360 environmental

Atlas Tenement

Level 2 Flora and Vegetation Survey – North Perth Mineral Sands Project (Single Phase)

Prepared for:

Image Resources

February 2012

people • planet • professional

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Executive Summary

Image Resources has commissioned 360 Environmental PL to undertake a Level 2 flora and vegetation survey of the 'Atlas Tenement' as part of the environmental impact assessment process for a mining development.

The Atlas Tenement survey area lies on the north side of Wongonderrah Road and on the east side on Munbinea Road, approximately 19 kilometres south-east of Cervantes. The Atlas Tenement survey area was approximately 940 hectares in size, with approximately 715 hectares of bushland. The tenement is located on Crown Land in the southern part and mostly cleared farmland in the northern part.

The Atlas Tenement survey area lies in the Bassendean Dune System that consists of low dunes with numerous inter-dunal swamps or 'swampy flats' underlain by a calcareous hardpan. It lies near the northern-most extent of the Interim Biogeographic Regionalisation of Australia (IBRA) Swan Coastal Plain biogeographic region, with the southern part of the Geraldton Sandplains biogeographic region approximately 20 kilometres to the east.

A search of the Department of Environment and Conservation (DEC) rare flora databases (DEFL and WAHERB) was undertaken in November 2011, as was a search of Threatened species listed under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Nambung River flows westwards through the Atlas Tenement survey area and into the Nambung National Park, where it disappears into underground channels before draining towards the Indian Ocean. DEC have recently mapped wetlands in the region, including the Nambung River wetlands, part of which lie in the survey area.

The Atlas Tenement flora and vegetation survey was conducted between 29 October and 3 November 2011 and continued between 15 and 21 November 2011.

Three hundred and sixteen (316) species of native flowering plants, one native cycad (the Zamia Palm, *Macrozamia fraseri*) and one native conifer (the Sandplain Cypress, *Callitris arenaria*) were recorded in the Atlas tenement survey area. In addition, forty six (46) non-native species (weeds) were recorded.

The number of native species recorded in the Atlas Tenement survey area was assessed to be a moderate number for the vegetation types in the area and the size of the area surveyed. Species richness varied from between 43 and 51 native taxa in the *Banksia attenuata-Banksia menziesii* woodland quadrats to 28

to 34 in the *Banksia prionotes* woodlands, 22 to 37 in the dampland heaths and 21 to 41 in the samphire herblands.

No Declared Rare Flora were recorded during this survey. Eleven Priority species were recorded in the Atlas Tenement survey area during the field survey (determinations for two taxa to be confirmed). The eleven Priority taxa consisted of:

- One Priorty 1 taxon (*Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B));
- Three Priority 2 taxa (*Isopogon panduratus* subsp. *palustris*, *Schoenus badius* and *Stylidium aceratum*);
- Six Priority 3 taxa (*Angianthus micropodioides*, *Conospermum scaposum*, *Hensmania stoniella*, *Melaleuca clavifolia*, *Onychosepalum nodatum* and *Stylidium longitubum*); and
- One Priority 4 taxon (*Banksia platycarpa*) (Figure 5; Appendix 5).

Schoenus griffinianus (P3) wase not recorded during this survey, however it is listed by DEC as being previously reported from the survey area.

Thirteen vegetation units were described and mapped in the remnant bushland in the Atlas Tenement survey area. These could be grouped into the five (5) broad groupings:

- Banksia low woodlands on plains low rises (comprising *Banksia attenuata-Banksia menziesii* low woodlands and *Banksia prionotes* low woodlands);
- *Banksia telmatiaea-Regelia ciliata* heaths on seasonal damplands;
- Melaleuca shrublands along flowlines and flow areas and on adjacent dampland flats;
- Samphire low shrublands; and
- Other vegetation.

Vegetation units considered to be wetland vegetation were listed. Wetland vegetation included the Melaleuca shrublands, the samphire low shrublands and the surrounding transitional *Banksia telmatiaea-Regelia ciliata* dampland heaths.

The vegetation condition of the Banksia low woodlands and the *Banksia telmatiaea-Regelia ciliata* heaths was estimated to be 'Excellent to Pristine'. The Melaleuca shrublands generally had a high weed cover in the herbland/sedgeland/grassland strata and they were estimated to be in 'Good' and 'Good to Degraded' condition. Some areas of the samphire low shrublands vegetation also had high weed cover in the herbland/sedgeland/grassland strata,

but significant areas were in 'Very Good to Excellent' condition with low weed cover and a species-rich herb layer. Most of the farmland in the survey area was cleared pasture paddocks and was rated 'Completely Degraded'. Areas of dampland where there was some sedge regrowth in the pasture paddocks were rated 'Degraded'. There were small areas of uncleared, but grazed, remnant vegetation in the south-east corner of the farmland portion of the survey area.

A number of areas of Banksia deaths were noted in the *Banksia attenuata-Banksia menziesii* low woodlands vegetation unit. While some fire scars were noted on some trees, others did not appear to have been burnt. Dieback (caused by *Phytophthorra cinnamomi* infection) and changing water tables may be associated with the deaths. A dieback survey by accredited 'dieback interpreters' is recommended.

Lomandra hermaphrodita, a foodplant of the listed Graceful Sun Moth, was recorded at eight locations in the survey area and appeared to be sparsely scattered in the *Banksia attenuata-Banksia menziesii* low woodlands. *Lomandra maritima* was not recorded in the Atlas Tenement survey area.

It was concluded that flora values for rareness in the survey area are probably in the range of moderate to high, taking into consideration a number of Threatened taxa that are considered to have a high likelihood of occurring there, but which were not recorded during the survey.

The Banksia low woodland vegetation in the survey area is considered to have moderate vegetation conservation values because of the wide distribution of these low woodlands on the northern part of the Swan Coastal Plain. However, the association of *Macarthuria keigheryi* with this vegetation type in this region should be considered. The Melaleuca shrublands were considered to have a low to moderate conservation value because of the high weed covers. However, it is noted that the restricted taxa *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) (P1) is scattered in this vegetation type. The *Banksia telmatiaea* heath vegetation may be variable over its range on the Bassendean Dune System and both the heaths and the samphire herblands are associated with Threatened flora. An assessment of their values could not be finalised within the scope of this survey. Consultation with DEC is recommended regarding these communities.

The vegetation in the survey area also has linkage and wetland/creekline vegetation value.

1 Introduction

1.1 Background

Image Resources NL is a mineral sands exploration company with a number of projects in the North Perth Basin. One of these, the Cooljarloo project, is adjacent to the TiWest Cooljarloo heavy mineral sands mine and includes the Atlas resource north-west of the Cooljarloo mine. Image Resources has commissioned 360 Environmental Pty Ltd (360 Environmental) to undertake a Level 2 flora and vegetation survey of the 'Atlas Tenement' as part of the environmental permitting process for a mining lease application (Figure 1).

1.2 Purpose of the Study

The purpose of the Level 2 flora and vegetation survey of the Atlas Tenement was to:

- Compile a comprehensive list of the flora in the survey area, including any Significant flora;
- Map the vegetation and the vegetation condition in the survey area;
- Assess the flora and vegetation values in the survey area; and
- Report on the survey results.

The Level 2 survey was conducted in partial accordance with the Environmental Protection Authority's (2004) *Guidance for the assessment of Environmental Factors – Terrestial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (No 51).* Full accordance was not achieved as this was a single phase survey only.

1.3 The Survey Area

The Atlas Tenement survey area lies on the north side of Wongonderrah Road and on the east side on Munbinea Road and has a total length (north south) of approximately seven kilometres (Figure 1). The Atlas Tenement survey area is 957 hectares in size.

The northern part of the survey area was on private land and was mostly cleared farm land. The southern part of the survey area was bushland on Crown Land.

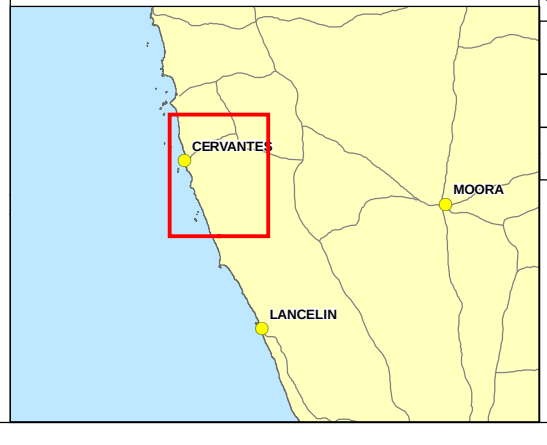
Legend

Site Boundary

1 centimeter = 1,250 meters

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED FROM LANDGATE 2006

LOCALITY MAP



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0 750 1,500 3,000 4,500 6,000 Meters

DRAWING ID	DATE
EBS133_2.01	16/01/2012

HORIZONTAL DATUM AND PROJECTION

GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
TD	AH	FD	0

Image Resources Pty. Ltd.
Atlas Mineral Sands Mine Site
Cervantes

Level 2 Flora & Vegetation Survey
Site Location
Figure 1

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2 Site Description and Background Information

2.1 Physical Environment

2.1.1 Climate

The central coastal plain, which includes the survey area, has a Mediterranean type climate with hot, dry summers and mild, wet winters with an average rainfall of approximately 600 mm (Australian Bureau of Meteorology website, January 2012).

2.1.2 Geomorphology of the Survey Area

Over the years, the coastal plain between Dunsborough and Geraldton has been given various names, including the term Swan Coastal Belt. The term Swan Coastal Plain has been variously applied to all or parts of this coastal plain, but most recently has defined the biogeographic coastal plain unit that extends north to approximately Jurien Bay (Beard 1981; Environment Australia, 2010; Schoknecht et. al., 2004) and will be applied with this meaning hereafter. As such, the Atlas Tenement lies on the Swan Coastal Plain, near its northern most extent (Figure 2).

The geomorphology of the Swan Coastal Plain consists of a series of geomorphological elements which are sub parallel to the present coastline (McArthur and Bettenay, 1960; Churchward and McArthur, 1980). Each of these geomorphic elements has distinctive geology, vegetation, topography and soils. Lowry (1974) mapped two physiographic units on the coastal plain in the Cervantes region: the westward Coastal Belt that consisted of two Quarternary dune systems (Quindalup Dune System and Spearwood Dune System) and the eastward Bassendean Dune System.

The Atlas Tenement survey area lies in the Bassendean Dune System (Lowry, 1974). The Bassendean Dune System consists of low dunes with numerous inter dunal swamps or 'swampy flats' underlain by a calcareous hardpan (Lowry, 1974; Beard, 1979). It takes the form of a flat plain 'behind' the Coastal Belt, approximately 60 to 100 metres above sea level, sloping gently seaward and drained by small seasonal streams which generally terminate into large swamps or lakes near the coast or, in the case of Nambung River, drains into caves beneath the coastal limestone (Beard, 1979). Beard described the sands of the Bassendean Dune System in this region as being old, highly leached and bleached white.

2.2 Flora and Vegetation

2.2.1 Vegetation

2.2.1.1 Regional Vegetation

Beard (1981) defined boundaries for botanical provinces, districts and subdistricts for Western Australia on the basis of his vegetation mapping of the State. In this framework, the survey area lies in the Drummond Botanical Sub District (more or less equivalent to the Swan Coastal Plain and part of the Dandaragan Plateau) in the Darling Botanical District of the South West Botanical Province of Western Australia (Beard 1981). More particularly, the Atlas Tenement is located in the northern most extent of the Swan Coastal Plain, with the southern most extension of the Irwin Botanical District only approximately 20 kilometres to the east.

The survey area lies within an area of the Drummond Botanical Sub District mapped by Beard (1979, 1981) as "Banksia low woodland on coastal plain white sand" with "numerous patches of heath in swamps". Beard (1979) noted that the "heath of the swampy patches varies locally", with abundant taxa including *Banksia sphaerocarpa*, *Calytrix aurea*, *Calytrix flavescens*, *Verticordia densiflora* and *Verticordia drummondii*, with *Frankenia* and samphire occurring in salty patches, and the whole forming a mosaic requiring further study.

More recently, the IBRA biogeographic representation of Australia has been developed, that categorizes the Australian continent into regions of like geology, landform, vegetation, fauna and climate (Thackway and Cresswell, 1995). The Western Australian IBRA region boundaries were largely based on Beard's Botanical District boundaries (Paczkowska and Chapman, 2000). The Atlas Tenement survey area lies in the IBRA Swan Coastal Plain biogeographic region and the Perth biogeographic subregion (IBRA 6.1 in Environment Australia, 2010; Figure 2).

More recent regional flora and vegetation surveys have included those by Griffin, who conducted a regional survey of the flora of the Quindalup Dunes between the Swan and Irwin Rivers (Griffin, 1993) and a broad scale floristic survey of the northern sandplains between Perth and Geraldton (Griffin 1994). Griffin and Keighery (1989) also surveyed the northern coastal plain and recorded quadrats in cooperation with the Wildflower Society. However, the major vegetation mapping and vegetation floristic surveys by Heddle et al (1980) and Gibson et al. (1994) were undertaken in the southern part of the Swan Coastal Plain and their study areas did not extend as far north as the Atlas Tenement survey area.

GS2

SWA2

SWA1

AW2

JF1

Legend

- Site Boundary

IBRA Subregion

Subregion Name - Region Name

- Avon Wheatbelt P2 - Avon Wheatbelt
- Dandarragan Plateau - Swan Coastal Plain
- Leseur Sandplain - Geraldton Sandplains
- Northern Jarrah Forest - Jarrah Forest
- Perth - Swan Coastal Plain

1 centimeter = 4,000 meters

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- IBRA SUBREGIONS SOURCED FROM D.O.E. 2008
- LOCALITY MAP SOURCED FROM LANDGATE 2006

LOCALITY MAP

1:400,000 @ A3

0 2,450 4,900 9,800 14,700 19,600 Meters

DRAWING ID	DATE
EBS133_2.02	27/01/2012

HORIZONTAL DATUM AND PROJECTION

GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
TJ	AH	FD	1

Image Resources Pty. Ltd.
Atlas Mineral Sands Mine Site
Cervantes

Level 2 Flora & Vegetation Survey
IBRA Subregions
Figure 2

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2.2.1.2 Rare vegetation: Threatened Ecological Communities (TEC's) and Priority Ecological Communities (PEC's)

The DEC (and it's predecssors) has developed a procedure for identifying 'Threatened Ecological Communities' (Department of Environmental Protection 2000b; English and Blythe 1997). Threatened Ecological Communities (TEC's) are assigned to one of four categories: 'Presumed Totally Destroyed'; 'Critically Endangered'; 'Endangered' or 'Vulnerable' (Department of Environmental Protection, 2000b).

