*	<1	0.1	APQ84.14
Trichodesma zeylanicum	<1	0.4	APQ84.16
Triodia wiseana (fine form)	70	0.3	APQ84.26
Triumfetta clementii	<1	0.3	APQ84.5

API Rail Flora

Site APQ85

Described by GM **Date** 4/06/2009 **Type** R 15 X 100

Location Campsite 2

MGA Zone 50 430582 **mE** 7672386 **mN**

Habitat Minor Drainage line

Soil Loamy

Vegetation Open Heath *of Acacia ancistrocarpa, Acacia bivenosa, Acacia inaequilatera* and *Senna artemisioides ssp. oligophylla* over Mid to Dense Hummock Grassland of *Triodia wiseana* (fine form) on orange loam.

Veg Condition Very Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa	40	200	APQ85.13
Acacia bivenosa	5	150	APQ85.10
Acacia inaequilatera	3	180	APQ85.11
Eremophila forrestii ssp. *forrestii*	<1	0.3	APQ85.2
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.1	APQ85.9
Indigofera monophylla (Cape Preston form)	<1	0.3	APQ85.1
Paspalidium clementii	<1	0.05	APQ85.19
Polycarpaea longiflora (Whim Creek form, WC147-	<1	0.2	APQ85.18
Ptilotus exaltatus var. *exaltatus*	<1	0.1	APQ85.7
Rhynchosia minima	<1	Creeper	APQ85.8
Scaevola spinescens (broad leaf form)	<1	0.2	APQ85.3

Species	Cover (%)	Height (m)	Specimen
Senna artemisioides ssp. *oligophylla*	3	100	APQ85.12
Senna glutinosa ssp. *glutinosa*	1	110	APQ85.14
Senna glutinosa ssp. *glutinosa x luerssenii*	<1	100	APQ85.15
Senna glutinosa ssp. *pruinosa*	<1	100	APQ85.16
Sida aff. *echinocarpa* (MET 15,350)	1	0.2	APQ85.5
Tephrosia aff. *supina* (MET 12,357)	<1	0.3	APQ85.17
Triodia wiseana (fine form)	40	0.4	APQ85.4
Triumfetta clementii	1	0.1	APQ85.6

API Rail Flora

Site APQ86

Described by GM **Date** 4/06/2009 **Type** Q 50 X 50
Location Campsite 2

MGA Zone 50 431132 **mE** 7674024 **mN**
Habitat Horseflat
Soil Clayey loam
Rock Type ironstone
Vegetation Horseflats dominated by *Dichanthium sericeumssp. humilius* and *Eragrsotis xerophila* on orange clay flats.
Veg Condition Very Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Aristida contorta	<1	0.1	APQ86.15
Aristida latifolia	2	0.4	APQ86.4
Brachyachne convergens	<1	0.3	
Chloris pectinata	1	0.4	APQ86.13
Dichanthium sericeum ssp. *humilius*	70	0.2	APQ86.3
Enneapogon caerulescens var. caerulescens	<1	0.1	APQ86.1
Eragrostis xerophila	15	0.4	APQ86.8
**Flaveria trinervia*	5	0.1	APQ86.1
Heliotropium conocarpum	<1	0.1	APQ86.16
Indigofera linifolia	<1	0.2	APQ86.14
Iseilema macratherum	1	0.3	APQ86.7

Species	Cover (%)	Height (m)	Specimen
Neptunia dimorphantha	<1	0.1	APQ86.2
Rhynchosia minima	<1	Creeper	APQ86.12
Sida aff. fibulifera (HD200-6)	<1	0.4	APQ86.5
Streptoglossa bubakii	<1	0.2	APQ86.10

API Rail Flora

Site APQ87

Described by KG **Date** 29/06/2009 **Type** Q 50 x 50

MGA Zone 50 506918 **mE** 7716617 **mN**

Soil Red fine sandy clay, rocky with shell fragments

Vegetation Mid Dense Hummock Grassland of *Triodia angusta* over a Very Open Tussock Grassland of **Cenchrus ciliaris* on fine red sandy clay with rock and shell nodules.

Veg Condition Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	4	1.2	87.08
**Aerva javanica*	<1	0.5	87.17
Alysicarpus muelleri	<1	0.1	87.21
Cassytha capillaris	<1	creeper	87.03
**Cenchrus ciliaris*	10	0.4	87.04
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	87.07
Cullen cinereum	<1	0.02	87.23
Eriachne obtusa	<1	0.6	87.02
Evolvulus alsinoides var. *villosicalyx*	<1	0.1	87.22
Gomphrena cunninghamii	<1	0.1	87.05
Goodenia microptera	<1	0.5	87.14
Hybanthus aurantiacus	<1	0.1	87.20
Indigofera trita	<1	0.1	87.13
Phyllanthus maderaspatensis	<1	0.15	87.12
**Portulaca oleracea*	<1	0.05	87.06

Species	Cover (%)	Height (m)	Specimen
Portulaca pilosa	<1	0.1	87.18
Rhynchosia minima	<1	creeper	87.19
Sclerolaena diacantha	<1	0.3	87.16
Sida aff. *fibulifera* (oblong; MET 15 220)	<1	0.3	87.09
Solanum ellipticum	<1	0.2	87.11
Swainsona pterostylis	<1	0.3	87.10
Trianthema turgidifolia	1	0.3	87.15
Triodia angusta	60	0.5	87.01
Triodia wiseana	<1	0.5	87.01A

API Rail Flora

Site APQ88

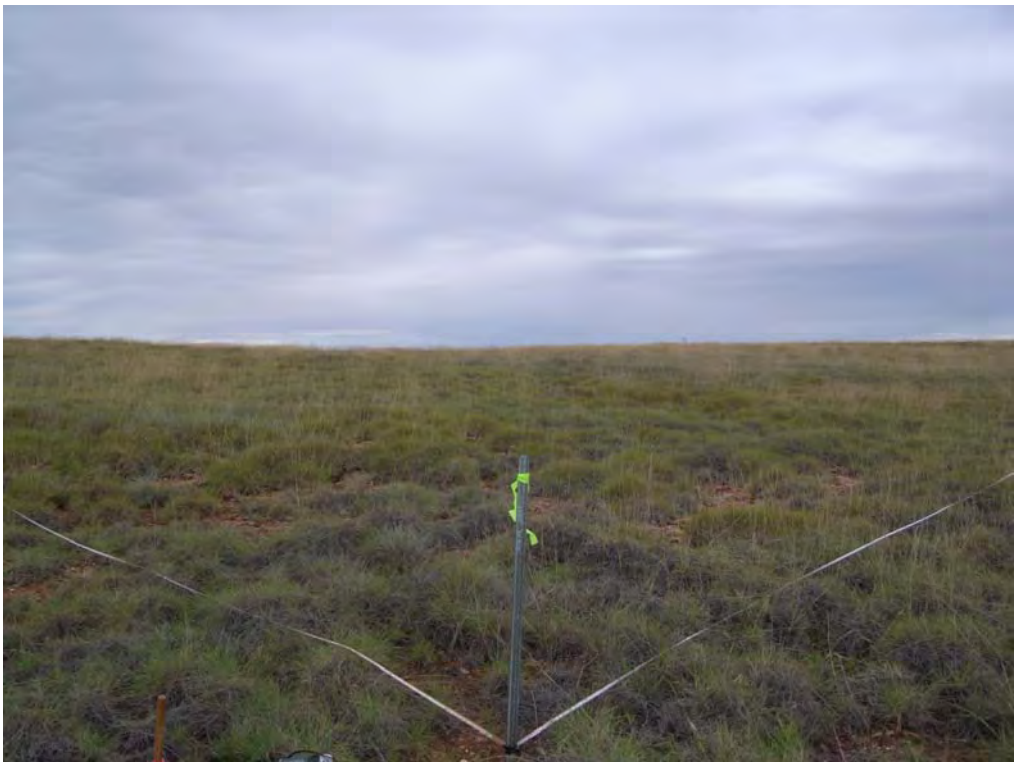
Described by KG **Date** 29/06/2009 **Type** Q 50 x 50

MGA Zone 50 507086 **mE** 7716422 **mN**

Soil Red loamy clay, rocky with shell fragments

Vegetation Closed Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia angusta* on red rocky hillslope.

Veg Condition Very Good - Good



SPECIES LIST:

Species	Cover (%)	Specimen
Abutilon aff. *lepidum* (4)	<1	88.07
Aristida burbidgeae	<1	88.10
Boerhavia gardneri	<1	88.06
Bonamia media var. *villosa*	<1	88.09
Corchorus parviflorus	<1	88.01
Euphorbia coghlanii	<1	88.18
Gomphrena cunninghamii	<1	88.03
Indigofera colutea	<1	88.17
Indigofera linifolia	<1	88.05
Indigofera trita	2	88.04
Panicum decompositum	<1	88.14
Rhynchosia minima	<1	88.08
Streptoglossa decurrens	<1	88.16
Tephrosia aff. *supina* (HD205-10)	<1	88.17B
Trianthema glossostigma	<1	88.02
Triodia angusta	40	88.13

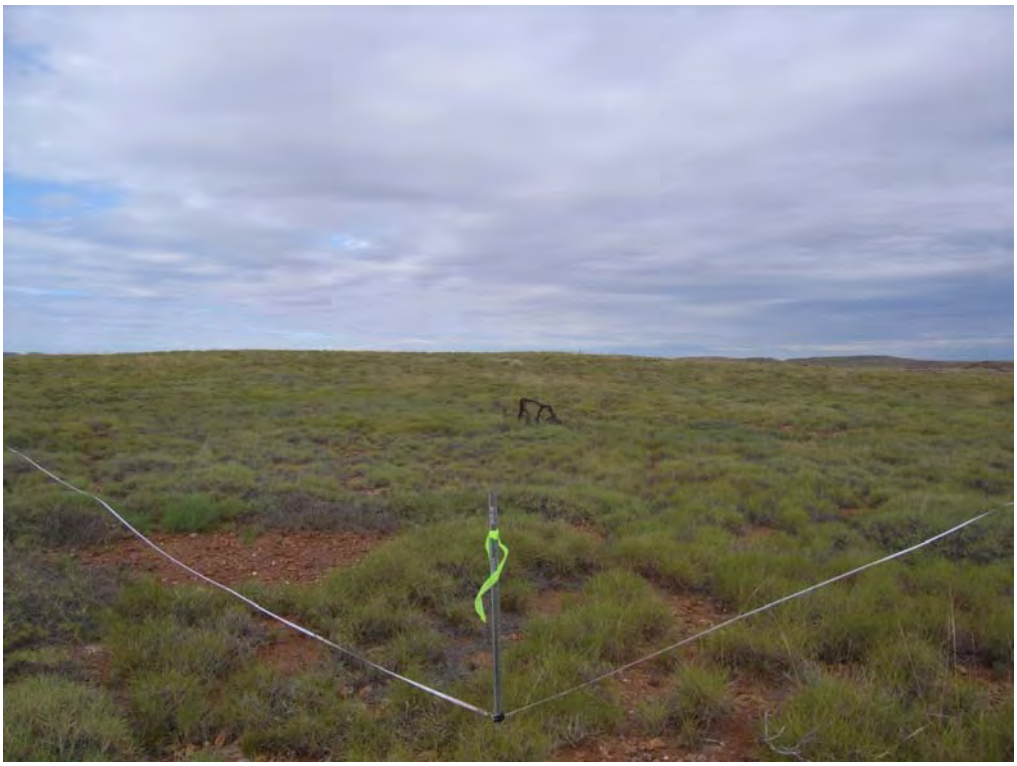
Species	Cover (%)	Specimen
Triodia wiseana (fine form)	51	88.12
Triumfetta clementii	<1	88.15

API Rail Flora

Site APQ89

Described by KG **Date** 29/06/2009 **Type** Q 50 x 50
Season E

MGA Zone 50 507382 **mE** 7716589 **mN**
Soil Red loamy clay, rocky with shell fragments
Vegetation Closed Hummock Grassland of *Triodia wiseana* (fine form) and *Triodia angusta* on a red loamy clay, rocky hillslope.
Veg Condition Very Good - Good



SPECIES LIST:

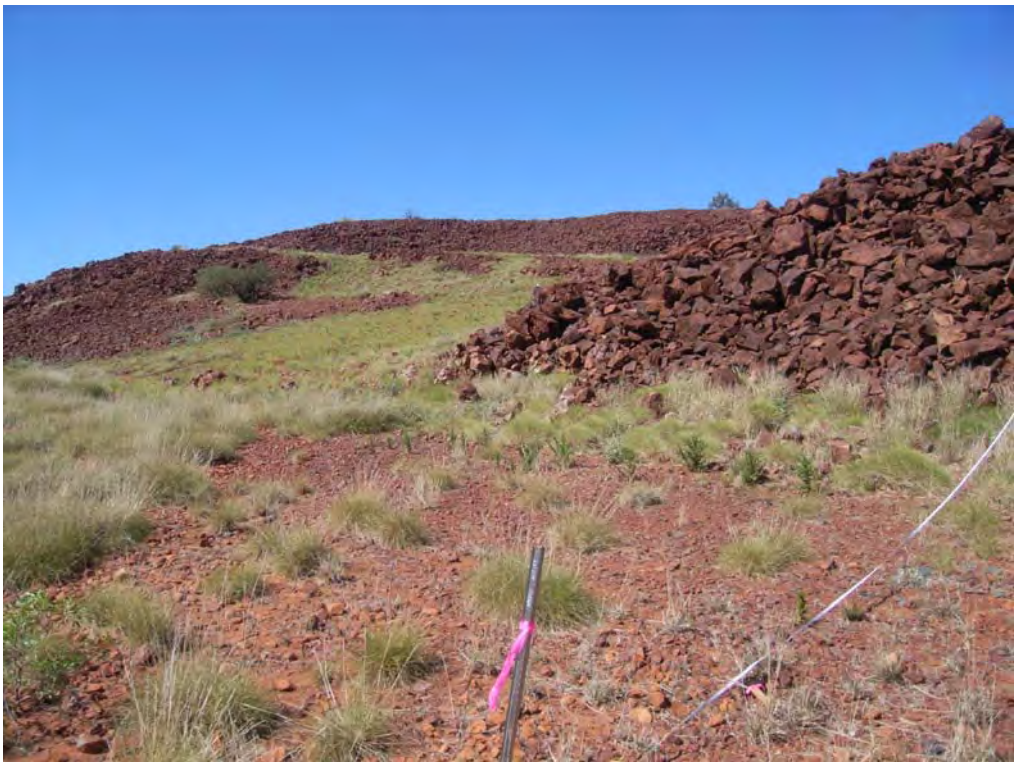
Species	Cover (%)	Height (m)	Specimen
Abutilon lepidum	<1	0.7	89.20
Acacia inaequilatera	<1	0.8	89.04
**Cenchrus ciliaris*	<1	0.4	89.15
Cleome viscosa	<1	0.2	89.01
Crotalaria medicaginea var. *neglecta*	<1	0.2	89.18
Cymbopogon ambiguus	1	1.6	89.23
Eriachne aristidea	<1	0.1	89.13
Euphorbia coghlanii	<1	0.2	89.10
Evolvulus alsinoides var. *villosicalyx*	<1	0.3	89.21
Gomphrena cunninghamii	<1	0.2	89.06
Hibiscus coatesii	<1	0.3	89.03
Indigofera linifolia	<1	0.2	89.08
Indigofera linnaei	<1	0.2	89.17
Indigofera trita	<1	0.2	89.09B

Species	Cover (%)	Height (m)	Specimen
Indigofera trita	5	0.2	89.05
Salsola tragus ssp. *tragus*	<1	0.4	89.07
Solanum lasiophyllum	<1	0.3	89.19
Tephrosia aff. *supina* (HD133-20)	<1	0.2	89.09A
Triodia angusta	30	0.4	89.22
Triodia wiseana (fine form)	60	0.4	89.11
Triumfetta clementii	<1	0.2	89.02

API Rail Flora

Site APQ90

Described by GM **Date** 21/07/2009 **Type** Q 50 x 50
MGA Zone 50 512069 **mE** 7714528 **mN**
Soil Rocks over sandy clay
Vegetation Closed Hummock Grassland of *Triodia epactia* on rocky ridgetop.
Veg Condition Very Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon lepidum	<1	0.4	90.17
Bonamia media var. *villosa*	<1	0.1	90.15
**Cenchrus ciliaris*	1	0.4	90.06
Cucumis maderaspatanus	<1	creeper	90.05
Cullen leucochaites	1	0.5	90.04
Cymbopogon ambiguus	<1	0.5	90.18
Gomphrena cunninghamii	<1	0.2	90.12
Ptilotus fusiformis var. fusiformis	<1	0.3	90.01
Rhynchosia minima	<1	0.2	90.08
Senna notabilis	<1	0.4	90.10
Senna venusta	<1	0.6	90.11
Sporobolus australasicus	<1	0.2	90.03
Streptoglossa decurrens	<1	0.5	90.02
Tephrosia aff. *supina* (HD133-20)	<1	0.2	90.14
Trichodesma zeylanicum var. *zeylanicum*	<1	0.3	90.09
Triodia epactia	70	0.3	90.16
Triumfetta clementii	<1	0.3	90.13