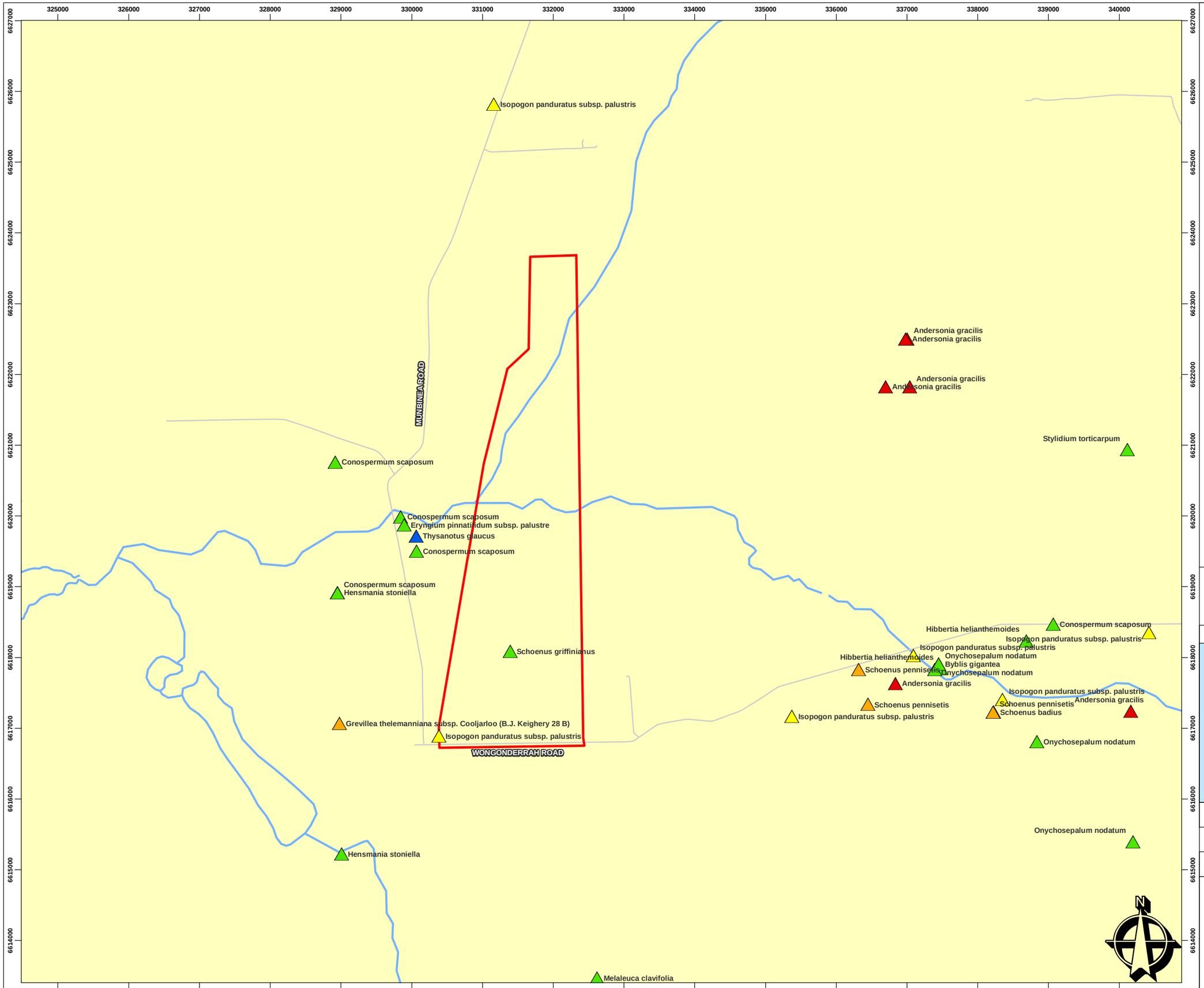
Priority Ecological Communities (PECs) include 'possible threatened ecological communities that do not meet survey criteria or are not adequately defined' (DEC, undated). These are added to the DEC's PEC list under Priorities 1, 2 and 3. Priority 4 status is given to "Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. Conservation Dependent ecological communities are placed in Priority 5 (DEC, undated).

A search of the Department of Environment and Conservation's TEC and PEC database found that there were no vegetation based TECs or PECs recorded within a 10 kilometre radius of the survey area. The nearest TEC to the Atlas Tenement survey area was the Thetis microbialite TEC: 'Stromatolite community of stratified hypersaline coastal lakes' located at Lake Thetis, less than one kilometre east of Cervantes (approximately 18 kilometres west of the Atlas Tenement survey area).

2.2.2 Rare Flora

A search of the DEC rare flora databases (DEFL and WAHERB) was undertaken in November 2011 for an area centred on a point in the Atlas Tenement survey area, with a 10 kilometre radius. DEC records showed that four Threatened taxa and twenty three (23) Priority taxa had been previously recorded in this locality (Table 1; Figure 3). Two of these taxa, *Isopogon panduratus* subsp. *palustris* (P2) and *Schoenus griffinianus* (P3) had been previously recorded in the Atlas Tenement survey area (Figure 3).

The results of a search of Threatened species listed under the Australian Government's EPBC Act using the online 'protected matters search tool' are also shown in Table 1. The search was centred around the coordinate point 115° 14' 54"E, 30° 32' 16"S with a 10 kilometre radius.



Legend

- Site Boundary

Flora of Conservation Significance

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Declared Rare
- Road
- Waterway

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- RARE/PRIORITY FLORA DATA SOURCED FROM D.E.C. 2011
- LOCALITY MAP SOURCED FROM LANDGATE 2006

0 375 750 1,500 2,250 3,000

Metres

1:50,000 @ A3

LOCALITY MAP

DRAWING ID	DATE
EBS133_2.03	27/01/2012

HORIZONTAL DATUM AND PROJECTION

GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
TJ	AH	FD	0

Image Resources Pty. Ltd.
Atlas Mineral Sands Mine Site
Cervantes

Level 2 Flora & Vegetation Survey
Rare/Priority Flora & TEC/PEC
Figure 3

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Table 1: Declared Rare and Priority Flora previously recorded in the survey area locality (from DEC DEFL and WAHERB database searches, November 2011) and Threatened flora listed for the area (EPBC Act).

Taxon	Status		Likelihood of Occurrence in survey area	Comments
	DEC data	EPBC data		
Andersonia gracilis	T (DRF)	T (V)	Moderate to High	Small erect, straggly shrub to 10 to 50 cm. Flowers white-pink-purple, Sep to Nov. Recorded on white/grey sand, sandy clay, gravelly loam in winter-wet areas, near swamps (DEC FloraBase, January 2012).
Anigozanthos viridis subsp. terraspectans	T (DRF)	T (V)	Moderate to High	Rhizomatous, perennial, herb, 5 to 20 cm high. Fl. green/yellow-green, Aug to Sep. Grey sand, clay loam. Winter-wet depressions.
Macarthuria keigheryi	T (DRF)	T (E)	Moderate	Erect or spreading perennial, herb or shrub, 20 to 40 cm high. Flowers white; Sep to Dec or Feb to Mar. White or grey sand (DEC FloraBase, January 2012). Found in *Banksia* woodlands on Bassendean sands on low plains (B Keighery, pers. comm.). Responds to fire and less abundant in long-unburnt areas. Difficult to find.
Patersonia spirifolia	T (DRF)	T (E)	Moderate	Spreading, woody, tussock-forming rhizomatous, herb, to 0.3 m high, to 0.4 m across. Sand over laterite. Low hills (DEC FloraBase, January 2012).
Banksia serratuloides subsp. *Perissa*		T (E)	Low	Bushy, lignotuberous shrub, to 1 m high. Fl. yellow, Aug to Sep. Gravelly lateritic soils. (DEC FloraBase, January 2012). Soils not found in survey area and known from Geraldton sandplains (not Swan Coastal Plain) – therefore unlikely to be present.
Centrolepis caespitosa	Priority 4	T(CE)	Low	Tufted annual, herb (forming a rounded cushion up to 25 mm across). Fl. Oct to Dec. White sand, clay. Salt flats, wet areas. (DEC FloraBase, January 2012). Unlikely – only known to short distance north of Perth.
Darwinia foetida		T (E)	Low	Erect, or spreading, shrub to 0.7 m high. Young branches are slender, with prominent, decurrent leaf bases, becoming grey and woody (Keighery 2009). Green flowers; October to November. Distinctive foetid smell of the flowers. (Australian Gvt 'Threatened Species and Communities/Recovery Plans'

Taxon	Status DEC data	Status EPBC data	Likelihood of Occurrence in survey area	Comments
				webpage). Unlikely – known from Muchea, long way to south.
Epiblema grandiflorum var. cyaneum		T (E)	Low	Orchid with slender, erect stem (25 and 80 cm in height) with a basal, narrowly rounded leaf 20-25 cm long. Flowers in late November to January. Winter-wet swamps. Known from Perth site. Assoc. with particular hydrological regime. (Australian Gvt 'Threatened Species and Communities/Recovery Plans' webpage).
Eucalyptus balanites		T (E)	Low	Mallee to 5 m high, bark rough, flaky. Fl. white, Oct to Dec or Jan to Feb. Sandy soils with lateritic gravel. Geraldton Sand Plain. (DEC FloraBase, January 2012). Soils not in survey area.
Eucalyptus impensa		T (E)	Low	Straggly mallee, to 1.5 m high, bark smooth. Fl. pink, Jun to Jul. Yellow sand. Lateritic hills. Geraldton Sand Plain. (DEC FloraBase, January 2012). Soils not in survey area.
Eucalyptus leprophloia		T (E)	Low	Mallee, 2-5(-8) m high, bark rough loose & flaky to 1 m. Fl. cream-white, Aug to Oct. White or grey sand over laterite. Valley slopes. Geraldton Sand Plain. (DEC FloraBase, January 2012). Soils not in survey area.
Grevillea batrachioides		T (E)	Low	Shrub, 0.5-1.5 m high. Fl. orange-red, Oct. Sandy loam. Sandstone outcrops. Geraldton Sand Plain. (DEC FloraBase, January 2012). Soils/rock type not in survey area.
Hemiandra gardneri		T (E)	Low	Prostrate, pungent shrub, 0.1-0.2 m high, to 1 m wide. Fl. red/pink-red, Aug to Oct. Grey or yellow sand, clayey sand. Sandplains. Geraldton Sand Plain, Avon wheatbelt. (DEC FloraBase, January 2012).
Calectasia palustris	Priority 1		Moderate to high	Stilt-rooted herb (undershrub), stems to 0.7 m high. Fl. blue, Jul to Oct. White or grey sand. Seasonally inundated swamplands. (DEC FloraBase, January 2012).
Grevillea thelemanniana subsp. Cooljarloo (BJ	Priority 1			Spreading, lignotuberous shrub, 0.3-1.5 m high.

Taxon	Status DEC data	Status EPBC data	Likelihood of Occurrence in survey area	Comments
Keighery 28B)				
Schoenus pennisetis	Priority 1		Moderate to high	Tufted annual, grass-like or herb (sedge), 0.05-0.15 m high. Fl. purple-black, Aug to Sep. Grey or peaty sand, sandy clay. Swamps, winter-wet depressions. (DEC FloraBase, January 2012).
Isopogon panduratus subsp. palustris	Priority 2			Shrub observed to grow to a height of 60 cm to 100 cm.
Persoonia filiformis	Priority 2			Erect, spreading, lignotuberous shrub, 0.07-0.4 m high. Fl. yellow, Nov to Dec. Yellow or white sand over laterite. Geraldton Sand Plain. (DEC FloraBase, January 2012). Soils/rock type not in survey area.
Phlebocarya pilosissima subsp. teretifolia	Priority 2		Moderate to high	Shortly *rhizomatous*, loosely tufted perennial herb, 0.15-0.4 m high, terete leaves. Fl. cream-white, Aug to Oct. White or grey sand. (DEC FloraBase, January 2012).
Scheonus badius	Priority 2			Slender annual, grass-like or herb (sedge), 0.05-0.12 m high. Fl. brown-green, Sep to Oct. Grey sand. Moist areas. (DEC FloraBase, January 2012).
Stylidium hymenocraspedum	Priority 2		Low to Moderate	Rosetted perennial, herb, 0.27-0.7 m high, Leaves adpressed to soil, spathulate, 1.5-7 cm long, 6-13 mm wide. Fl. yellow, Sep to Oct. Sand over laterite. Hillslopes. Heath, *Banksia* and *Eucalyptus* low open woodland. (DEC FloraBase, January 2012). Soils/rock type not in survey area???
Baeckea sp. Perth Region (R J Cranfield 444)	Priority 3		Low to Moderate	Erect, open straggly shrub, to 1.2 m high. Fl. pink/white, Jan to Mar. Orange sand, brown loam, white sandy clay. Low flats, winter-wet swamps. (DEC FloraBase, January 2012). Soils/rock type not thought to be in survey area
Biblis gigantea	Priority 3		Low	Concepts of Byblis revised and now Byblis gigantea extends not far north of Perth. Byblis lamellata expected in area (Allen Lowrey, pers. comm.).
Conospermum scaposum	Priority 3			Erect shrub, 0.2-0.45(-0.75) m high. Fl. blue, Oct to Dec or Jan to Feb. White-grey sand, sandy clay. Low swampy areas, road verges . (DEC FloraBase,

Taxon	Status DEC data	Status EPBC data	Likelihood of Occurrence in survey area	Comments
				January 2012).
Eryngium pinnatifidum subsp. palustre	Priority 3			Erect perennial, herb, 0.15-0.5 m high. Fl. white/blue, Oct to Nov. Clay, sandy clay. Claypans, seasonally wet flats (DEC FloraBase, January 2012).
Hensmania stoniella	Priority 3			Tufted, stilt-rooted perennial, herb, 0.1-0.2 m high. Fl. yellow-cream-white, Sep to Nov. White, grey or lateritic sand, often winter-wet . (DEC FloraBase, January 2012).
Hibbertia helianthemoides	Priority 3		Low	Spreading to erect, low or prostrate shrub, to 0.3 m high. Fl. yellow, Jul or Sep to Oct. Clayey sand over sandstone or loam over quartzite. Hills and scree slopes. (DEC FloraBase, January 2012). Soils/rock type not in survey area
Lasiopetalum lineare	Priority 3		Low to Moderate	Erect, multi-stemmed shrub, 0.2-0.4 m high. Fl. pink-blue-purple, Aug to Nov. White/grey sand. Lateritic breakaways, rises, sandplains. (DEC FloraBase, January 2012). Soils/rock type not in survey area.
Melaleuca clavifolia	Priority 3			Erect shrub, to 1 m high. Fl. pink-purple, Oct to Dec. White-grey sand, brown sandy brown, rgavel, laterite. Flats, slopes, hillsides . (DEC FloraBase, January 2012).
Onychosepalum nodatum	Priority 3			Caespitose grass-like or herb, forming small, many-culmed tussocks. Sand (DEC FloraBase, January 2012).
Schoenus griffinianus	Priority 3		Known to occur in survey area	Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high. Fl. Sep to Oct. White sand (DEC FloraBase, January 2012).
Stylidium torticarpum	Priority 3		Moderate	Caespitose perennial, herb, 0.12-0.27 m high, Leaves tufted, broadly linear, 5-13 cm long. Scape glandular throughout. Inflorescence paniculate. Capsule twisted. Fl. pink, Sep to Nov. Sandy clay and clay loam over laterite. Adjacent to creeklines, depressions, and beneath breakaways. Heath or mallee shrubland. (DEC FloraBase, January 2012).
Synaphea aephynsa	Priority 3		Low	Erect, tufted shrub, to 0.3 m high. Fl. yellow, Jul to Oct. Gravelly laterite, sand over laterite. (DEC FloraBase, January 2012). Soils/rock type not in survey

Taxon	Status DEC data	EPBC data	Likelihood of Occurrence in survey area	Comments
				area.
Banksia chamaephyton	Priority 4		Low	Low, lignotuberous shrub, to 0.4 m high, up to 2 m wide. Fl. cream & brown, Oct to Dec. Grey or white sand over laterite. (DEC FloraBase, January 2012). Soils/rock type appears not to occur in survey area.
Conostephium magnum	Priority 4		Moderate	Erect, compact, many-stemmed shrub, to 2 m high. Fl. pink-purple, Jul to Sep. White-grey sands sometomes associated with laterite gravels. (DEC FloraBase, January 2012).
Thysanotus glaucus	Priority 4		Moderate	Caespitose, glaucose perennial, herb, 0.1-0.2 m high. Fl. purple, Oct to Dec or Jan to Mar. White, grey or yellow sand, sandy gravel. (DEC FloraBase, January 2012).

*For the definition of the rare flora classifications, refer to Appendix 1.

2.3 Wetlands and Wetland Vegetation

Western Australia's wetlands have been defined as 'areas of seasonally intermittently or permanently waterlogged soils or inundated land whether natural or otherwise, fresh or saline, e.g. waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries (Wetland Advisory Committee 1977, quoted in DEC, 2000b).