API Rail Flora

Site APQ91

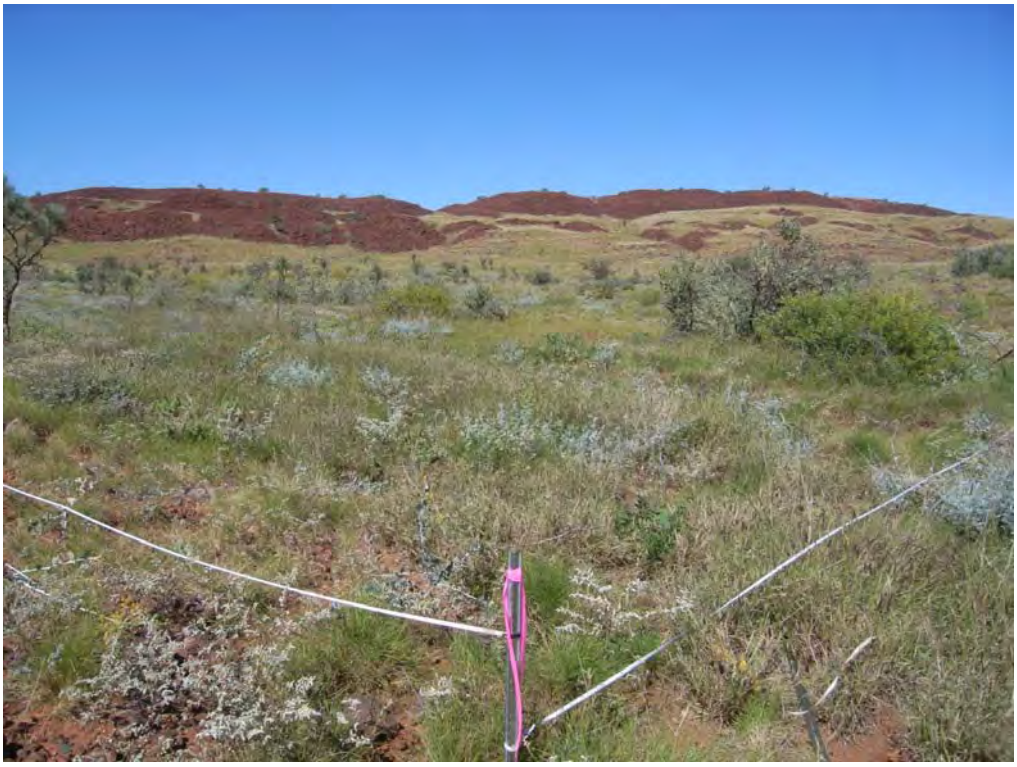
Described by GM **Date** 21/07/2009 **Type** Q 50 x 50

MGA Zone 50 511750 **mE** 7714694 **mN**

Soil Orange rocky sand

Vegetation Open Shrubland of *Acacia inaequilatera* and *Acacia bivenosa* over a Closed Hummock Grassland of *Triodia epactia* and *Triodia wiseana* (fine form) on orange rocky flats.

Veg Condition Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon lepidum	<1	0.3	91.17
Acacia bivenosa	1	1.2	91.08
Acacia coriacea ssp. *coriacea*	<1	0.8	91.30
Acacia inaequilatera	5	2	91.32
Acacia pyrifolia var. *pyrifolia*	<1	1	91.06
Acacia tumida var. *pilbarensis*	<1	0.4	91.42
Boerhavia gardneri	<1	0.3	91.35
**Cenchrus ciliaris*	3	0.4	91.26
Corchorus parviflorus	1	0.4	91.21
Eulalia aurea	<1	0.3	91.11
Euphorbia coghlanii	<1	0.3	91.28
Euphorbia sp. (BPBS10-50)	<1	0.1	91.31
Euphorbia wheeleri	<1	creeper	91.25
Goodenia microptera	<1	0.4	91.38
Gossypium australe (Burrup Peninsula form)	<1	0.3	91.14

Species	Cover (%)	Height (m)	Specimen
Grevillea pyramidalis ssp. *leucadendron*	1	1.5	91.12
Hibiscus coatesii	<1	0.2	91.37
Hybanthus aurantiacus	<1	0.3	91.19
Indigofera linifolia	<1	0.3	91.01
Indigofera monophylla (MJOPP-2)	<1	0.3	91.04
Indigofera trita	<1	0.2	91.16
Ptilotus auriculifolius	<1	0.4	91.02
Ptilotus exaltatus var. *exaltatus*	<1	0.4	91.13
Rhynchosia minima	<1	0.1	91.33
Sida aff. *echinocarpa* (MET 15,350)	<1	0.4	91.15
Sida pilbarensis (Ferrugineous form)	<1	0.3	91.22
Stemodia grossa	1	0.4	91.23
Swainsona canescens	<1	0.1	91.34
Tephrosia aff. *supina* (HD133-20)	<1	0.1	91.09
Tephrosia aff. *supina* (MET 12,357)	<1	0.1	91.07
Tephrosia rosea var. *clementii*	1	0.3	91.03
Tephrosia sp. *Bungaroo Creek* 11601)	<1	0.3	91.20
Themeda triandra	<1	0.4	91.10
Trichodesma zeylanicum var. *zeylanicum*	<1	0.4	91.18
Triodia epactia	70	0.4	91.36
Triodia wiseana (fine form)	10	0.3	91.40
Triumfetta clementii	<1	0.4	91.29
Waltheria indica	<1	0.4	91.24

API Rail Flora

Site APQ92

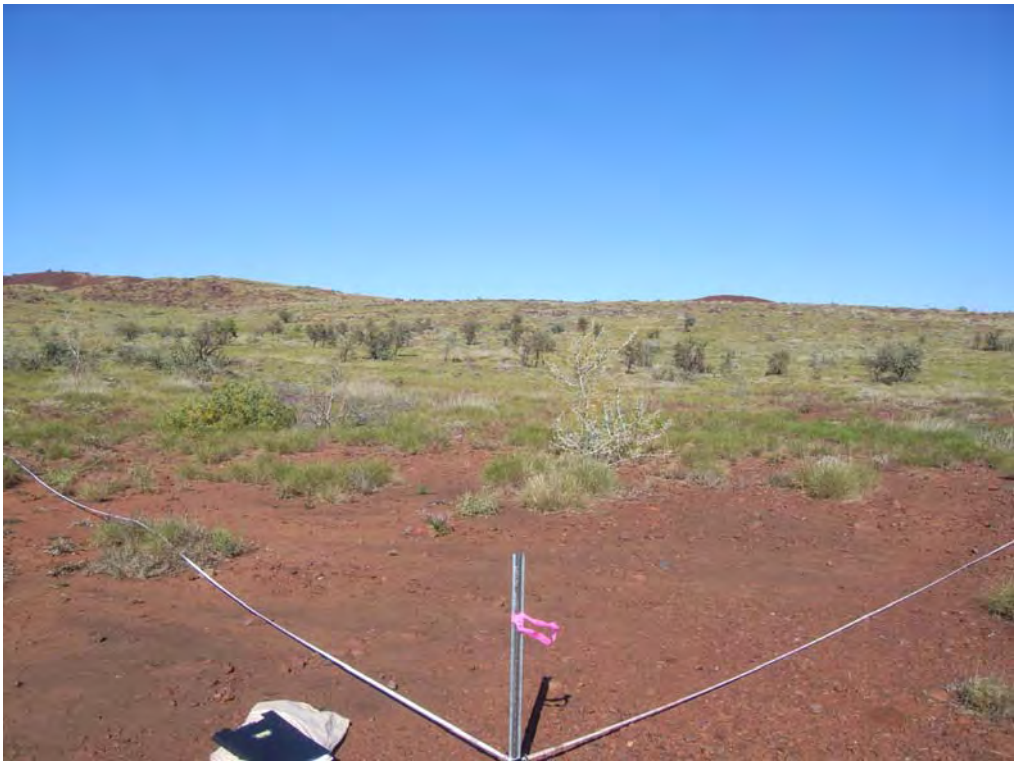
Described by GM **Date** 21/07/2009 **Type** Q 50 x 50

MGA Zone 50 511312 **mE** 7714355 **mN**

Soil Red rocky sandy clay

Vegetation Tall Open Shrubland to Open Shrubland of of *Acacia inaequilatera* over an Open Shrubland of *Acacia bivenosa* and *Acacia pyrifolia var. pyrifolia* over a Closed Hummock Grassland of *Triodia epactia* on sandy clay flats.

Veg Condition Very Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	2	0.9	92.06
Acacia inaequilatera	5	2.5	92.08
Acacia pyrifolia var. *pyrifolia*	3	1.2	92.16
Alysicarpus muelleri	<1	0.2	92.05
Boerhavia coccinea	<1	0.3	92.12
Bonamia pannosa	<1	0.3	92.13
Bulbostylis barbata	<1	0.4	92.01
**Cenchrus ciliaris*	1	0.4	92.03
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.3	92.22
Corchorus parviflorus	1	0.3	92.18
Dichanthium sericeum ssp. *humilius*	<1	0.2	92.34
Eriachne pulchella ssp. *dominii*	<1	0.2	92.21
Euphorbia australis	<1	0.1	92.32
Euphorbia coghlanii	<1	0.2	92.29
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	92.17
Gomphrena cunninghamii	<1	0.2	92.25

Species	Cover (%)	Height (m)	Specimen
Indigofera monophylla (MJOPP-2)	<1	0.3	92.15
Leptopus decaisnei var*. orbicularis*	<1	0.4	92.10
**Portulaca oleracea*	<1	0.1	92.02
Ptilotus exaltatus var. *exaltatus*	<1	0.4	92.11
Rhynchosia minima	<1	0.1	92.14
Salsola tragus ssp*. tragus*	<1	0.2	92.28
Senna notabilis	<1	0.3	92.19
Sida echinocarpa	<1	0.3	92.31
Sida pilbarensis (Ferrugineous form)	<1	0.4	92.20
Sporobolus australasicus	<1	0.1	92.04
Swainsona formosa	<1	0.1	92.30
Tephrosia aff*. supina* (HD133-20)	<1	0.2	92.27
Trachymene oleracea	<1	0.5	92.23
Trichodesma zeylanicum var*. zeylanicum*	<1	1	92.07
Triodia epactia	70	0.3	92.33
Triumfetta clementii	<1	0.4	92.26

API Rail Flora

Site APQ93

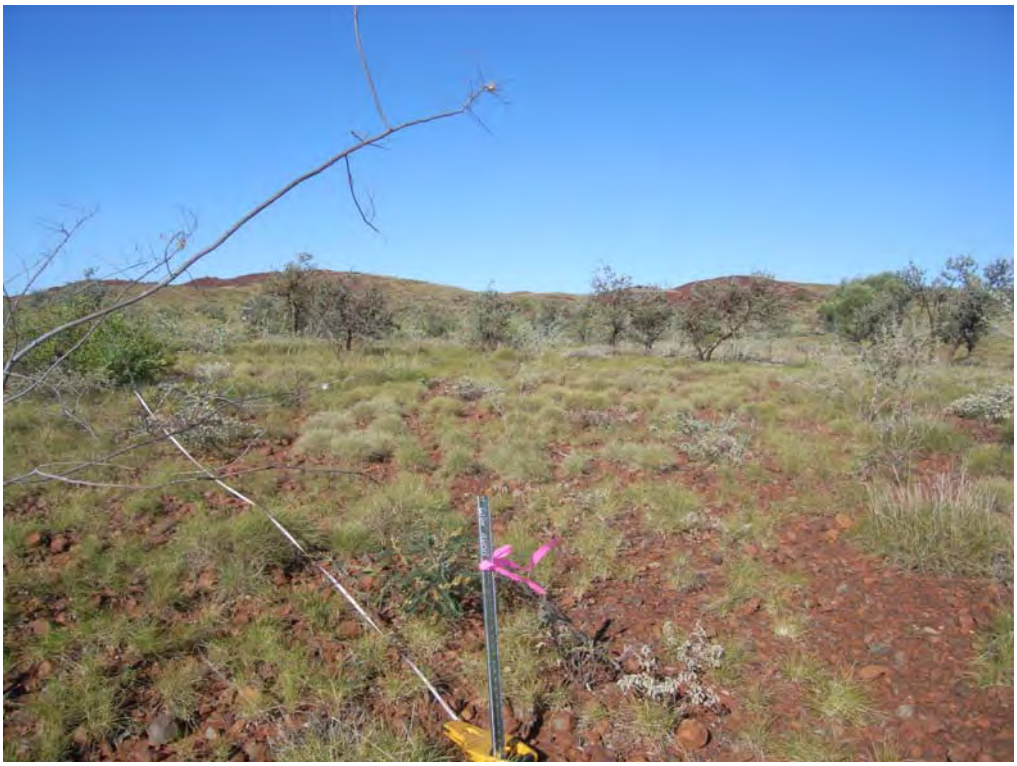
Described by GM **Date** 21/07/2009 **Type** R 25 x 100

MGA Zone 50 511039 **mE** 7714266**mN**

Soil Orange sandy clay with rocky nodules

Vegetation Shrubland of *Acacia inaequilatera, Acacia tumida* var. *pilbarensis* with ocassional *Acacia coriacea* ssp*. coriacea, Acacia coriacea* ssp. *pendens, Acacia bivenosa* and *Acacia inaequilatera* over an Open Shrubland of *Corchorus* aff*. parviflorus, Corchorus* aff. *walcotti* (K.J. Atkins 570), *Stemodia grossa and Sida* aff*. echinocarpa* (MET 15,350) over a Hummock Grassland of *Triodia epactia* over a Very Open Tussock Grassland of **Cenchrus ciliaris* on orange sandy clay drainage lines.

Veg Condition Very Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	1	1	93.25
Acacia coriacea ssp*. coriacea*	1	0.8	93.20
Acacia coriacea ssp*. pendens*	1	1.2	93.12
Acacia inaequilatera	2	2	93.26
Acacia pyrifolia var. *pyrifolia*	20	93.30	
Acacia tumida var. *pilbarensis*	10	5	93.32
Boerhavia gardneri	<1	0.4	93.27
**Cenchrus ciliaris*	10	0.4	93.21
Cleome viscosa	<1	0.4	93.31
Corchorus aff. *parviflorus*	3	0.4	93.07
Corchorus aff*. walcotti* (K.J. Atkins 570)	4	0.3	93.03
Crotalaria medicaginea var*. neglecta*	<1	0.1	93.38
Cucumis maderaspatanus	<1	creeper	93.34

Species	Cover (%)	Height (m)	Specimen
Cymbopogon ambiguus	1	0.8	93.10
Euphorbia coghlanii	<1	0.1	93.23
Euphorbia wheeleri	<1	0.1	93.05
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	93.35
Gomphrena cunninghamii	<1	0.2	93.33
Indigofera monophylla (MJOPP-2)	1	0.4	93.41
Ptilotus calostachyus var. *calostachyus*	<1	1.2	93.06
Rhynchosia minima	<1	0.1	93.22
Salsola tragus ssp. *tragus*	<1	0.4	93.09
Senna notabilis	<1	0.2	93.04
Sida aff. *echinocarpa* (MET 15,350)	2	0.3	93.08
Sida echinocarpa	<1	0.2	93.16
Solanum diversiflorum	<1	0.2	93.19
Stemodia grossa	2	0.5	93.02
Streptoglossa decurrens	<1	0.4	93.39
Swainsona formosa	<1	0.4	93.37
Tephrosia aff. *supina* (MET 12,357)	1	0.3	93.24
Tephrosia rosea var. *clementii*	<1	0.5	93.29
Themeda triandra	<1	0.7	93.11
Trichodesma zeylanicum var. *zeylanicum*	<1	0.6	93.14
Triodia epactia	30	0.3	93.01
Triumfetta clementii	1	0.4	93.28
Triumfetta maconochieana	<1	0.5	93.17

API Rail Flora **Site** APQ94

Described by GM **Date** 22/07/2009 **Type** Q 50 x 50

MGA Zone 50 513165 **mE** 7715001 **mN**

Soil Orange clayey loam

Vegetation Open Heath of *Acacia bivenosa* and *Acacia synchronicia*, with oaccsaional *Acavia pyrifolia* var. *pyrifolia* and **Aerva javanica* over a Closed Tussock Grassland of **Cenchrus ciliaris* on orange clayey loam.

Veg Condition Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon lepidum	<1	0.4	94.32
Acacia bivenosa	40	2	94.01
Acacia pyrifolia var. *pyrifolia*	<1	1	94.19
Acacia synchronicia	5	1.5	94.08
**Aerva javanica*	1	0.4	94.16
Bonamia media var. *villosa*	<1	0.1	94.26
**Cenchrus ciliaris*	70	0.4	94.10
Chrysopogon fallax	<1	0.7	94.24
Corchorus parviflorus	<1	0.4	94.22
Enneapogon caerulescens var. *caerulescens*	<1	0.2	94.09
Eulalia aurea	1	0.5	94.17
Euphorbia coghlanii	<1	0.3	94.23
Evolvulus alsinoides var. *villosicalyx*	<1	0.3	94.04
Gomphrena cunninghamii	<1	0.2	94.25
Goodenia microptera	<1	0.3	94.03

Species	Cover (%)	Height (m)	Specimen
Hybanthus aurantiacus	<1	0.2	94.13
Myoporum montanum	<1	0.4	94.02
Oldenlandia crouchiana	<1	0.2	94.33
Phyllanthus maderaspatensis	<1	0.4	94.30
Polycarpaea longiflora (red form)	<1	0.3	94.15
Pterocaulon sphaeranthoides	<1	0.4	94.31
Ptilotus exaltatus var. *exaltatus*	<1	0.5	94.18
Rhynchosia minima	<1	0.2	94.06
Senna artemisioides ssp. *oligophylla x helmsii*	<1	0.3	94.12
Senna glutinosa ssp. *glutinosa*	<1	0.8	94.20
Sida aff. *fibulifera* (oblong; MET 15 220)	<1	0.3	94.28
Streptoglossa decurrens	<1	0.2	94.29
Tephrosia aff. *supina* (HD205-10)	<1	0.2	94.05
Trianthema turgidifolia	<1	0.2	94.11
Tribulus hirsutus	<1	0.1	94.14
Trichodesma zeylanicum var. *zeylanicum*	<1	0.2	94.27
Triodia epactia	0.4	94.34	

API Rail Flora

Site APQ95

Described by GM **Date** 22/07/2009 **Type** Q 50 x 50

MGA Zone 50 512772 **mE** 7715197 **mN**

Soil Orange sandy clay on granite outcropping

Vegetation Tall Open Scrub to Open Heath dominated by *Acacia sabulosa* and *Acacia bivenosa* with occasional *Acacia pyrifolia* var. *pyrifolia* over a Closed Tussock Grassland of **Cenchrus ciliaris* on sandy clay slopes