Management categories for wetlands in Western Australia have been described by the Water and Rivers Commission (DEC, 2000b). They are:

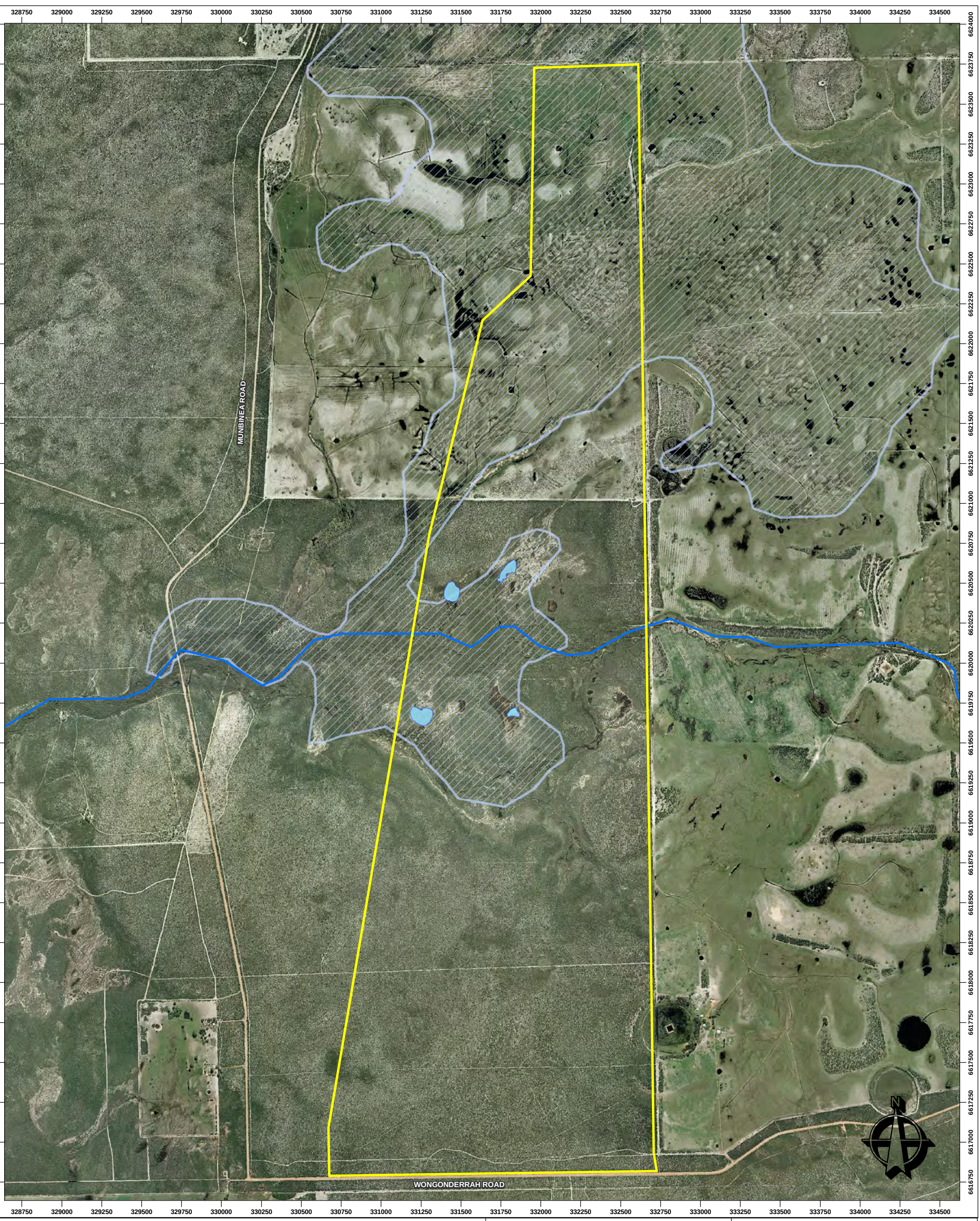
- Conservation wetlands: 95-100% vegetated; management objective of preserving their natural attributes and functions;
- Resource enhancement: 10-94% vegetated; management for restoration and enhancement of natural attributes and functions; and
- Multiple Use: 0-9% vegetated; management for their use and development in the context of water, town and environmental planning.

There are over 9,600 wetlands covering over 25% of the Swan Coastal Plain land area (Balla, 1994). Geomorphic wetlands have been digitally mapped at 1:25,000 for the Swan Coastal Plain as far north as Wedge Island (Hill *et. al*., 1996). More recently, wetland mapping has extended to the Cervantes region, including the Atlas Tenement survey area ('Geomorphic Wetlands Cervantes South 1:25000' (DEC), accessed on 'WetlandBase' on the DEC website at 'http://www.dec.wa.gov.au/', January 2012).

Coastal drainage off the Dandaragan Plateau is seasonal and generally collected in a series of wetlands on the coastal backplain of Bassendean sands. The Nambung River flows westwards through the Atlas Tenement survey area and into the Nambung National Park, where it disappears into a cave system before filtering westward through underground channels and discharging into the Indian Ocean (Lowry, 1974; Department of Conservation and Land Management, 1998).

The 'WetlandBase' shows wetlands mapped on the Nambung River east of Nambung National Park, with wetland areas in the Atlas Tenement survey area (Figure 4). The WetlandBase mapping does not appear to allocate a management category for the Nambung wetlands.

A list of nationally important wetlands in Australia has been compiled by the States and Territories, and the Commonwealth Government of Australia as the Directory of Important Wetlands in Australia (DIWA) (DEC, 2012). The directory used six criterea to identify nationally important wetlands. In the third edition of the directory (released in 2001), 851 nationally important wetland sites around Australia were identified, 120 of which were wetland systems in Western Australia (DEC 2012). A review of the DIWA list showed that no DIWA wetlands occurred in the Atlas Tenement survey area.



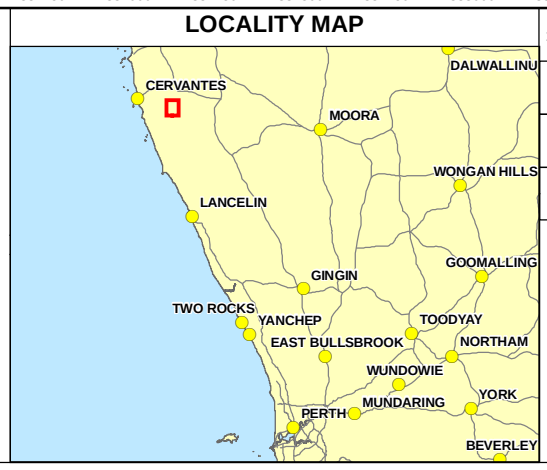
Legend

- Site Boundary
- Nambung Wetlands
- Seasonal Waterbody
- Significant Stream

1 centimetre = 220 meters

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- WETLAND DATA SOURCED FROM WETLANDSBASE 2012
- LOCALITY MAP SOURCED FROM LANDGATE 2006
- HYDROGRAPHY DATA SOURCD FROM D.O.W. 2009

LOCALITY MAP



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0 130 260 520 780 1,040 Metres

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HORIZONTAL DATUM AND PROJECTION			
GDA 1994 MGA Zone 50			
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Level 2 Flora & Vegetation Survey
Surrounding Wetlands
Figure 4

360 environmental

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3 Methods and Limitations

3.1 Survey Timing

The Atlas Tenement flora and vegetation survey was conducted between 29 October and 3f November 2011 and continued between 15 and 21 November 2011.

3.2 Vegetation Survey

3.2.1 Methods of the Vegetation Survey

The vegetation was described and recorded at quadrat, releve ('unbounded' sample sites) and mapping note (abbreviated releves) sites. These sites were selected at locations that were representative of observed variations in the vegetation. Suitable sites for the more detailed quadrats were limited to sites in Good or better condition, where a good suite of species representative of that vegetation type, were present.

Twenty eight (28) 10 metre by 10 metre quadrats (CQ1 to CQ28) were marked out with a field measuring tape between fence dropper stakes driven into the ground at each corner, each fitted with a yellow plastic safety cap. The 10 metre by 10 metre quadrat dimensions were used because a 100m^2 sample area on the Swan Coastal Plain is considered to capture most species in a given plant community.

Each quadrat was photographed. A description of the quadrat location, the habitat, surface soil texture and colour were all recorded and the time since the site was last burnt was estimated. The vegetation structure was described using a modification of Specht's vegetation description table by Aplin (1979; Appendix 2). To obtain more representative data for the overstorey cover, the tree layer(s) cover was estimated over a larger area around the quadrats. The condition of vegetation in the quadrat was described using the Keighery classification outlined in Bush Forever (Department of Environmental Protection, 2000b; see Appendix 3). All plant species occurring in a quadrat were recorded, along with their height, percentage cover and specimen number if collected. Where a plant species was not well known, a specimen was collected and allocated a specimen number

The plant specimens were pressed, dried and identified. The identifications were made by comparison to specimens in the reference and research collections of the Western Australian Herbarium, by the use of keys in various papers and books and by relevant experts on various groups of flora that occur on the Swan Coastal Plain.

The DEC Declared Rare and Priority Flora List (Smith, 2010; definitions in Appendix 1) was consulted as required to confirm the status of plant species in the survey area.

Eighteen (18) releves (CBR1 to CBR16; CCR1 and 2) were also recorded to describe vegetation units. The composition of the releve descriptions was similar to that of the

quadrats, but the area described was 'open' (not a measured 10 m x 10 m space) and not all plant species in the releve area were recorded, but rather the dominant, subdominant and some associated species were recorded. Seven mapping notes (CM1 to CBM7) were recorded.

3.2.2 Wetland Vegetation

The identification and delineation of a wetland is dependent on an areas hydrology, hydric soils and wetland vegetation (Hill et al., 1996). Obligate wetland species are considered reliable wetland indicators (Hill et al., 1996).

The vegetation units recorded in the Atlas Tenement survey area were classified as wetland vegetation if a number of obligate wetland species were present in the units as dominants. Obligate wetland species were considered to be those that only occur in wetland sites and therefore appeared to require wetland conditions for growth.

3.2.3 Limitations of the Vegetation Survey

The cover estimate of each plant species recorded in the quadrats was based on estimating species projected canopy cover. The assumption was made that for most species, canopy cover and projected foliar cover are reasonably similar, or that the difference is less than the level of accuracy of the estimates.

There is a limit to the accuracy of the assignment of the different strata in the vegetation descriptions to structural units (for example, low open woodland, low woodland, low open forest, open shrubland, shrubland etc.). However, descriptive exercises such as that carried out for this report require only a moderate level of accuracy.

3.3 Flora Survey

3.3.1 Flora survey methods

The flora survey was carried out in parallel with the vegetation survey, with records of flora species largely derived from records at quadrat, releve and mapping note sites. Flora species records were also compiled opportunisticly while walking between the vegetation recording sites, while broadly traversing the survey area to map the vegetation units and when conducting general flora searches.

Again, plant species not well known to the field botanists were collected and allocated a specimen number. GPS coordinates were recorded (using a Garmin 60CX hand held GPS unit) whenever it was considered there was a possibility that the plant species may be of special interest.

The collected specimens were processed and subsequently identified as described earlier.

3.3.2 Rare flora searches

No specific grid searches for rare flora were conducted. However, the survey area was broadly traversed while undertaking the vegetation and flora survey and a list of rare flora known to occur in the survey area locality was reviewed prior to the survey. When flora species were observed that were known to be of conservation significance or whose conservation status was uncertain, the location and number of plants in the stand were recorded.

Again, plant species not well known to the field botanists were collected and allocated a specimen number and subsequently processed and identified as described previously.

3.3.3 Limitations of the flora survey

The major limitation of the flora survey was that any such survey is a sampling procedure of a variable environment with plant populations of variable growth habit, life span and flowering season. Some species, including annuals, are only available for collection for part of the year. This means that to locate all species that grow in an area is a substantial task, the success of which is related to the time available and the size and diversity of habitat in the survey. Consequently, it is possible that there are species present in the survey area that were not recorded during this survey as they have only low abundance on the land, or were not flowering at the time of the survey. However, this limitation was mitigated by conducting this survey during mid to late Spring, in a year when late rains meant that many annual species were still present and in some stage of flowering.

Given the limitations of the flora survey, it is likely that this survey recorded more than 85% of the vascular flora in the survey area. That is, while the flora survey was relatively thorough, it was possible that some species occurring in the survey area were not recorded.

3.4 Vegetation and vegetation condition mapping

3.4.1 Vegetation mapping

Vegetation units were recorded at approximately the vegetation association level. The vegetation unit boundaries were drawn on a computer generated aerial photograph while traversing the study area and both interpreting vegetation boundaries from the aerial image and ground truthing interpreted boundaries. Actual vegetation boundary positions were located on the maps using GPS coordinate readings. Orthocorrected aerial photography at 1:5,000 was used.

The vegetation mapping unit descriptions were based on the quadrat, releve and mapping note descriptions.

3.4.2 Vegetation condition mapping

Vegetation condition mapping was undertaken at a broad scale by inferring vegetation condition from a sample point in a vegetation unit, across the full extent of the stand of that unit. Areas of particular disturbance that had a different condition classification to that of the same surrounding vegetation unit, were mapped discretely onto the vegetation unit map.

The vegetation condition was classified according to the Bush Forever classification (Department of Environmental Protection, 2000b; Appendix 3). Where the vegetation condition was assessed as varying between condition classes or where the subjective assessments of different field staff differed across an otherwise fairly uniform area, a vegetation condition range was applied (eg "Excellent to Pristine').

3.5 Analysis of vegetation data and regional significance

A statistical regional analysis of vegetation found in the survey area was not undertaken because of the limited regional data available for comparison.

4 Flora of the Atlas Tenement Survey Area

4.1 Flora list for the survey area

Three hundred and sixteen (316) species of native flowering plants, one native cycad (the Zamia Palm, *Macrozamia fraseri*) and one native conifer (the Sandplain Cypress, *Callitris arenaria*) were recorded in the Atlas tenement survey area. In addition, forty six (46) non-native species (weeds) were recorded. A list of species recorded in the Atlas Tenement survey area is shown in Appendix 4. The list of non-native species in the survey area is comprehensive (for the bushland area), but not exhaustive.

The flowering plant families that were well represented by native species in the survey area were the Myrtaceae (eucalypt family) with thirty four (34) native species (including twelve Melaleuca species), the Proteaceae (Banksia family) with thirty (30) native species, the Asteraceae (daisy family) with twenty four (24) native species, the Cyperaceae (sedge family) with twenty (20) native species and the Fabaceae (pea and Acacia family) with eighteen (18) native species..

The number of native species recorded in the Atlas Tenement survey area was probably a moderate number for the vegetation types in the area and the size of the area surveyed. The *Banksia attenuata-Banksia menziesii* woodlands were quite species rich at the quadrat sample level (mostly between 43 and 51 native taxa per quadrat), but did not vary greatly floristically over the large area they covered (Table 2). The *Banksia prionotes* woodlands were less species rich (28 to 34 native taxa per quadrat). The heaths on the edge of the samphire flats scored between 22 and 37 native species per quadrat. The samphire herbland areas were herb rich at the quadrat level where weed cover was low (between 21 and 41 native taxa per quadrat). Parts of the samphire flats and most of the Melaleuca shrublands along flowlines had very high weed covers and low counts of native species.

4.2 Significant flora recorded in the survey area

4.2.1 Declared Rare Flora (DRF) recorded in the survey area

No Declared Rare Flora were recorded during this survey.

4.2.2 Priority Flora

Eleven Priority species were recorded in the Atlas Tenement survey area during the field survey (determinations for two taxa to be confirmed). The eleven Priority taxa consisted of:

- One Priorty 1 taxon (*Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B));
- Three Priority 2 taxa (*Isopogon panduratus* subsp. *palustris*, *Schoenus badius* and *Stylidium aceratum*);
- Six Priority 3 taxa (*Angianthus micropodioides*, *Conospermum scaposum*, *Hensmania stoniella*, *Melaleuca clavifolia*, *Onychosepalum nodatum* and *Stylidium longitubum*); and
- One Priority 4 taxon (*Banksia platycarpa*) (Figure 5; Appendix 5).

In addition, *Schoenus griffinianus* (P3) while not recorded during this survey, is listed by DEC as being previously reported from this survey area (Table 1, Figure 3).

Table 2: Numbers of Native Plant Taxa Recorded in Quadrats

Quadrat	Veg unit	No Species	Quadrat	Veg unit	Nos Species	Quadrat	Veg unit	Nos Species
CQ1	BaBm	45	CQ11	BtRc	19	CQ21	BaBm	51
CQ2	MrMt	4	CQ12	BtRc	28	CQ22	BtRc	35
CQ3	ErMr	4	CQ13	BaBm	47	CQ23	BaBm	49
CQ4	BaBm	49	CQ14			CQ24		
CQ5	BaBm	51	CQ15	BtRc	22	CQ25	Bp	28
CQ6	BtRc	17	CQ16	MbTi	41	CQ26	MbTi	35
CQ7	BaBm	43	CQ17	MbTi	21	CQ27	BtRc	37
CQ8	BaBm	31	CQ18			CQ28	MbTi	21
CQ9	BtRc	16	CQ19	Bp	36			
CQ10			CQ20	TTiFp	24			

4.2.2.1 *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) P1)

Grevillea thelemanniana subsp. Cooljarloo (B.J. Keighery 28 B) is a low shrub growing to 50 to 60 cm (in the survey area) with dissected leaves.