Veg Condition Good - Degraded

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon otocarpum	<1	0.3	95.04
Acacia bivenosa	15	1.2	95.03
Acacia coriacea ssp. *coriacea*	<1	1.2	95.06
Acacia pyrifolia var. *pyrifolia*	1	1	95.18
Acacia sabulosa	31	2.2	95.11
**Aerva javanica*	2	0.5	95.13
Cassytha capillaris	<1	creeper	95.16
**Cenchrus ciliaris*	80	0.4	95.02
Cleome viscosa	<1	0.4	95.07
Corchorus aff. *walcotti* (K.J. Atkins 570)	<1	0.2	95.21
Corchorus parviflorus	<1	0.5	95.14
Crotalaria ramosissima	<1	0.4	95.20
Eragrostis aff. *eriopoda*	1	0.5	95.19
Goodenia microptera	<1	0.3	95.05

Species	Cover (%)	Height (m)	Specimen
Heliotropium ovalifolium	<1	0.2	95.22
Portulaca pilosa	<1	0.2	95.17
Rhynchosia minima	<1	95.08	
Sida rohlenae ssp. *rohlenae*	<1	0.4	95.01
Swainsona canescens	<1	0.2	95.09
Trichodesma zeylanicum var. *zeylanicum*	<1	0.4	95.10
Triodia epactia	1	0.4	95.12

API Rail Flora

Site APQ96

Described by GM **Date** 22/07/2009 **Type** Q 50 x 50

MGA Zone 50 512012 **mE** 7713046 **mN**

Soil Orange sand

Vegetation Low Woodland of *Corymbia hammerselyana* over an Open Shrubland of *Acacia bivenosa* and *Grevillea pyramidalis* ssp. *leucadendron* over a Mid Dense Hummock Grassland of *Triodia* aff. *epactia* on sandy lower slopes in association with drainage lines.

Veg Condition Very Good - Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	2	0.7	96.14
Acacia pyrifolia var. *pyrifolia*	<1	0.6	96.04
Acacia tumida var. *pilbarensis*	<1	0.5	96.10
Aristida hygrometrica	<1	0.6	
**Cenchrus ciliaris*	3	0.4	96.03
Chrysopogon fallax	5	0.5	96.02
Cleome viscosa	<1	0.1	96.22
Corchorus parviflorus	<1	0.3	96.34
Corymbia hamersleyana	20	4	96.12
Crotalaria medicaginea var. *neglecta*	<1	0.3	96.26
Euphorbia coghlanii	<1	0.2	96.21
Goodenia microptera	<1	0.4	96.06
Gossypium australe (Burrup Peninsula form)	<1	0.6	96.18
Grevillea pyramidalis ssp. *leucadendron*	3	1	96.15
Hibiscus leptocladus	<1	0.4	96.25
Hybanthus aurantiacus	<1	0.3	96.16

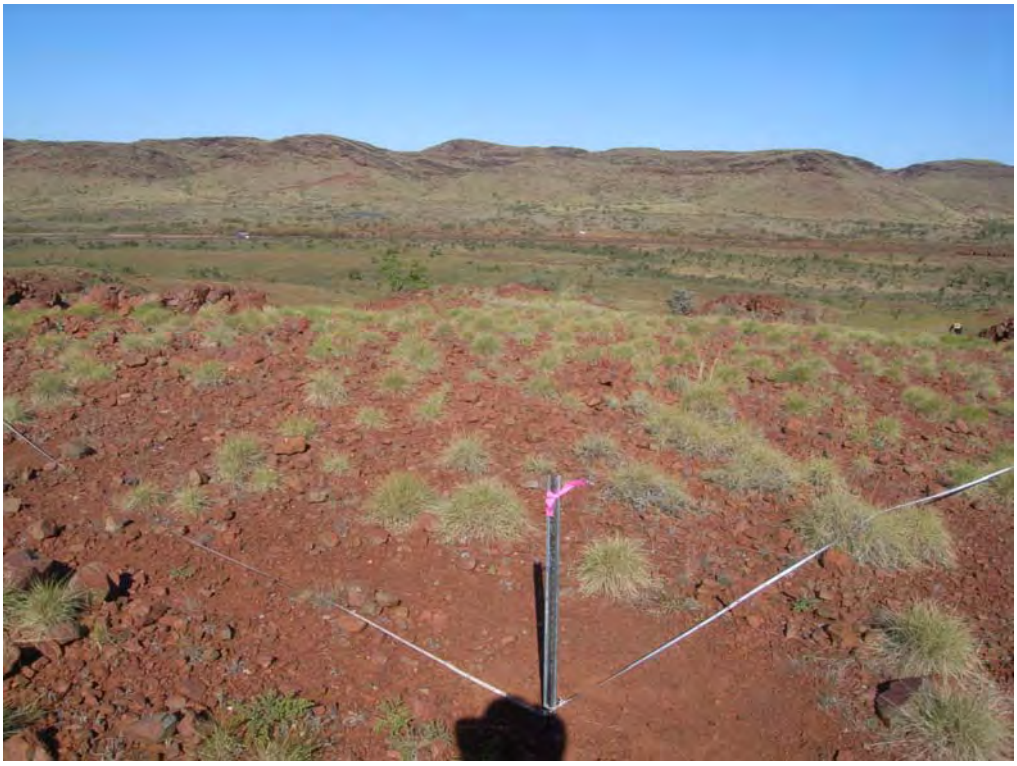
Species	Cover (%)	Height (m)	Specimen
Indigofera colutea	<1	0.1	96.05
Indigofera linifolia	<1	0.3	96.08
Indigofera monophylla (MJOPP-2)	<1	0.4	96.17
Mollugo molluginea	<1	0.3	96.19
**Portulaca oleracea*	<1	0.1	96.24
Ptilotus helipteroides var. *helipteroides*	<1	0.2	96.27
Ptilotus polystachyus var. *polystachyus*	<1	0.4	96.07
Rhynchosia minima	<1	creeper	96.13
Sida pilbarensis (Ferrugineous form)	<1	0.3	96.30
Sida rohlenae ssp. *rohlenae*	<1	0.4	96.33
Sida sp. verrucose glands (F.H. Mollemans 2423)	<1	0.3	96.28
Swainsona formosa	<1	0.3	96.23
Tephrosia aff. *supina* (MET 12,357)	<1	0.7	96.20
Tephrosia sp. *Bungaroo Creek* (M.E. Trudgen 114601)	<1	0.4	96.31
Themeda triandra	<1	0.7	96.01
Trichodesma zeylanicum var. *zeylanicum*	<1	0.4	96.29
Triodia aff. *epactia*	50	0.4	96.11

API Rail Flora

Site APQ97

Described by GM **Date** 22/07/2009 **Type** Q 50 x 50

MGA Zone 50 511795 **mE** 7713450 **mN**
Habitat Closed Hummock Grassland of *Triodia wiseana* (fine form) on hillslopes and ridgetops
Soil Orange rocky sandy clay
Veg Condition Very Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Abutilon lepidum	<1	0.4	97.07
Acacia bivenosa	<1	1	97.18
Amaranthus cuspidifolius	<1	0.4	97.03
Aristida contorta	<1	0.4	97.21
Capparis spinosa var. *nummularia*	<1	0.3	97.06
**Cenchrus ciliaris*	1	0.4	97.25
Cucumis maderaspatanus	<1	creeper	97.05
Cymbopogon ambiguus	<1	0.7	97.16
Ehretia saligna var. *saligna*	<1	3	97.02
Enneapogon caerulescens var. *caerulescens*	<1	0.2	97.24
Euphorbia australis	<1	0.3	97.12
Euphorbia wheeleri	<1	0.1	97.14
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	97.20
Fimbristylis aff. *dichotoma* (M75-4)	<1	0.4	97.22
Flueggea virosa ssp. *melanthesoides*	<1	0.4	97.13
Gomphrena cunninghamii	<1	0.3	97.19

Species	Cover (%)	Height (m)	Specimen
Gossypium australe (Whim Creek form)	<1	0.3	97.08
Hibiscus aff. *platychlamys* (MET 15,067)	<1	0.4	97.27
Indigofera monophylla (grey leaflet form)	<1	0.4	97.04
Indigofera monophylla (MJOPP-2)	<1	0.2	97.09
Oldenlandia crouchiana	<1	0.3	97.26
Rhynchosia minima	<1	0.3	97.15
Trachymene oleracea	<1	0.4	97.17
Trichodesma zeylanicum var. *zeylanicum*	<1	0.3	97.23
Triodia wiseana (fine form)	70	0.3	97.10
Triumfetta clementii	<1	0.1	97.01

API Rail Flora

Site APQ98

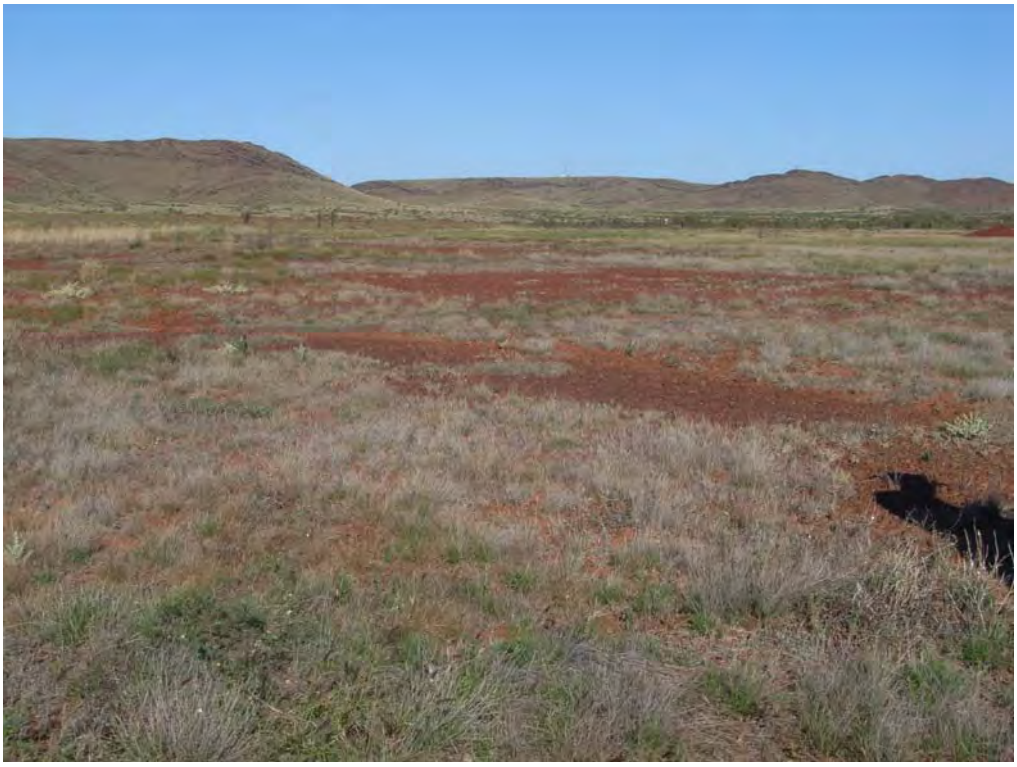
Described by GM **Date** 22/07/2009 **Type** V

MGA Zone 50 510567 **mE** 7712512 **mN**

Soil Orange loamy clay

Vegetation Mid to dense tussock grassland of *Eragrostis xerophila* with scattered *Sclerolaena bicornis* on loamy clayey lower slopes.

Veg Condition Degraded



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Atriplex codonocarpa	<1	0.3	98.02
Eragrostis tenellula	<1	0.4	98.12
Eragrostis xerophila	40	0.3	98.10
Eriachne benthamii	<1	0.4	98.13
Iseilema macratherum	<1	0.1	98.09
Marsilea hirsuta	<1	0.1	98.05
Neptunia dimorphantha	<1	0.2	98.04
Panicum decompositum	<1	0.3	98.06
Polygala aff. *isingii*	<1	0.3	98.14
**Portulaca oleracea*	<1	0.1	98.16
Ptilotus exaltatus	<1	0.4	98.01
Rhynchosia minima	<1	creeper	98.03
Sclerolaena bicornis	1	0.4	98.11
Sida aff. *fibulifera* (HD200-6)	<1	0.1	98.08
Xerochloa barbata	<1	0.3	98.17

API Rail Flora

Site CP012

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 422895 **mE** 7664784 **mN**
Soil Red cracking clay
Vegetation Horseflats dominated by *Eragrostis xerophila* and *Iseilema macratherum* on red cracking clay.
Veg Condition Very Good - Good

SPECIES LIST

Species	Cover (%)	Height (m)	Specimen
Alysicarpus muelleri^	<1	0.3	BN200
Aristida latifolia	0.5	0.5	CP12.12
Astrebla pectinata	<1	0.2	CP12.18
Brachyachne convergens	1	0.3	CP12.07
Chrysopogon fallax	<1	0.7	CP12.09A
Cleome viscosa#	<1	0.4	CP12.06
Crotalaria dissitiflora ssp. *benthamiana*	<1	0.1	CP12.28
Cucumis maderaspatanus	<1	creeper	CP12.09B
**Cucumis melo ssp. agrestis*	<1	creeper	CP12.10
Dactyloctenium radulans#	0.5	0.1	CP12.19
Dichanthium sericeum ssp. *humilius*	1	0.15	CP12.21
Dichrostachys spicata	0.1	0.8	CP12.05
Enneapogon caerulescens var. *caerulescens*	<1	0.2	CP12.11
Eragrostis falcata^	12	0.2	BN89

Species	Cover (%)	Height (m)	Specimen
Eragrostis xerophila#	40	0.2	CP12.20
Gomphrena affinis ssp. *pilbarensis*	<1	0.2	CP12.14
Heliotropium conocarpum#	1	0.1	BN93
Hibiscus brachysiphonius	<1	0.4	CP12.19B
Indigofera trita	<1	0.1	CP12.16
Ipomoea plebeia	<1	0.1	CP12.25
*Iseilema dolichotrichum^*	20	0.3	BN14
Iseilema macratherum	20	0.1	CP12.01
**Malvastrum americanum#*	<1	0.4	
Neptunia dimorphantha	<1	0.3	CP12.04
Operculina aequisepala	<1	creeper	CP12.02
Panicum laevinode#	1.5	0.4	BN115
**Prosopis pallida^*	<1	0.8	
Ptilotus carinatus#	<1	0.15	BN124
Ptilotus exaltatus var. *exaltatus#*	<1	0.15	CP12.30
Ptilotus gomphrenoides var. *gomphrenoides*	<1	0.1	CP12.24
Rhynchosia minima#	<1	0.4	BN77
Salsola tragus#	<1	0.1	AP12
Salsola tragus ssp. *grandiflora^*	<1	0.1	BN248
Senna glutinosa ssp. *glutinosa#*	<1	0.3	AP13
*Sesbania cannabina^*	<1	0.4	BN164
Sida aff. *fibulifera* (HD200-6)	<1	0.2	CP12.29
Sida aff. *fibulifera* (oblong; MET 15 220)^	<1	0.4	BN149
*Sida spinosa^*	<1	0.25	BN33
Solanum lasiophyllum	<1	0.2	CP12.03
Sporobolus australasicus	<1	0.05	CP12.17
*Stemodia kingii^*	<1	0.3	AP15
Streptoglossa bubakii#	<1	0.3	BN95
*Streptoglossa liatroides^*	<1	0.1	BN123

API Rail Flora

Site CP014

Described by KH **Date** 21/04/2009 **Type** Q 50 X 50

MGA Zone 50 422529 **mE** 7663263 **mN**

Soil Red brown loam

Vegetation Shrubland of *Acacia bivenosa*, *Acacia pyrifolia* var. *pyrifolia* with scattered *Acacia syncronicia* over a Mid Dense Hummock Grassland of *Triodia wiseana* (fine form) and **Cenchrus ciliaris* on red brown loam.

Veg Condition Very Good

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia ancistrocarpa	<1	1.8	CP14.14
Acacia bivenosa#	10	2.5	BN54
Acacia inaequilatera	0.1	1.5	CP14.06
Acacia pyrifolia var. *pyrifolia*#	5	2.2	AP03
Acacia synchronicia#	1.5	1.8	CP14.34
Alysicarpus muelleri	<1	0.1	CP14.30
**Cenchrus ciliaris*#	30	0.8	CP14.01
Chrysopogon fallax#	<1	1.1	CP14.35
Corchorus laniflorus^	<1	0.3	BN24
Crotalaria medicaginea var. *neglecta*	<1	0.1	CP14.32
Cucumis maderaspatanus#	<1	creeper	CP14.09
Dactyloctenium radulans	<1	0.1	CP14.17
Dichanthium sericeum ssp. *humilius*	<1	0.15	CP14.20
Ehretia saligna var. *saligna*	<1	1.5	CP14.04
Eremophila forrestii ssp. *forrestii*#	1	1.2	
Eremophila longifolia^	<1	1	BN184
Euphorbia coghlanii	<1	0.1	CP14.22
Evolvulus alsinoides var. *villosicalyx*	<1	0.2	CP14.11
Gomphrena affinis ssp. *pilbarensis*#	<1	0.3	BN09
Goodenia forrestii#	<1	0.2	BN201
Heliotropium cunninghamii	<1	0.3	CP14.25
Hybanthus aurantiacus^	<1	0.3	BN209
Indigofera colutea	<1	0.1	CP14.08
Indigofera linifolia#	<1	0.2	CP14.07
Indigofera monophylla (Cape Preston form)^	<1	0.3	BN180
Ipomoea polymorpha	<1	0.1	CP14.27
Leptopus decaisnei var. *orbicularis*	<1	0.2	AP04
**Malvastrum americanum*^	<1	0.3	
Melhania sp. (CH15-39)	<1	0.25	CP14.26
Melhania sp. *Burrup*	<1	0.15	CP14.23
**Portulaca oleracea*^	<1	0.3	BN207
Ptilotus exaltatus^	<1	0.3	
Ptilotus obovatus var. *obovatus*#	<1	0.3	CP14.33
Salsola tragus ssp. *Grandiflora*^	<1	0.2	BN248
Scaevola spinescens (broad leaf form)#	8	0.9	BN64
Senna artemisioides ssp. *oligophylla*#	<1	0.5	AP01
Sida aff. *fibulifera* (oblong; MET 15 220)^	<1	0.2	BN149
Sida spinosa^	<1	0.3	BN33
Solanum diversiflorum#	<1	0.3	BN6