Grevillea thelemanniana subsp. Cooljarloo (B.J. Keighery 28 B) was recorded in the dampland areas of the Atlas Tenement, in the Melaleuca shrublands along flow areas and in parts of the samphire herbland. Eleven records were made during the survey (Figure 5, Apendix 5), but it was observed to be widely scattered in the dampland areas. There was an existing record of *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) from Nambung National Park approximately 1.4 kilometres west of the survey area.

Grevillea preissii, a related taxa, is known from dryland habitats in the region. As there is no 'key' to assist with the determination of *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) and there was no public access to the Western Australian Herbarium's main collection during this study, it has been necessary to lodge specimens with the Herbarium to confirm the determination.

329000 330000 331000 332000 333000 334000

6624000 6623000 6622000 6621000 6620000 6619000 6618000 6617000

331957, 6623727

332609, 6623753

331935, 6622427

331633, 6622148

331299, 6620806

330667, 6617091

330673, 6616793

332705, 6616934

332725, 6616822

N

Legend

Site Boundary

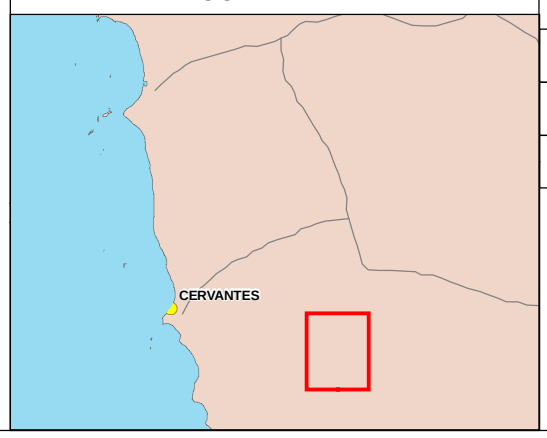
Rare Flora

Name, Status

- Grevillea thelemanniana subsp. Coojarloo (B.J. Keighery 28 B), P1
- Isopogon panduratus subsp. palustris, P2
- Schoenus badius, P2
- Stylidium aceratum, P2
- Angianthus micropodioides, P3
- Conospermum scaposum, P3
- Hensmania stoniella, P3
- Melaleuca clavifolia, P3
- Onychosepalum nodatum, P3
- Stylidium longitubum, P3
- Banksia platycarpa, P4
- Levenhookia preissii, RS
- Microtis alboviridis, RS

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- AERIAL IMAGERY SOURCED FROM GOOGLE EARTH 2011
- LOCALITY MAP SOURCED FROM LANDGATE 2006

LOCALITY MAP



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DRAWING ID	DATE
EBS133_2.05	6/2/2012

HORIZONTAL DATUM AND PROJECTION

GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
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Cervantes

360 environmental

Flora & Vegetation Survey
Significant Flora Recorded During Survey

Figure 5

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4.2.2.2 *Isopogon panduratus* subsp. *palustris* (P2)

Isopogon panduratus subsp. *palustris* (P2) (formerly *Ispopogon* sp. Badgingarra (A.S. George 14200)) is a shrub that was observed to grow to a height of approximately 60 cm to 100 cm. It has olive-green leaves that are incurved and finish with a short, spiny tip (mucro) (Plate 1). The flowers cones are borne in the leaf axils.

Isopogon panduratus subsp. *palustris* was recorded in heaths in depressions and on the margins of the samphire flats in the survey area. It was recorded at eight locations in the survey area (Figure 5, Appendix 5). However, it was noted to commonly occur in the dampland heaths.

Plate 1: *Isopogon panduratus* subsp. *palustris* (P2)

4.2.2.3 *Schoenus badius* (P2)

Schoenus badius is a slender annual, grass-like herb (sedge) that grows to a height of between 5 and 12 cm and that is known to grow in grey sand in moist areas (Paczkowska and Chapman, 2000). It is only known from the Geraldton Sandplains biogeographic region.

Schoenus badius was recorded from one location in the Atlas Tenement survey area, in heath on seasonal dampland (Figure 5, Appendix 5). As this vegetation unit was

widespread in the survey area, it is likely that *Schoenus badius* is scattered in other parts of the survey area heaths.

4.2.2.4 *Stylidium aceratum* (P2)

Stylidium aceratum is a fibrous rooted annual herb that grows to a height of 5 to 9 cm and occurs on sandy soils in swamp heathland (Paczkowska and Chapman, 2000). It is similar to *Stylidium calcaratum* but can be distinguished by the lack of hair at the bend of the style.

Stylidium aceratum was recorded from four dampland locations in the Atlas Tenement survey area (Figure 5, Appendix 5).

4.2.2.5 *Angianthus micropodioides* (P3)

Angianthus micropodioides is a small erect or decumbent annual daisy that grows to a height of 3 to 15 cm (Paczkowska and Chapman, 2000). It has been recorded on saline sandy soils on river edges, saline depressions and claypans.

Angianthus micropodioides was recorded from eight dampland locations in the survey area. However, the identification of *Angianthus* sp. is difficult and the specimen determinations are being reviewed.

4.2.2.6 *Conospermum scaposum* (P3)

Conospermum scaposum (P3) is an erect shrub with upright basal leaves which have a linear, flat blade on a long petiole (Plate 2). It grew to a height of approximately 50 to 60 cm in the survey area. It was flowering at the time of the survey (November). It has small compound heads of small blue flowers (Plate 3).

Conospermum scaposum was recorded at twenty (20) locations in the survey area (Figure 5, Appendix 5), although some of these may be from the same stand, as some of the stands were extensive. It occurred on low sandy rises.

Conospermum scaposum was very abundant at many of the locations where it was recorded and it appeared to respond to disturbance (colonised track verges).

Plate 2: *Conospermum scaposum* (P3)

Plate 3: *Conospermum scaposum* (P3)

4.2.2.7 *Hensmania stoniella* (P3)

Hensmania stoniella is a small herb growing to approximately 20 cm. It has small basal flowers and was flowering at the time of the survey (Plate 4).

Hensmania stoniella was recorded at one location in the survey area (Figure 5, Appendix 5).

4.2.2.8 *Melaleuca clavifolia* (P3)

Melaleuca clavifolia is a small shrub growing to approximately 60 cm with pink flowers. It was flowering at the time of the survey.

Melaleuca clavifolia was recorded at six locations in the survey area (Figure 5, Appendix 5), mostly in *Banksia prionotes* woodland and *Banksia attenuata - Banksia menziesii* woodland. There are a number of similar Melaleuca species growing in the area and it is therefore likely that more *Melaleuca clavifolia* plants occur in the survey area than were recorded.

Plate 4: *Hensmania stoniella* (P3).

4.2.2.9 *Onychosepalum nodatum* (P3)

Onychosepalum nodatum is a grass-like herb. It was growing to approximately 20 cm in the survey area. It has a distribution restricted to the Cervantes region.

Onychosepalum nodatum was recorded at one location in the *Banksia telmatiaea* heaths in the northern part of the bushland part of the survey area (Figure 5, Appendix 5). Since this vegetation unit is extensive in the Atlas Tenement survey area, it is likely that *Onychosepalum nodatum* occurs elsewhere in the survey area.

4.2.2.10 *Stylidium longitubum* (P3)

Stylidium longitubum is an erect annual herb growing to height of only 5 to 12 cm (Plate 5; Paczkowska and Chapman, 2000). It has been recorded growing on sandy clays and clays in seasonal wetlands.

Stylidium longitubum was recorded from four dampland sites in the Atlas Tenement survey area, three of which were herbland sites on the margins of the samphire low shrubland vegetation unit (Figure 5, Appendix 5). It is likely to be scattered throughout this vegetation type.

Plate 5: *Stylidium longitubum* (P3). (Plate sourced from the DEC FloraBase website).

4.2.2.11 *Banksia platycarpa* (P4)

Banksia platycarpa is an erect non-lignotuberous shrub growing to between 0.2 and 1 metre (Plate 6; Paczkowska and Chapman, 2000). It has been recorded on white to grey brown sand, often with gravel and over laterite.

Banksia platycarpa was recorded from two quadrats, both in *Banksia telmatiaea* heaths (Figure 5, Appendix 5). It is likely to occur infrequently in this heath vegetation in the survey area.

Plate 6: *Banksia platycarpa* (P4). (Plate sourced from the DEC FloraBase website).

4.2.3 Other species of regional significance recorded in the survey area

Two plant species recorded in the Atlas Tenement survey area, *Levenhookia preissii* and *Microtis alboviridis*, were considered to have regional significance (Figure 5, Appendix 5).

4.2.3.1 *Levenhookia preissii*

Levenhookia preissii is an annual herb with pink flowers that grows on grey or black, peaty sand in swampy areas (Paczkowska and Chapman, 2000). It is known to occur from the south coast of Western Australia near Albany to just north of Perth.

It was recorded from five locations in the survey area on the margins of damplands (Figure 5, Appendix 5). It appeared to respond well to disturbance with at least three of the records being from tracks or track verges. These records in the Atlas Tenement survey area represent a significant range extension (Allen Lowrie, *pers. comm*.). A voucher specimen will be lodged at the Western Australian Herbarium.

4.2.3.2 *Microtis alboviridis*

Microtis alboviridis is a recently described Mignonette orchid that grows to approximately 30 cm in height. It is endemic to Western Australia and while it occurs over a large area in south-west Western Australia, it is only known to occur only as far north as approximately Gingin (DEC FloraBase website, January 2012).

Microtis alboviridis was recorded at one location in *Melaleuca* shrubland along a flow line (Figure 5, Appendix 5). This recording represents a significant range extension from its currently known northern range limit at approximately Gingin (Andrew Brown, *pers. comm*.). The specimen will be lodged at the Western Australian Herbarium.

4.2.4 Other species of interest recorded in the survey area

Eucalyptus rudis was recorded in one small area of the survey area (vegetation unit ErMr). The Atlas Tenement is at approximately the northern most extent of the range of *Eucalyptus rudis* and at approximately the southern most extent of the range of a related taxa *Eucalyptus camaldulensis* (river red gum). Hybridising of these taxa has been reported in this region of overlap and it is possible that the *Eucalyptus rudis* reported in the survey area was in fact a *Eucalyptus rudis x Eucalyptus camaldulensis* hybrid.

Eryngium pinnatifidum was common in the dampland areas. It was well collected and all specimens had only pinnatifid (dissected) leaves and were not considered to be the Priority form *Eryngium pinnatifidum* subsp. *palustre*.

4.3 Weeds recorded in the survey area

None of the forty six (46) non-native species (weeds) recorded from the survey area were listed as Declared weeds (Agricultural Protection Board, 2011).

5 Vegetation of the Survey Area

5.1 Vegetation description

5.1.1 Introduction to the vegetation descriptions

The vegetation units described are considered to be mostly described at the vegetation association level.

The vegetation unit codes that discriminate the mapped vegetation units are derived from the generic and species names of the more abundant genera or species in the different strata present in each unit (see Table 3). For example, the vegetation unit 'BaBm' has its code derived from the two dominant upper strata species in that unit: 'Ba' (*Banksia attenuata*) and 'Bm' (*Banksia menziesii*).

Table 3: Abbreviations for species names that were used in vegetation unit codes.

Code	Species name	Code	Species name
Al	*Allocasuarina lehmanniana subsp. lehmanniana*	Mb	*Melaleuca brevifolia*
Ba	*Banksia attenuata*	Mco	*Melaleuca concreta*
Bm	*Banksia menziesii*	Mcu	*Melaleuca cuticularis*
Bp	*Banksia prionotes*	Mr	*Melaleuca raphiophylla*
Bt	*Banksia telmatiaea*	Mt	*Melaleuca teretifolia*
Ca	*Callitris arenaria*	Mv	*Melaleuca viminea subsp. viminea*
Er	*Eucalyptus rudis*	Rc	*Regelia ciliata*
Fp	*Frankenia pauciflora*	T	*Tecticornia ?syncarpa*
Ma	*Melaleuca acutifolia*	Ti	*Tecticornia indica subsp. bidens*

5.1.2 Vegetation of the Atlas Tenement survey area

Thirteen vegetation units were described and mapped in the remnant bushland in the Atlas Tenement survey area (Figure 6). These could be grouped into the following five (5) broad groupings:

- Banksia low woodlands on plains and low rises;
- *Banksia telmatiaea-Regelia ciliata* heaths on seasonal damplands;
- Melaleuca shrublands along flowlines and flow areas and on dampland flats;
- Samphire low shrublands; and
- Other vegetation.

Two Banksia woodland units were described in the Atlas Tenement survey area:

- *Banksia attenuata-Banksia menziesii* low woodland and *Banksia prionotes* low woodland. The *Banksia attenuata-Banksia menziesii* low woodlands occurred on white to grey sand plains and low sandy rises and were quite species rich, with approximately 45 to 50 species per quadrat (Table 2 above). They occurred over most of the southern part of the survey area. *Eucalyptus todtiana* was typically scattered through the unit.
- *Banksia prionotes* low woodlands occurred on areas of yellow sand on the plains and low rises and included other calcarious-loving species such as *Calothamnus quadrifidus*. In a number of patches the *Banksia prionotes* woodland was actually a scrub to 2 to 4 metres height, presumeably regrowth after fire.

The *Banksia telmatiaea-Regelia ciliata* heaths on seasonal damplands occurred mostly as an extensive unit on the margins of flowlines and the samphire flats (Figure 6). Smaller patches of *Banksia telmatiaea-Regelia ciliata* heath also occurred in small depressions in the southern part of the survey area. These appeared to be drier and the *Banksia telmatiaea* unit formed scrubs and heaths in these areas. The *Banksia telmatiaea* cover was higher in these apparently drier areas, compared to the lower, wetter heaths on the margins of the samphire flats and flow lines, where the *Regelia ciliata* cover was relatively higher.

The Melaleuca shrublands included *Melaleuca raphiophyla-Melaleuca teretifolia* scrubs in small dampland depressions and *Melaleuca viminea* subsp. *viminea-Melaleuca brevifolia* dominated shrublands along flowlines and on adjacent flats (Figure 6). A *Melaleuca raphiophyla-Melaleuca concreta* scrub unit occurred in a disturbed area of flowline where some drainage works had been undertaken. Another flow area, apparently saltier, had a *Melaleuca acutifolia-Melaleuca cuticularis-Melaleuca brevifolia* shrubland unit growing along it.