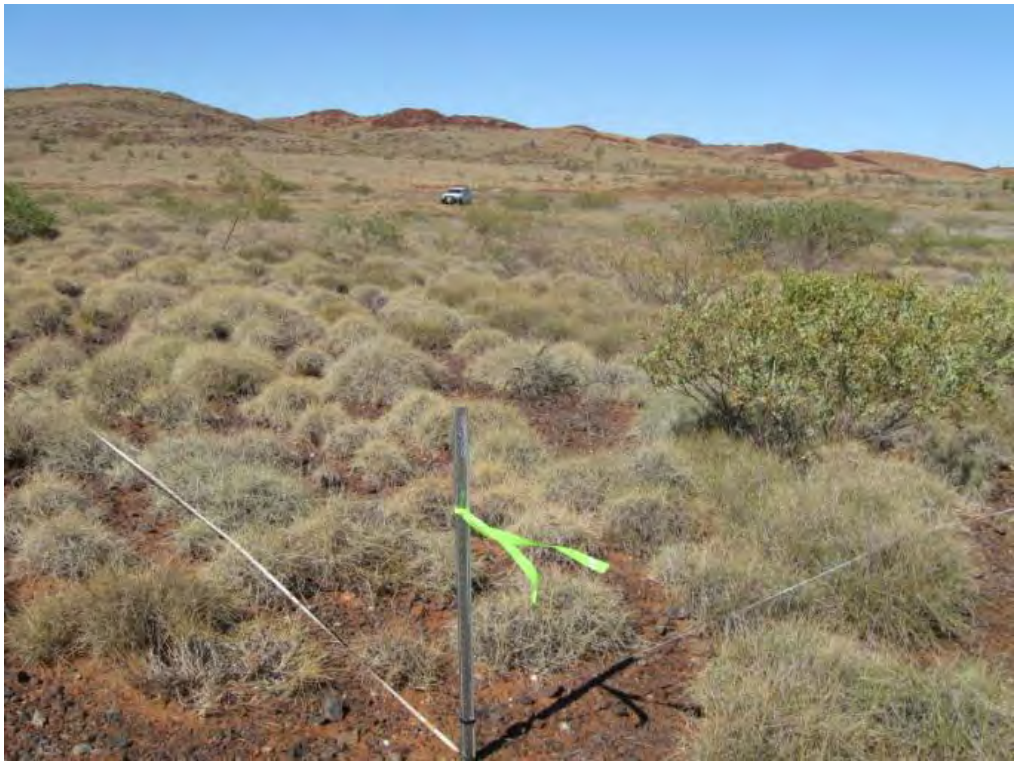
Species	Cover (%)	Height (m)	Specimen
Solanum lasiophyllum#	<1	0.2	CP14.21
Sporobolus australasicus	<1	0.05	CP14.18
Tephrosia aff. *supina* (MET 12,357)#	<1	0.2	BN204
Trachymene oleracea ssp. *oleracea*^	<1	0.5	BN39
Trichodesma zeylanicum var. *zeylanicum*#	<1	0.2	CP14.12
Triodia wiseana (fine form)#	55	0.8	CP14.03
Triumfetta clementii	<1	0.4	CP14.15
Vigna sp. *central*	<1	0.25	CP14.10

API rail Flora

Site APQ100

Described by GM **Date** 30/05/2010 **Type** Q 50x50
Season P

MGA Zone 50 510296**mE** 7714058**mN**
Soil orange sandy clay
Rock Type Ironstone
Vegetation Open Shrubland of *Acacia bivenosa* over a Closed Hummock Grassland of *Triodia wiseana* and *Triodia epactia* on orange sandy clay.
Veg Condition Very Good



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	3	1.2	
Acacia synchronicia	1	1.1	
**Cenchrus ciliaris*	1	0.4	
Heliotropium ?cunninghamii	<1	0.3	
Ptilotus exaltatus var. *exaltatus*	<1	0.4	
Trichodesma zeylanicum	<1	1.5	
Triodia epactia	20	0.5	
Triodia wiseana	55	0.4	

API rail Flora **Site APQ101**

Described by GM **Date** 31/05/2010 **Type** Q 50x50

MGA Zone 50 511281**mE** 7712776**mN**

Soil Orange brown rocky clay loam

Vegetation Tall Shrubland of *Acacia inaequilatera* over an Open Shrubland of *Acacia pyrifolia* var. *pyrifolia* and *Acacia bivensa* over a Low Open Shrubland of *Sida* aff. *echinocarpa* over a Mid-Dense Hummock Grassland of *Triodia wiseana* on rocky clay/loam hillslopes.

Veg Condition Very Good

Fire Age ~5yrs

SPECIES LIST:

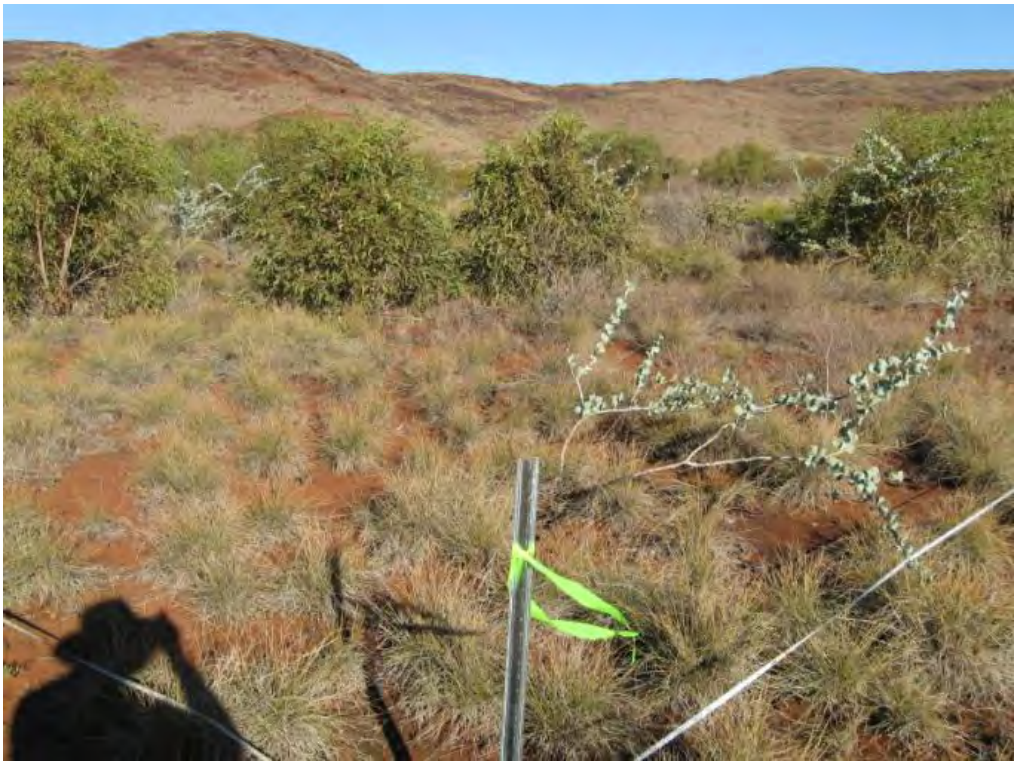
Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	3	1	
Acacia inaequilatera	15	2.5	
Acacia pyrifolia	10	1.5	
Bonamia media	<1	0.05	
Grevillea pyramidalis ssp. *leucadendron*	<1	1.2	
Ptilotus calostachyus	<1	1	
Triodia wiseana	65	0.4	
Sida aff. *echinocarpa*	5	0.3	API-04
Acacia tumida var. *pilbarensis*	1	0.4	API-05
Euphorbia schultzii	<1	0.2	API-06

API rail Flora

Site APQ102

Described by GM **Date** 30/05/2010 **Type** Q 50x50
Season P

MGA Zone 50 512215**mE** 7713248**mN**
Soil orange sandy clay
Vegetation Tall Open Shrubland of *Acacia inaequilatera* with scattered *Corymbia hamersleyana* over an Open Shrubland of *Acacia bivenosa* and *Acacia stellaticeps* over a Closed Hummock Grassland mainly dominated by *Triodia wiseana, *Cenchrus ciliaris* and *Chrysopogon fallax* on sandy clayey loam.
Veg Condition Good
Fire Age <3 years



SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	1	1.1	
Acacia inaequilatera	3	2.1	
**Cenchrus ciliaris*	25	0.6	
Chrysopogon sp.	2	0.4	
Cleome viscosa	<1	0.4	
Corchorus parviflorus	<1	0.3	
Corchorus sp.	<1	0.4	
Corymbia hamersleyana	2	2.5	
Grevillea pyramidalis ssp. *leucadendron*	<1	0.3	
Indigofera trita	<1	0.5	
Rhynchosia minima	<1	creeper	
Salsola tragus	<1	0.1	
Tephrosia clementii	<1	0.4	
Trichodesma zeylanicum	<1	0.8	

Species	Cover (%)	Height (m)	Specimen
Triodia wiseana	40	0.6	
Acacia stellaticeps	1	1.1	APJ1
Mollugo molluginea	<1	0.2	APJ3
Gossypium australe Whim Creek Form	<1	0.6	APJ4
Acacia tumida var. *pilbarensis*	<1	0.3	APJ5

API rail Flora

Site APQ103

Described by GM **Date** 31/05/2010 **Type** Q 50x50
Season P

MGA Zone 50 508016**mE** 7715427**mN**
Habitat Coastal grassland. Flat, elevation 8.7m
Soil Red orange, loamy/silty clay
Vegetation Tusscok Grassland dominated by **Cenchrus ciliaris* and *Eragrostis xerophila* over a Low Open Shrubland of *Sclerolaena glabra* on orange silty clay flats.
Veg Condition Good – Degraded

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
**Cenchrus ciliaris*	30	0.4	
Eragrostis xerophila	3	0.3	
Sclerolaena glabra	5	0.5	API-07
Atriplex aff. *amnicola*	<1	0.6	API-08
**Portulaca oleracea*	<1	0.3	API-09
Atriplex codonocarpa	<1	0.6	API-10
Threlkeldia diffusa	<1	0.1	API-11
Neptunia monosperma	<1	0.3	API-12
Triodia epactia	<1	0.3	API-13

API rail Flora

Site APQ104

Described by GM **Date** 31/05/2010 **Type** Q 50x50
Season P

MGA Zone 50 512910 **mE** 7714671 **mN**
Soil Orange sandy clay
Vegetation Low Open Shrubland of *Acacia stellaticeps* and *Acacia ampliceps* over a Tussock Grassland of **Cenchrus ciliaris* with occasional *Triodia wiseana* on orange sandy clay.
Veg Condition Degraded
Fire Age <2 years

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
**Cenchrus ciliaris*	65	0.6	
Ptilotus exaltatus var. *exaltatus*	<1	0.2	
Trichodesma zeylanicum	0.4		
Triodia wiseana	3	0.4	
Acacia stellaticeps	1	0.7	APJ1
Acacia ampliceps	1	0.7	APJ6
Acacia colei var. *colei*	<1	0.6	APJ7
Eragrostis xerophila	<1	0.3	APJ10
Triumfetta sp.	<1	0.2	APJ8
Sida sp.	<1	0.2	APJ9
Eriachne sp.	<1	0.4	APJ11

API rail Flora

Site APQ105

Described by GM **Date** 31/05/2010 **Type** Q 50x50

MGA Zone 50 504234 **mE** 7718085 **mN**

Habitat Elevation 7m, undulating dune

Soil light brown sand with shell fragments

Vegetation Tall Open Scrub of *Acacia coriacea* ssp. *coriacea* with scattered *Acacia bivenosa* over a Tussock Grassland of **Cenchrus ciliaris* on light brown sands with shell fragments.

Veg Condition Degraded

Notes Heavy grazing by Kangaroos

SPECIES LIST:

Species	Cover (%)	Height (m)	Specimen
Acacia bivenosa	2	1	
Acacia coriacea ssp. *coriacea*	35	2.5	
**Cenchrus ciliaris*	35	0.3	
Santalum lanceolatum	1	1.3	
Alternanthera sp. (juvenile)	<1	0.6	API-14
Adriana tomentosa var. *tomentosa*	<1	0.6	API-15

Appendix F

Recommended *Department of Agriculture and Food* control measures for **Prosopis* spp

Mesquite (*Prosopis spp.*)

Declaration

(Code: C= City; S=Shire; T=Town)

Category : P1
Location : For the whole of the State

Category : P2
Location : For the whole of the State except the area on Mardie Station bordered by the coast, the boundary between Mardie and Karratha stations, the North West Coastal Highway, Peter's Creek and the boundary between Yarraloola and Mardi stations.

Category : P4
Location : For the area on Mardie Station bordered by the coast, the boundary between Mardie and Karratha stations, the North West Coastal Highway, Peter's Creek and the boundary between Yarraloola and Mardie stations.

Standard Control Codes (these may vary for individual plants)	
P1 **REQUIREMENTS** Prohibits movement	The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2 **REQUIREMENTS** Aim is to eradicate infestation	Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.

P4 REQUIREMENTS Aims to prevent infestation spreading beyond existing boundaries of infestation.	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants: • within 100 metres inside of the boundaries of the infested property • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
Special considerations	In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas .

Control Method

Recommended herbicides	**:**	• When activley growing - basal bark spray and/or overall foliar spray **Triclopyr** **Triclopyr + picloram** • At any time **Velpar®** **Access™ Herbicide** • small plants **Garlon™ 600**

Herbicide	**:**	**Access™ Herbicide**
Active ingredient	**:**	240 g/L triclopyr + 120 g/L picloram **(Group I)**
Rates of dilution for spot spraying	**:**	1:60 in distillate
Amount of product per 10 litres distillate	**:**	160 mL
Time of application	**:**	When actively growing at all stages before pod formation
Remarks	**:**	Treat plants with stems up to 5 cm diameter. If using 'cut stump' treatment, the tree diameter is not restrictive
More information and other control methods	**:**	• Treat stems up to a height of 30 cm above ground level for 'basal bark'. • For 'cut stump'cut stem as close to the ground (<15 cm) as possible. • Do not treat trees with wet bark

Herbicide	**:**	**Triclopyr** (Various trade names)
Active ingredient	**:**	600 g/litre triclopyr **(Group I)**
Rates of dilution for spot spraying	**:**	1:60-1:120 in distillate

Amount of product per 10 litres distillate	**:**	1:60 = 160 mL; 1:120 = 80 mL
Rate of product per hectare	**:**	Not Recommended
Time of application	**:**	When actively growing.
Remarks	**:**	Apply as a 'basal bark' spray to mature trees. Poor results can be expected if treatment undertaken during or after long dry spell. Mix only what can be used on day of spraying. Agitate regularly. Use 1:60 on large mature trees. The mixture can be used as a 'cut-stump' treatment at any time of year.
More information and other control methods	**:**	Individual trees can be removed mechanically. There will be seedling regrowth in subsequent years.

Herbicide	**:**	**Tryclopyr** (other trade names also available)
Active ingredient	**:**	600 g/litre triclopyr **(Group I)**
Rates of dilution for spot spraying	**:**	1:330
Amount of product per 10 litres water	**:**	30 mL
Rate of product per hectare	**:**	Not Recommended
Remarks	**:**	Use to treat small plants as overall foliar spray.

Herbicide	**:**	**Triclopyr + picloram** (various trade names)
Active ingredient	**:**	300 g/litre triclopyr + 100 g/litre picloram **(Group I)**
Amount of product per 10 litres water	**:**	350 - 670 mL
Rate of product per hectare	**:**	Not Recommended
Wetting agent	**:**	BS 1000 @ 100mL/100L
Time of application	**:**	When actively growing, up to pod formation

Herbicide	**:**	**Velpar®**
Active ingredient	**:**	250 g/litre hexazinone **(Group C)**
Rates of dilution for spot spraying	**:**	Use undiluted at 4 mL/spot. One spot/tree up to 5 m tall. Recommendation for parkinsonian.
Amount of product per 10 litres water	**:**	Not Recommended
Rate of product per hectare	**:**	Not Recommended
Time of application	**:**	At any time. Inject into soil (sub-surface) if dry. Use spotgun.
Remarks	**:**	Needs rain to activate. Distribute dose around dripline of large trees. Keep clear of desirable trees. Best suited to isolated small plants (up to 2 m in height). For prickly acacia (*Acacia nilotica*) 4 mL/spot using one spot for every meter of height.

Weed Description

Family : Mimosaceae
Form : Tree – Perennial
Status : Present in WA

Can be evergreen or deciduous shrub or low tree with one to several trunks and arched branches. It has different growth forms depending on its location and water supply. Mesquite is a Weed of National Significance.

- Drier soils – short, many stemmed shrubs 1-3 m high
- Near permanent water – large single trunk 6-15 m high.
- Floodplains – branching from the base, forming dense thickets 5-8 m high, particularly along the banks of intermittently flowing creeks.

Reproduce by seed and suckers.

Branches: Small branches have a zigzag appearance. Plants can have an irregular outline, with some branches protruding out of the canopy. Spines are solitary or paired along the stem, and range from 4 mm to 75 mm in length.

Leaves: Bipinnate (like jacaranda leaves),i.e. divided twice, with 1-4 pairs of pinnae, each with 7-21 pairs of small opposite leaflets.

Flowers: Long finger-like spikes (5-12 cm long) of many small greenish, cream or yellow flowers, all densely crowded. Stamens 10 in number and protrude out of the flower.

Seed: Pods are 5-20 cm long, compressed, straight to curved, smooth or with slight restrictions between the seeds. Ripe pods are yellow, purple, or yellow with purple streaks and patches. The flat seeds are oval or elliptical 2.5-7 mm long by 2-3 mm wide, each enclosed in a flattened fibrous case, and surrounded by sweet pulp.

Other relevant information related to this topic:

- Quarantine WA
- Permitted and quarantine species list
- Weed of National Significance
- Weeds CRC
- CSIRO poster
- Permit for minor off-label-use of a registered agvet chemical product (Permit number – per9655)
- Off-label permit (olp) for use of a registered agvet chemical product (Permit number - per4590)