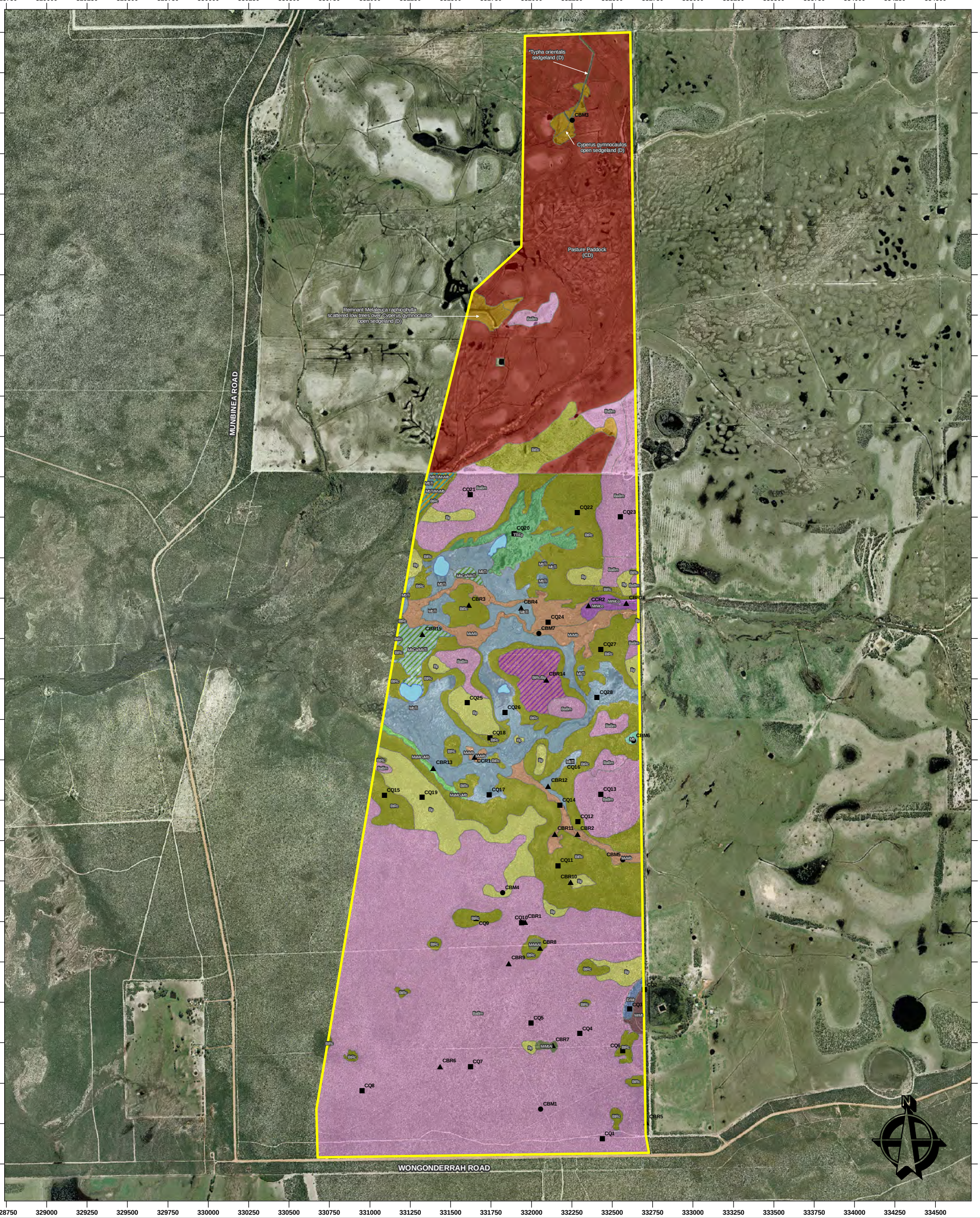
Most of the samphire low shrublands were *Tecticornia indica* subsp. *bidens* low shrublands with scattered *Melaleuca brevifolia* shrubs. Towards the edge of this samphire low shrubland unit and typically adjacent to the heath vegetation, scattered shrubs to low open shrublands of *Melaleuca brevifolia- Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) and *Verticordia plumosa* var. *brachyphylla* grew over low, species-rich herblands. Another Tecticornia low shrubland unit was dominated by *Tecticornia ?syncarpa* and appeared to be a saltier habitat with lower vegetation cover.

Finally, a small area of *Eucalyptus rudis* woodland over *Melaleuca rhaphiophylla* open scrub was mapped on the margins of a small dampland.

The northern part of the survey area was farmland that was almost all Completely Degraded pasture paddock (Figure 6). Much of the farm area still carried the linear pattern of the long, linear mounds that in the past had grown watermelon crops (Mr Cockram, landowner, *pers. comm*.). Areas of grazed remnant *Banksia*

attenuata-Banksia menziesii low woodland and *Regelia ciliata* heath occurred in the south-east corner of the farmland. The only other remnant vegetation consisted of scattered *Melaleuca rhaphiophylla* along degraded flow lines covered in introduced pasture grasses and herbs and some low lying areas of regrowth open sedgelands amongst the pasture grasses and herbs.

Detailed descriptions of the quadrat, releve and mapping note sites referred to in the following sections can be found in Appendices 6 and 7.



Legend

Vegetation Units
- BtRc
- BaBm
- Bp
- ErMr
- MaMcuMb
- Mb
- MbCa
- MbTi
- MrMco
- MrMt
- MrMtAl
- MvMb
- TTiFp

Other Vegetation
- Degraded
- Completely Degraded

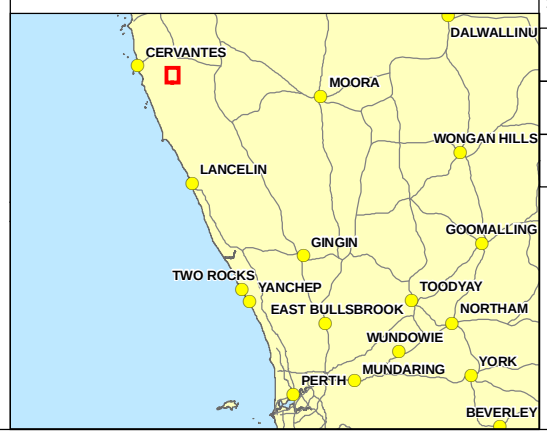
- Site Boundary
- Seasonal Waterbody
- Quadrat
- Releve
- Mapping Note

NB: combination units (e.g. MbCa/MbTi) indicate a patchy mosaic incorporating both of the nominated vegetation units.

1 centimetre = 220 meters

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- RARE/PRIORITY FLORA DATA SOURCED FROM D.E.C. 2011
- LOCALITY MAP SOURCED FROM LANDGATE 2006

LOCALITY MAP



1:22,000 @ A3

0 125 250 500 750 1,000 Metres

DRAWING ID	DATE
EBS133_2.06	25/01/2012

HORIZONTAL DATUM AND PROJECTION

GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
TJ	AH	FD	0

Image Resources Pty. Ltd.
Atlas Mineral Sands Mine Site
Cervantes

Level 2 Flora & Vegetation Survey
Vegetation Units
Figure 6

360 environmental

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Figure 6. Legend: The Atlas Tenement survey area vegetation unit descriptions.

(i) Banksia low woodlands on plains and low rises

BaBm *Banksia attenuata, Banksia menziesii*, (*Eucalyptus todtiana*) low woodland over *Adenanthos cygnorum* subsp. *cygnorum* scattered tall shrubs to high open shrubland (in parts) over a mixed low shrubland including *Eremaea pauciflora* var. *lonchophylla*, *Eremaea asterocarpa* subsp. *asterocarpa*, *Melaleuca seriata*, *Melaleuca systena*, *Hibbertia hypericoides* and *Petrophile rigida* over *Mesomelaena pseudostygia* scattered sedges.

Bp *Banksia prionotes* low woodland over *Acacia spathulifolia* high shrubland over *Calothamnus quadrifidus* subsp. *quadrifidus*, *Scholtzia umbellifera* shrubland over *Hibbertia hypericoides*, *Conospermum stoechadis* subsp. *stoechadis* low shrubland over *Lepidobolus preissianus* scattered sedges.

(ii) *Banksia telmatiaea-Regelia ciliata* heaths on seasonal damplands

BtRc *Banksia telmatiaea*, *Regelia ciliata*, *Hakea obliqua* subsp. *parviflora* dominated scrubs and heaths with a *Melaleuca seriata* low shrub layer with *Callitris arenarea* common in the damper, lower lying areas.

(iii) Melaleuca shrublands along flowlines and flow areas and on dampland flats

MaMcuMb *Melaleuca acutifolia*, *Melaleuca cuticularis*, *Melaleuca brevifolia*, *Melaleuca viminea* subsp. *viminea* closed scrub over *Gahnia trifida* scattered sedges and very open herbland.

Mb *Melaleuca brevifolia* heath over *Calytrix flavescens*, *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B), *Verticordia densiflora* var. *densiflora* scattered low shrubs over open herbland/sedgeland.

MbCa *Melaleuca brevifolia*, *Callitris arenaria* open heath over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Cotula coronopifolia*, **Lotus subbiflorus* herbland/sedgeland/grassland.

MrMco *Melaleuca rhaphiophylla*, *Melaleuca concreta* high open shrubland to closed scrub (patchy) over *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B) scattered low shrubs over *Cyperus gymnocaulos*, *Lepidosperma longitudinale* sedgeland (on edge of banks) and **Lotus subbiflorus*, **Polypogon monspeliensis*, **Hordeum geniculatum* closed herbland/grassland.

MrMt *Melaleuca raphiophylla* low woodland over *Melaleuca teretifolia* open scrub over **Polypogon monspeliensis*, **Cotula coronopifolia* grassland/herbland.

MrMtAl *Allocasuarina lehmanniana* subsp. *lehmanniana* scattered tall shrubs to high open shrubland over *Melaleuca rhaphiophylla*, *Melaleuca teretifolia* open scrub over *Schoenus subfascicularis* open sedgeland.

MvMb *Melaleuca viminea* subsp. *viminea* over *Melaleuca brevifolia* scattered shrubs over *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) scattered low shrubs over **Lotus subbiflorus*, **Juncus bufonius*, *Centrolepis polygyna*, **Monopsis debilis*, **Cotula coronopifolia*, **Crassula glomerata*, *Crassula decumbens* var. *decumbens* herbland/sedgeland.

(iv) Samphire low shrublands

MbTi (*Melaleuca brevifolia* scattered shrubs) over *Tecticornia indica* subsp. *bidens*, (*Lawrencia squamata*) low shrubland over *Angianthus micropodioides*, **Juncus bufonius*, *Quinetia urvillei, Drosera menziesii* subsp. *thysanosepala, Brachyscome pusilla*, *Triglochin* sp. A Flora of Australia (G.J. Keighery 2477) open herbland/sedgeland/grassland.

TTiFp *Tecticornia ?syncarpa*, *Frankenia pauciflora*, *Tecticornia indica* subsp. *bidens* low shrubland over *Angianthus pygmaeus*, *Brachyscome pusilla*, *Isotoma scapigera* low open herbland.

(v) Other vegetation

ErMr *Eucalyptus rudis* open woodland to woodland over *Melaleuca raphiophylla* open scrub over **Ehrarta longiflora*, **Brassica tournefortii* annual grassland/herbland.

(i) Banksia low woodlands on plains low rises

BaBm

Banksia attenuata, *Banksia menziesii*, (*Eucalyptus todtiana*) low woodland over *Adenanthos cygnorum* subsp. *cygnorum* scattered tall shrubs to high open shrubland (in parts) over a mixed low shrubland including *Eremaea pauciflora* var. *lonchophylla*, Eremaea asterocarpa subsp. *asterocarpa*, *Melaleuca seriata*, *Melaleuca systena*, *Hibbertia hypericoides* and *Petrophile rigida* over *Mesomelaena pseudostygia* scattered sedges.

Habitat and soil: Flat plains and low rises of grey sand.

Notes: This vegetation unit was widespread in the survey area and occupied most of the southern part of the survey area (Figure 6). It was recorded at quadrats CQ1, CQ4, CQ5, CQ7, CQ8, CQ13, CQ21 and CQ23 (Plates 7 and 8). *Eucalyptus todtiana* was typically scattered through the unit, although it was very sparse or abscent in some parts. *Banksia ilicifolia* was also sparsely scattered in parts of the unit. This vegetation was quite species rich, with typically 45 to 50 native species (Table 2 above) occurring in a 100 m^2 quadrat. Vegetation condition was generally Excellent to Pristine, with very low numbers of weed species and very low weed cover.

Plate 7: Vegetation unit BaBm at quadrat CQ1.

Plate 8: Vegetation unit BaBm at quadrat CQ8.

Bp

Banksia prionotes low woodland over *Acacia spathulifolia* high shrubland over *Calothamnus quadrifidus* subsp. *quadrifidus*, *Scholtzia umbellifera* shrubland over *Hibbertia hypericoides*, *Conospermum stoechadis* subsp. *stoechadis* low shrubland over *Lepidobolus preissianus* scattered sedges.

Habitat and soil: Flat plain and low rises on yellow sand.

Notes: This vegetation occurred in smaller discrete areas, mostly in the immediate surrounds of the dampland heaths, probably related to underlying limestone. It was recorded at quadrats CQ19 and CQ25 (Plate 9). Parts of the area mapped as this unit were areas of vegetation that were transitional between the Bp and BaBm units, with elements of the BaBm unit present (including *Banksia attenuata* and *Banksia menziesii* in the low tree strata). The Bp vegetation unit was significantly less species rich than the BaBm low woodlands, with the Bp vegetation unit having approximately 30 to 35 native species in a 100 m^2 quadrat (Table 2 above). Vegetation condition was generally Excellent to Pristine, with very low numbers of weed species and very low weed cover.

Plate 9: Vegetation unit Bp at quadrat CQ25.

(ii) *Banksia telmatiaea-Regelia ciliata* heaths on seasonal damplands

BtRc

Banksia telmatiaea, *Regelia ciliata*, *Hakea obliqua* subsp. *parviflora* dominated scrubs and heaths with a *Melaleuca seriata* low shrub layer with *Callitris arenarea* common in the damper, lower lying areas.

Habitat and soil: Very gentle lower slopes adjacent to flats. Grey sands.

Notes: This vegetation unit was recorded at quadrats CQ6 (Plate 10), CQ9, CQ11 (Plate 11), CQ12 (Plate 12), CQ15, CQ18, CQ22 and CQ27. There was a consistent transition from the taller areas of this unit in dryer parts with high covers of *Banksia telmatiaea* to the lower heaths on the lower slopes surrounding the samphire flats where *Regelia ciliata* and *Melaleuca seriata* had high covers and where *Callitris arenaria* and *Banksia nivea* were typically present, along with some dampland herb species (such as *Drosera gigantea*).

Plate 10: Vegetation unit BtRc at quadrat CQ6.

Plate 11: Vegetation unit BtRc at quadrat CQ11.

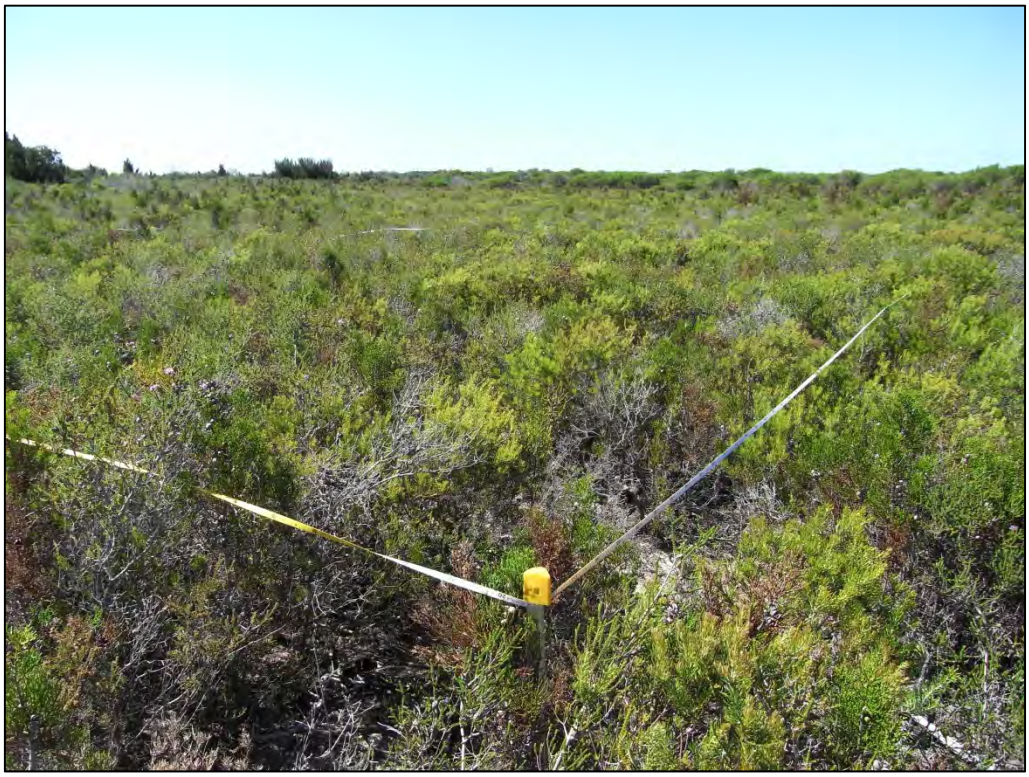


Plate 12: Vegetation unit BtRc at quadrat CQ12.

(iii) Melaleuca shrublands along flowlines and flow areas and on dampland flats

MaMcuMb

Melaleuca acutifolia, *Melaleuca cuticularis*, *Melaleuca brevifolia*, *Melaleuca viminea* subsp. *viminea* closed scrub over *Gahnia trifida* scattered sedges and very open herbland.

Habitat and soil: Flow line (?) along edge of low flats on plain. Light brown clayey sand.

Notes: This vegetation occurred along what appeared to be a flow line (possibly subsurface) and was recorded at releve site CBR13. The presence of *Melaleuca cuticularis* suggests it may be a more saline area. Associated species included *Tecticornia indica* subsp. *bidens*, *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B) and *Lawrencia squamata*.

Mb

Melaleuca brevifolia heath over *Calytrix flavescens*, *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B), *Verticordia densiflora* var. *densiflora* scattered low shrubs over open herbland/sedgeland.

Habitat and soil: Very slight depression on broad plain. Pale brown sand (crusty).

Notes: This was an unusual area of *Melaleuca brevifolia* heath vegetation that was only recorded from one site (CBM6) on the central-eastern side of the bushland part of the survey area. Associated species included *Ptilotus manglesii*, *Austrostipa elegantissima*, *Verticordia pholidophylla* (70cm), *Pimelea imbricata* var. *piligera* and *Burchardia bairdiae*.

MbCa

Melaleuca brevifolia, *Callitris arenaria* open heath over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Cotula coronopifolia*, **Lotus subbiflorus* herbland/sedgeland/grassland.

Habitat and soil: Low areas on broad plain. Grey sand with iron stains.

Notes: This vegetation was described at releve site CBR15 on the western side of the survey area (Plate 13). Associated species included *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B), *Centaurium* sp., **Crassula glomerata*, *Eryngium pinnatifidum* and *Hordeum* sp. The herbland/sedgeland/grassland was primarily made up of weed species and the units vegetation condition was considered to be (?) Good to Very Good. It may have been transitional vegetation occurring between Melaleuca shrublands and the BtRc dampland heath unit.

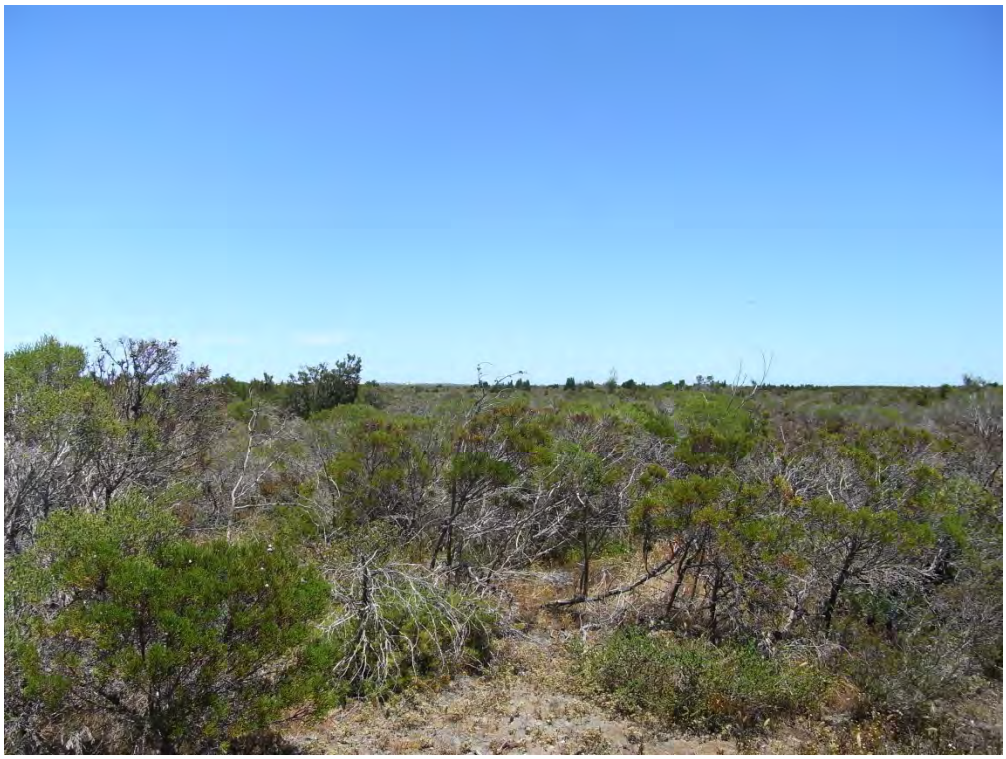


Plate 13: Vegetation unit MbCa recorded at releve CBR15.

MrMco

Melaleuca rhaphiophylla, *Melaleuca concreta* high open shrubland to closed scrub (patchy) over *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B) scattered low shrubs over *Cyperus gymnocaulos*, *Lepidosperma longitudinale* sedgeland (on edge of banks) and **Lotus subbiflorus*, **Polypogon monspeliensis*, **Hordeum geniculatum* closed herbland/grassland.

Habitat and soil: Creek banks. Light brown sand. This vegetation was recorded along a section of flow line which had been excavated in the past to increase drainage.

Notes: This vegetation was described at releve sites CBR16 (Plate 14) and CCR2. The greater inflow of water may have resulted in *Melaleuca rhaphiophylla* becoming dominant along this section of flowline. The flowline disturbance and drainage from the neighbouring farmland had resulted in a closed herbland/grassland of weeds in the unit and its vegetation condition was considered to be good to Degraded.

Plate 14: Vegetation unit MrMco described at releve site CBR16.

MrMt

Melaleuca raphiophylla low woodland over *Melaleuca teretifolia* open scrub over **Polypogon monspeliensis*, **Cotula coronopifolia* grassland/herbland.

Habitat and soil: Flat, low lying dampland. Dark brown clayey sand (saturated).

Notes: This vegetation unit was recorded at quadrat CQ2 in a small dampland depression in the south-east corner of the survey area. Most of the dampland was located on farmland on the eastern side of the fenceline and this would have been the main reason for the infiltration of weeds and the resulting poor vegetation condition (understorey was a grassland/herbland of weeds).

MrMtAl

Allocasuarina lehmanniana subsp. *lehmanniana* scattered tall shrubs to high open shrubland over *Melaleuca rhaphiophylla*, *Melaleuca teretifolia* open scrub over *Schoenus subfascicularis* open sedgeland.

Habitat and soil: Broad depression on very gently undulating plain. Grey-brown sand.

Notes: This vegetation was described at releve CBR8 (Plate 15) and CBR7 (transitional with BtRc scrub). It ocurred in two small dampland areas. It was differentiated from the dampland vegetation unit MrMt by the presence of *Allocasuarina lehmanniana* subsp.

lehmanniana in the upper strata and other associated species (see Appendix 7). However it is difficult to compare the two units because of the poor condition of the MrMt vegetation.

Plate 15: Vegetation unit MrMtAl at releve site CBR8.

MvMb

Melaleuca viminea subsp. *viminea* over *Melaleuca brevifolia* scattered shrubs over *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) scattered low shrubs over **Lotus subbiflorus*, **Juncus bufonius*, *Centrolepis polygyna*, **Monopsis debilis*, **Cotula coronopifolia*, **Crassula glomerata*, *Crassula decumbens* var. *decumbens* herbland/sedgeland.

Habitat and soil: Low lying flat flood banks of narrow shallow flow area. Pale brown sand (saturated).

Notes: This vegetation unit was recorded at quadrats CQ14 and CQ24 and at releves CBR2 and CBR11 (Plates 16). It was recorded along parts of both the flow lines into and through the dampland areas. Associated species included *Melaleuca rhaphiophylla*, *Tecticornia indica* subsp. *bidens*, *Gahnia trifida*, *Eryngium pinnatifidum* and *Samolus junceus*. This vegetation unit typically had a herbland/sedgeland dominated by weed species and was mostly in a Good or Good to Degraded condition.

Plate 16: Vegetation MvMb at releve site CBR11.

(iv) Samphire low shrublands

MbTi

(*Melaleuca brevifolia* scattered shrubs) over *Tecticornia indica* subsp. *bidens*, (*Lawrencia squamata*) low shrubland over *Angianthus micropodioides*, **Juncus bufonius*, *Quinetia urvillei, Drosera menziesii* subsp. *thysanosepala, Brachyscome pusilla*, *Triglochin* sp. A Flora of Australia (G.J. Keighery 2477) open herbland/sedgeland/grassland.

Habitat and soil: Broad, shallow depression on plain. Light brown sand.

Notes: This vegetation was recorded at quadrats CQ17 (Plate 17) and CQ28 (Plate 18). It appeared to commonly have a high weed cover in the herbland/sedgeland strata (releves CBR4, CBR12 and CCR1), especially close to the weedy Melaleuca shrubland flowlines. In the slightly more elevated areas (especially on the margins of the samphire flats), the weed cover was lower and the unit took the form of *Melaleuca brevifolia* scattered shrubs over *Verticordia plumosa* var. *brachyphylla*, *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B), *Melaleuca systena*, *Tecticornia indica* subsp. *bidens* low shrubland over species-rich herblands (recorded at quadrats CQ16 (Plate 19) and CQ26 (Plate 20)).

TTiFp

Tecticornia ?syncarpa, *Frankenia pauciflora*, *Tecticornia indica* subsp. *bidens* low shrubland over *Angianthus pygmaeus*, *Brachyscome pusilla*, *Isotoma scapigera* low open herbland.

Habitat and soil: Samphire flats with microrelief (included very slightly raised areas). Grey clayey sand (moist).

Notes: This vegetation was recorded at quadrat CQ20 in the northern part of the survey area (Plate 21). It generally had less cover than the samphire herbland unit MbTi. It was mostly differentiated by the presence of the dominant *Tecticornia ?syncarpa* and may be a more saline area.

(v) Other vegetation

ErMr

Eucalyptus rudis open woodland to woodland over *Melaleuca raphiophylla* open scrub over **Ehrarta longiflora*, **Brassica tournefortii* annual grassland/herbland.

Habitat and soil: Very gentle slope on margin of wetland. Dry grey sand.

Notes: This vegetation unit covered a small area on the margins of a small dampland in the south-east corner of the survey area. It was described at quadrat CQ3 (near Plate 22). The high weed cover in this area of vegetation reflects its close contact to farmland pasture paddocks (it was adjacent to the weedy unit MrMt).

Plate 17: Samphire low shrubland vegetation unit MbTi, at quadrat CQ17.

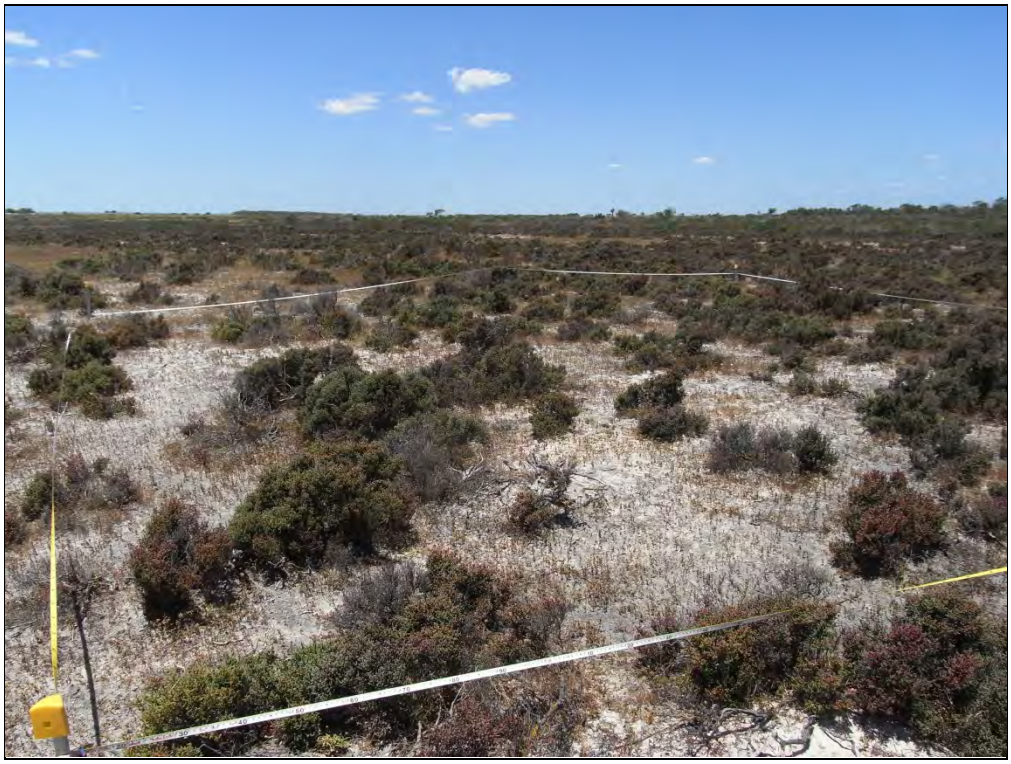


Plate 18: Samphire low shrubland vegetation unit MbTi, at quadrat CQ28.

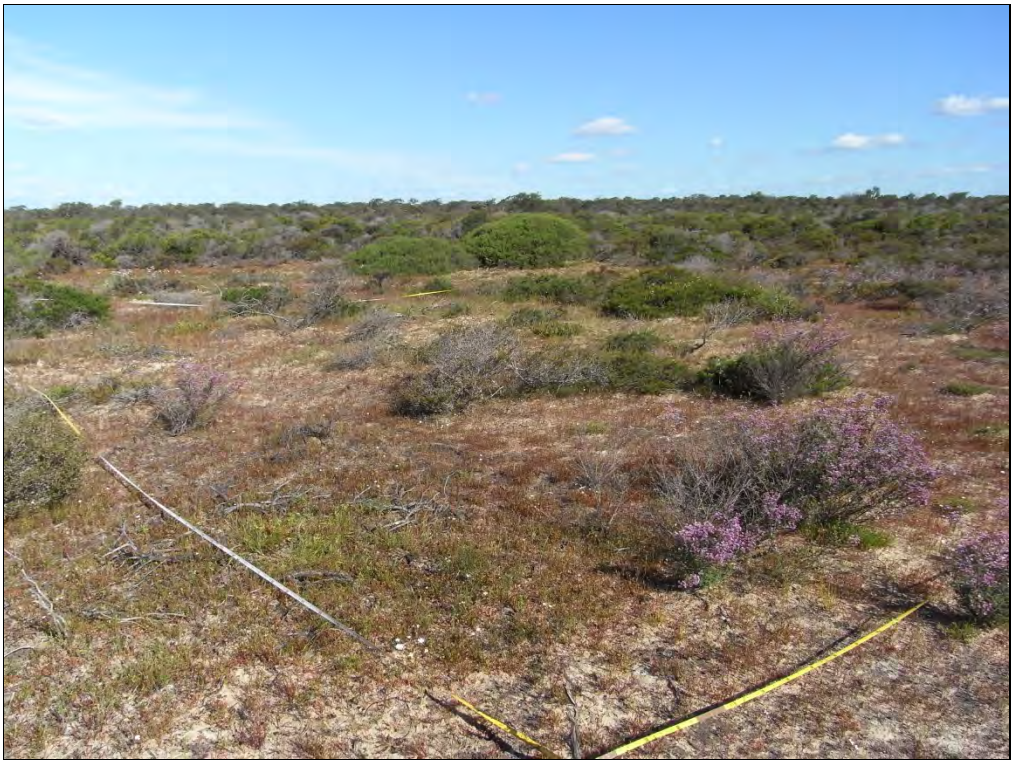


Plate 19: Vegetation unit MbTi at quadrat CQ16, on the edge of the samphire flats.

Plate 20: Vegetation unit MbTi at quadrat CQ26, on the edge of the samphire flats.

Plate 21: Vegetation unit TTiFp at quadrat CQ20

Plate 22: Vegetation unit ErMr near quadrat CQ3.

5.2 Wetland vegetation

The vegetation units described in Section 5.1 above are shown in Table 4 together with their wetland status. Melaleuca shrublands along flow lines and adjacent flats and samphire low shrublands were the main dampland vegetation types. *Banksia telmatiaea-Regelia ciliata* heaths were considered seasonal damplands that flanked the Melaleuca shrublands and samphire flats. These heaths also included many dryland species, especially in the more elevated parts, and the presence of these suggests this is a transitional dampland unit.

5.3 Vegetation condition

5.3.1 Vegetation condition in the survey area

The vegetation condition of large parts of the survey area bushland were in 'Excellent to Pristine' condition (Figure 7). These areas corresponded to the vegetation Banksia low woodland vegetation and the BtRc heaths.

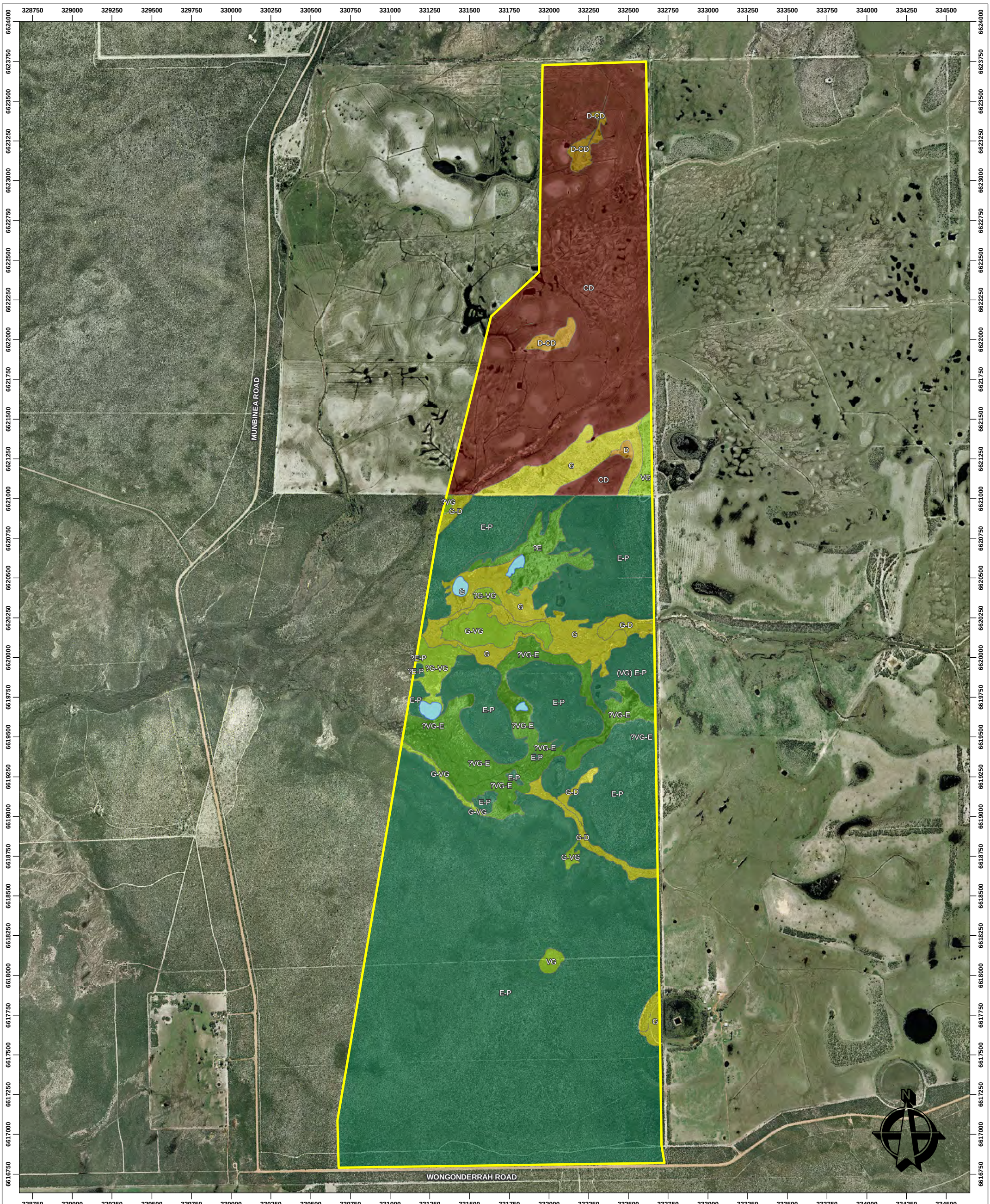
The vegetation condition of the main dampland areas was poorest, with the Melaleuca shrubland flowline areas and adjacent flats generally having high weed cover in the herbland/sedgeland/grassland strata. The Melaleuca shrubland areas visited had high weed cover and a loss of the herbland strata and were rated 'Good to Degraded' or 'Good' (Figure 7; Plate 23). Much of this decline in condition could be attributed to weed invasion from upstream in adjacent cleared farmland and the influx of nutrients from the farmland.

Areas of the samphire low shrublands vegetation also had high weed cover in the herbland/sedgeland/grassland strata (eg. sites CBR4 (Plate 24), CBR12 and CCR1). However, significant areas were in 'Very Good to Excellent' condition with low weed cover and a species-rich herb layer (CQ16, CQ26 and CQ28). Since the extent of the weed invasion of the unit was not known, the condition has been prefaced with a '(?)' to indicate a degree of uncertainty attached to the condition assigned.

Most of the farmland in the survey area was cleared pasture paddocks and was rated 'Completely Degraded' (Figure 7, Plate 25). Areas of dampland where there was some sedge regrowth in the pasture paddocks were rated 'Degraded' (Plate 26). Small areas of uncleared, but grazed, remnant vegetation in the south-east corner of the farmland were rated as having conditions ranging between 'Good' and 'Very Good'.

Table 4. Wetland status of Atlas Tenement survey area vegetation units.

VEGETATION GROUPING	VEGETATION UNIT	WETLAND STATUS	COMMENTS
(i) Banksia low woodlands on low rises	BaBm	Dryland	
	Bp	Dryland	
(ii) *Banksia telmatiaea-Regelia ciliata* heaths on seasonal damplands	BtRc	Seasonal dampland (transitional)	This unit includes what appear to be some areas of fairly dry heath, with dryland species present. More dampland species are present (especially in the herb layer) in the 'downslope' heaths nearest the samphire flats and Melaleuca shrublands.
(iii) Melaleuca shrublands along flowlines and flow areas and on dampland flats	MaMcuMb	Seasonal dampland	
	Mb	Seasonal dampland	Marginal.
	MbCa	Seasonal dampland	
	MrMco	Flowline	
	MrMt	Seasonal dampland	
	MtMtAl	Seasonal dampland	
	MvMb	Flowline and seasonal dampland	
(iv) Samphire low shrublands	MbTi	Seasonal dampland	Samphire flats.
	TTiFp	Seasonal dampland	Samphire flats.
(v) Other vegetation	ErMr	Margins of seasonal dampland	



Legend

Vegetation Condition

- P - Pristine
- E - Excellent
- VG - Very Good
- G - Good
- D - Degraded
- CD - Completely Degraded

- Site Boundary
- Seasonal Waterbody

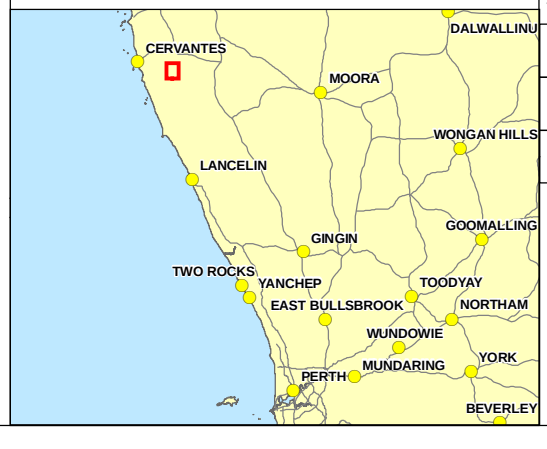
NB: ranges of vegetation condition (e.g. 'G-VG') indicates the vegetation condition in that area varies between the indicated classes.

vegetation conditions that have some uncertainty as to what condition they may be are indicated with a ? (e.g. ?E-P).

1 centimetre = 220 meters

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- RARE/PRIORITY FLORA DATA SOURCED FROM D.E.C. 2011
- LOCALITY MAP SOURCED FROM LANDGATE 2006

LOCALITY MAP



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DRAWING ID	DATE
EBS133_2.07	2/02/2012

HORIZONTAL DATUM AND PROJECTION

GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
TD	AH	FD	0

Image Resources Pty. Ltd.
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Cervantes

Level 2 Flora & Vegetation Survey
Vegetation Condition
Figure 7

K:\Projects\1.0 EBS\EBS133 Cervantes L2 Flora L2 Fauna\Figures\Flora

Plate 23: Melaleuca shrubland vegetation MvMb at quadrat CQ14 with an open herbland/grassland dominated by the weeds *Lotus subbiflorus, *Cotula coronopifolia and *Polypogon monspeliensis.

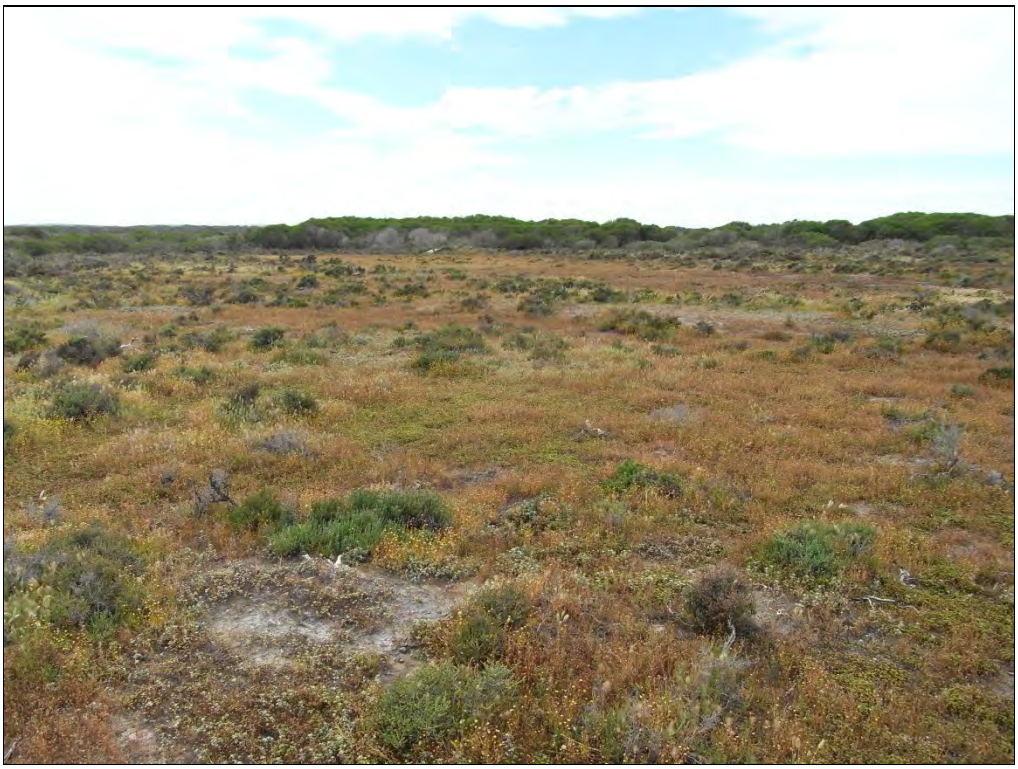


Plate 24: Samphire low open shrubland vegetation MbTi at site BR4, with a herbland/sedgeland/grassland with high weed cover.

Plate 25: Completely degraded pasture paddocks with some scattered remnant *Melaleuca rhaphiophylla*.

Plate 26: Degraded **Typha orientalis* sedgeland (site CBM3) in farm paddocks.

5.3.2 Salt encroachment and land clearing

The clearing of vegetation on farmland in the Nambung River catchment may have raised water tables and may have brought salt from lower in the profile to the soil surface, spreading salinity and expanding the samphire areas (E. A. Griffin, pers. comm.). However, the history of the vegetation in the survey area is not known and so some conjecture is attached to these ideas. The presence of the herblands on the samphire flats suggests a complex hydrology driven by seasonal influxes of fresh water.

Changes in the hydrology of the survey area and its impact on the vegetation has not been taken into account in assessing vegetation condition.

5.3.3 Banksia deaths in the survey area

A number of areas of Banksia deaths were noted in the *Banksia attenuata-Banksia menziesii* low woodlands vegetation unit (Plate 27). While some fire scars were noted on some trees, other dead trees did not appear to have fire scars. Healthy Banksia trees were in the surrounding areas.

Agents such as fire and drought (including falling water tables or salination of water tables) can be responsible for Banksia tree deaths. The deaths and decline of *Banksia* trees may also indicate the presence of the Dieback fungus *Phytophthera cinnamomi*, as well as other pathogens. *Phytophthera cinnamomi* is known to be in the region and it is recommended that a dieback survey by accredited 'dieback interpreters' be undertaken to determine if Dieback is present.

Plate 27: Banksia deaths in an area in the south-eastern part of the survey area.

5.4 *Lomandra hermaphrodita* occurrence: host plants of the Graceful Sun Moth

The Graceful Sun Moth (*Synemon gratiosa*, Family Castniidae) is endemic to Western Australia, and was until recently considered restricted to the Swan Coastal Plain between the Wanneroo area in northern Perth, south to Mandurah (approximately 60 km south of Perth). The Graceful Sun Moth is listed under the *Environment Protection and Biodiversity Conservation Act 1999* and is also currently listed on Schedule 1 (fauna that is rare or is likely to become extinct) of the Western Australian *Wildlife Conservation Act 1950*.

The Graceful Sun Moth is thought to breed exclusively on *Lomandra* species, probably *L. hermaphrodita*. Two known food plants for the Graceful Sun Moth are *Lomandra hermaphrodita* and *L. maritima* (McNamara 2009, sited on Department of Sustainability, Environment, Water, Population and Communities website).

Lomandra hermaphrodita was recorded at eight locations in the survey area, including five of the eight quadrats recorded in the BaBm vegetation unit (Table 5; Figure 8). It appeared to be sparsely scattered in the BaBm vegetation unit (Figure 8).

Lomandra maritima was not recorded in the Atlas Tenement survey area.

Table 5: Lomandra hermaphrodita records from the survey area.

EASTING	NORTHING	NUMBERS	COLLECTN NOS	SITE	MAPPING UNIT
331206	6617655	>10			BaBm
331132	6617472	1			BaBm
332204	6618106	2			MrMtAl
332438	6616905	na	CQ1-18a	CQ1	BaBm
332429	6619035	2	CQ13-10	CQ13	BaBm
331620	6620889	na	CQ21-20	CQ21	BaBm
331997	6617621	3	CQ5-12	CQ5	BaBm
331622	6617351	7	CQ7-10	CQ7	BaBm

329000 330000 331000 332000 333000 334000

6624000 6623000 6622000 6621000 6620000 6619000 6618000 6617000

331957, 6623727

332609, 6623753

331935, 6622427

331633, 6622148

331299, 6620806

330667, 6617091

330673, 6616793

332705, 6616934

332725, 6616822

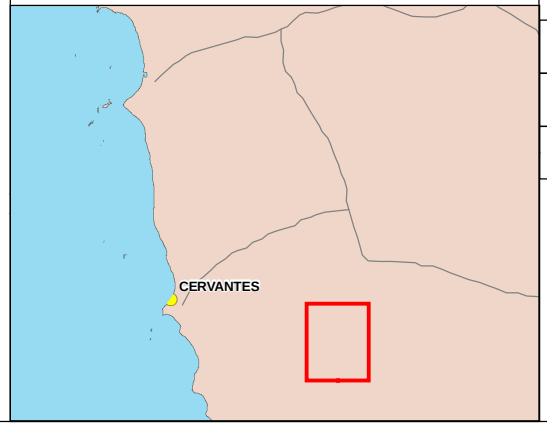
N

Legend

- Site Boundary
- *Lomandra hermaphrodita* Locations

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- AERIAL IMAGERY SOURCED FROM GOOGLE EARTH 2011
- LOCALITY MAP SOURCED FROM LANDGATE 2006

LOCALITY MAP



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0 125 250 500 750 1,000 Meters

DRAWING ID	DATE
EBS133_2.08	2/2/2012

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
TD	AH	FD	0

Image Resources Pty. Ltd.
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Cervantes

360 environmental

Level 2 Flora & Vegetation Survey
Lomandra hermaphrodita Locations

Figure 8

K:\Projects\1.0 EBS\EBS133 Cervantes L2 Flora L2 Fauna\Figures\Flora

6 Flora and vegetation values

6.1 Flora values

Three hundred and eighteen (318) native plant taxa were recorded in the survey area. Considering the size of the bushland part of the survey area (approximately 715 ha), this is probably a moderate number. The number of species was constrained by the limited number of habitats/vegetation types and the fact that several dampland vegetation units were heavily weed infested. While the BaBm vegetation unit was quite species rich (approximately 45 to 50 species per quadrat), it did not vary greatly floristically over the large area of the unit. Other vegetation units such as Bp and the heaths were less species rich. In conclusion, the survey area is considered to have moderate values for species richness.

No Threatened flora species were recorded from the survey area. However, a number of Threatened flora species have a high likelihood of occurring in the survey area, including *Andersonia gracilis*, *Anigozanthos viridis* subsp. *terraspectans* and *Macarthuria keigheryi* (Table 1). The first two taxa are likely to occur in the dampland heaths adjacent to the samphire flats. *Macarthuria keigheryi* may occur in the Banksia woodlands on low plains, but is difficult to find, particularly in fairly long unburnt areas (G. Keighery, *pers. comm*.). This Atlas Tenement survey was a broad scale survey and the taxa referred could be present, but undetected.

Eleven Priority taxa and two other significant taxa (significant because their presence in the Cervantes area means a large extension to their presently known range) were recorded in the bushland part of the Atlas Tenement survey area. In addition, a twelfth Priority taxon, *Schoenus griffinianus* (P3), while not recorded during this survey, has been previously recorded from the survey area (DEC records). Some of these Priority taxa, such as *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) (P1), *Isopogon panduratus* subsp. *palustris* (P2), *Melaleuca clavifolia* and *Onychosepalum nodatum*, have quite a restricted distribution.

It should be noted that an undescribed Eremophila taxa, *Eremophila glabra* subsp. green flowers (E.A. Griffin 5347), currently only known from the Cooljarloo area, is known from dampland margins in the region (Greg Woodman and G Keighery, *pers. comm*.). It occurs sporadically, and can be difficult to locate without intensive searches (Greg Woodman, *pers. comm*.). At this point the species is not considered to be specially protected or a Priority species.

Therefore, it is concluded that flora values for rareness in the survey area are in the range of moderate to high.

6.2 Vegetation values

6.2.1 Introduction

A detailed regional vegetation data set could not be acquired for an analysis of regional significance. Therefore, the major vegetation groups occurring in the survey area are considered below, against available information on their distribution and variation in the region.

6.2.2 Assessment of values of vegetation groups

6.2.2.1 Banksia woodlands

The Bassendean Dune System stretches discontinuously along the whole Swan Coastal Plain from Jurien Bay to Busselton (Lowry, 1974; McArthur and Bettenay, 1960). From the Cervantes area south to Perth, the Bassendean Dune System takes the form of a broad belt of between 10 to 20 km width. Much of this area was mapped by Beard (1981) as having Banksia low woodland, dominated by *Banksia attenuata, Banksia menziesii*, *Banksia illicifolia*, *Eucalyptus todtiana* and *Nuytsia floribunda*, with a dense understory of sclerophyll shrubs. Beard (1979) noted variation in the understory of the *Banksia attenuata-Banksia menziesii* low woodlands between Hill River near Jurien Bay and Regan's Ford to the south.

The Banksia low woodland in the Atlas Tenement is near the northern most extent of the Bassendean System Banksia woodlands. However, overall the unit appears, at present, to be widespread and was observed, during the survey to extend a considerable distance along Wongonderrah Road eastward from Munbinea Road.

Elkington (1986) described Banksia low woodland as one of six vegetation associations in a Cooljarloo study area (on the west side of the Brand Highway and south-east of the Atlas Tenement). Elkington's Banksia low woodland unit had *Banksia attenuata*, *Banksia menziesii* and *Banksia prionotes* as common tree species with a wide distribution, with *Banksia prionotes* well represented along the eastern edge of the survey area. Griffin's (1993) analysis of more than 2500 vegetation sites on the northern sandplains produced a *Banksia attenuata-Banksia menziesii* group at the 20-group level with many sites mostly distributed along the Bassendean Dune System between Jurien Bay and Ellenbrook.

Although the vegetation of Nambung National Park 'has not been documented in any detail' (DEC, 1998), Banksia low woodland has been noted by DEC to occur in the National Park.

Overall, the Banksia low woodlands in the survey area appears to currently have a wide distribution along the Bassendean Dune System unit, although their reservation status on the northern part of the Swan Coastal Plain is not known and there is some floristic variation within this broad vegetation grouping. They would therefore be considered to have moderate values for vegetation rareness.

6.2.2.2 *Banksia telmatiaea* heath vegetation

Beard (1981) noted that on the Bassendean Dunes unit, the lows in the topography north of the Moore River were typically underlain by a calcareous hardpan and were vegetated by heath communities. Elsewhere he noted also that the heath on swampy patches varies locally and that the whole was a mosaic that needed further study (Beard 1979).

Of the six vegetation associations that Elkington (1986) described for his Cooljarloo study area, one was 'Wetland heath' which was characteristic of lower lying areas and winter wet depressions and grew to 0.5 to 2.0 metres in height. Species common to this vegetation type included *Banksia telmatiaea*. Wege *et al*. (1993) reviewed Elkington's and another study in the Cooljarloo area and noted that the wetland communities are known to be extremely variable.

Publicly available information is insufficient to make an informed comment regarding the distribution and rarity of the *Banksia telmatiaea* heath vegetation. Further investigation of the literature (much of which is not available publicly) is required.

6.2.2.3 Melaleuca shrublands

The Melaleuca shrublands in the survey area had some variable composition (see Section 5.0 above) but were largely dominated by *Melaleuca viminea* subsp. *viminea* and *Melaleuca brevifolia*, with *Melaleuca rhaphiophylla* dominant in parts. It should be noted that the Atlas Tenement survey area was at the northern limits of the range of a number of Melaleuca species recorded, including *Melaleuca teretifolia* and *Melaleuca cuticularis*.

The Melaleuca shrublands typically had a very high weed cover in the herbland/sedgeland/grassland layer, no doubt mostly due to the surface flows of water from cleared pasture paddocks to the north and south. The loss of the herbland/sedgeland/grassland strata in the areas of this unit visited during the survey, led to the assessment of its vegetation condition as either Good or 'Good to Degraded'. The poorer condition of the Melaleuca dampland shrublands in the survey area somewhat diminishes their conservation values.

The Melaleuca shrublands probably have low to moderate conservation value base on the this survey.

6.2.2.4 Samphire low shrublands

The samphire low shrublands on the dampland flats in the survey area are in a habitat with an apparently complex hydrology. The salt distribution and concentrations are not known and these may change seasonally with influxes of fresh water. Certainly the rich herblands present in parts of these flats suggest atleast some profile with lower salt levels.

Elleanor Bennett (pers. comm.) reported sampling a similar suite of herbs on low flats adjacent to lakes just south of Jurien Bay and also in similar habitats in a small regional survey she conducted in the Jurien Bar area.

The samphire flats, along with the Melaleuca shrubland areas, were where the restricted taxa *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) (P1) was scattered. Some Threatened taxa are also associated with the margins of these damplands, an association that raises the conservation values of this vegetation type.

Further investigation of the literature (much of which is not publicly available) is required to be able to make more definitive findings on their values.

6.2.3 Conclusions on vegetation values

In conclusion, the Banksia low woodland vegetation in the survey area is considered to have moderate vegetation conservation values because of the wide distribution of *Banksia attenuata-Banksia menziesii* low woodlands and *Banksia prionotes* low woodlands on the northern Swan Coastal Plain. However, the association of *Macarthuria keigheryi* with this vegetation type in this region should be considered.

The Melaleuca shrublands are considered to have low to moderate conservation value because of their lesser vegetation condition due to the widespread high weed cover in their herbland/sedgeland/grassland strata. However, the restricted taxa *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) (P1) is scattered in this vegetation type.

Limited information on the samphire low shrublands and the *Banksia telmatiaea* heath vegetation has been found in the time available for the survey reporting and further investigation of the literature is required to finalise the assessment of their values.

6.3 Other flora and vegetation values

6.3.1 Linkages

The Atlas Tenement survey area lies a few kilometres east of Nambung National Park. As such, the area does have important linkage values. Presently land to the north and east of the survey area, on the north side of Wongonderrah Road, is cleared farmland. Bushland south of the survey area, south of Wongonderrah Road, extends to the east along Wongondaerrah Road.

6.3.2 Vegetation associated with creeklines and associated wetands

The wetlands in the Atlas Tenement survey area are part of the Nambung River system. The wetlands extend to the west beyond the survey area before the Nambung River continues a short distance west into Nambung National Park and subterrainean channels.

7 Conclusions and Recommendations

7.1 Conclusion

No Declared Rare Flora were recorded during this survey. Eleven Priority species were recorded in the Atlas Tenement survey area during the field survey (determinations for two taxa to be confirmed). The eleven Priority taxa consisted of:

- One Priorty 1 taxon (*Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B));
- Three Priority 2 taxa (*Isopogon panduratus* subsp. *palustris*, *Schoenus badius* and *Stylidium aceratum*);
- Six Priority 3 taxa (*Angianthus micropodioides*, *Conospermum scaposum*, *Hensmania stoniella*, *Melaleuca clavifolia*, *Onychosepalum nodatum* and *Stylidium longitubum*); and
- One Priority 4 taxon (*Banksia platycarpa*) (Figure 5; Appendix 5).

Schoenus griffinianus (P3) wase not recorded during this survey, however it is listed by DEC as being previously reported from the survey area.

It was concluded that flora values for rareness in the survey area are probably in the range of moderate to high, taking into consideration a number of Threatened taxa that are considered to have a high likelihood of occurring there, but which were not recorded during the survey.

7.2 Recommendations

Publicly available information is insufficient to make an informed comment regarding the distribution and rarity of the *Banksia telmatiaea* heath vegetation. Further investigation of the literature (much of which is not available publicly) is required.

The *Banksia telmatiaea* heath vegetation may be variable over its range on the Bassendean Dune System and both the heaths and the samphire herblands are associated with Threatened flora. An assessment of their values could not be finalised within the scope of this survey. Consultation with DEC is recommended regarding these communities.

A number of areas of Banksia deaths were noted in the *Banksia attenuata-Banksia menziesii* low woodlands vegetation unit. While some fire scars were noted on some trees, others did not appear to have been burnt. Dieback (caused by *Phytophthorra cinnamomi* infection) and changing water tables may be associated with the deaths. A dieback survey by accredited 'dieback interpreters' is recommended.

The DEC has mapped a wetland area within the Atlas Tenement survey area (Figure 4). Liaison the the DEC regarding the management category for this wetland is recommended. It is also important to consider any issues that may arise from disrupting the wetland water linkages when designing the mine and supporting infrastructure.

Lomandra hermaphrodita, a foodplant of the listed Graceful Sun Moth, was recorded at eight locations in the survey area and appeared to be sparsely scattered in the *Banksia attenuata-Banksia menziesii* low woodlands (Figure 8). As *Lomandra hermaphrodita* is present it is recommended a Graceful Sun Moth survey be undertaken.

8 Acknowledgements

Quadrats were recorded by Brian Morgan and Chris Hancock.

Plant identifications were undertaken principally by Brian Morgan, Ellenor Bennett and Chris Hancock. Andrew Brown identified the orchid specimens, Allen Lowrey identified most of the Drosera and Stylidium specimens, Frank Obbens identified the Calandrinia specimens and Mike Hislop and Rob Davis (Western Australian Herbarium) helped with the Leucopogon and Ptilotus groups respectively.

Mr Ted Griffin provided some information on his studies in the region during the 1990's.

The GIS mapping was undertaken by Terri Jones and Tim Donohue from 360 Environmental Pty Ltd.

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It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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APPENDIX ONE

The Department of Environment and Conservation Declared Rare Flora and Priority Flora Categories (from Smith, 2010)

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.

Declared Rare Flora - Presumed Extinct Flora

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.

Priority One - Poorly Known Taxa.

Taxa which are known from one or a few (generally < 5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

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 (ie. not currently endangered). Such taxa are under consideration for declaration as "rare flora", but are in urgent need of further survey.

Priority Three - Poorly Known Taxa.

Taxa which are known from several populations, and the taxa are not believed to under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally > 5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further study.

Priority Four - Rare Taxa.

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

APPENDIX TWO

Vegetation structural table of Trudgen based on Aplin's (1979) modification of Specht's classification

LIFE FORM AND HEIGHT OF TALLEST STRATUM	PROJECTIVE FOLIAGE COVER OF TALLEST STRATUM AS %	DESCRIPTION
Trees over 30 metres	70-100 30-70 10-30 2-10 Under 2	High closed forest High open forest High woodland High open woodland Scattered tall trees
Trees 10 - 30 metres	70-100 30-70 10-30 2-10 Under 2	Closed forest Open forest Woodland Open woodland Scattered trees
Trees under 10 metres	70-100 30-70 10-30 2-10 Under 2	Low closed forest Low open forest Low woodland Low open woodland Scattered low trees
Shrubs over 2 metres	70-100 30-70 10-30 2-10 Under 2	Closed scrub Open scrub High shrubland High open shrubland Scattered tall shrubs
Shrubs 1 - 2 metres	70-100 30-70 10-30 2-10 Under 2	Closed heath Open heath Shrubland Open shrubland Scattered shrubs
Shrubs under 1 metre	70-100 30-70 10-30 2-10 Under 2	low closed heath low open heath low shrubland Low open shrubland Low scattered shrubs
Herbs/Sedges/Grasses	70-100 30-70 10-30 2-10 Under 2	Closed herb, sedge, grassland Herb, sedge, grassland Open herb, sedge, grassland Very open herb, sedge, g'land Scattered herbs sedges, grasses
Grasslands then divide into: • Tussock grasslands (perennial tussock species, e.g. Eragrostis species); • Hummock grasslands (Triodia and Plectrachne species that form hummocks); • Curly spinifex grassland (Plectrachne pungens, which does not form hummocks) (follows J.S. Beard); and • Annual tussock grassland (e.g. annual Sorghum species).		

APPENDIX THREE

Vegetation Condition Scale and Descriptions

(from Keighery 1994, reproduced in Department of Environmental Protection 2000b)

Pristine (1): Pristine or nearly so, no obvious signs of disturbance

Excellent (2): Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.

Very Good (3): 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.

Good (4): Vegetation structure significantly altered by very obvious signs of multiple disturbance. 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.

Degraded (5): Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

Completely Degraded (6): 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.

APPENDIX FOUR

Flora list for the Atlas Tenement survey area

Notes:

1. Plant families are listed in alphabetical order within plant kingdom Divisions.

2. An asterisk (*) beside the taxon name indicates an introduced species exotic to Western Australia (weed).

3. The 'status' column shows the conservation status of significant flora species on the list. DRF = Declared Rare Flora; P1 to P4 = Priority 1 to Priority 4 (see definitions in Appendix 1); RS = other regionally significant flora.

FAMILY	SPECIES	COMMON NAMES	PRIORITY STATUS
GYMNOSPERMAE			
Class Cycadopsida (Cycads)			
Zamiaceae	*Macrozamia fraseri*		
Class Pinopsida (Conifers)			
Cupressaceae	*Callitris arenaria*		
ANGIOSPERMAE (Flowering Plants)			
Aizoaceae	**Carpobrotus edulis*		
	Carpobrotus virescens		
Amaranthaceae	*Ptilotus humilis subsp. humilis*		
	Ptilotus manglesii		
	Ptilotus polystachyus		
Apiaceae	*Actinotus leucocephalus*		
	Apium prostratum var. prostratum		
	Daucus glochidiatus		
	Eryngium pinnatifidum		
	Platysace xerophila		
	Xanthosia huegelii		
Araliaceae	*Hydrocotyle alata*		
	Trachymene coerulea subsp. coerulea		
	Trachymene pilosa		
Asparagaceae	*Laxmannia sp.*		
	Lomandra caespitosa		
	Lomandra hermaphrodita		
	Lomandra preissii		
	Lomandra sp.		
	Thysanotus asper		
	Thysanotus manglesianus		

	Thysanotus multiflorus		
	Thysanotus sparteus		
	Thysanotus thyrsoideus		
Asphodelaceae	**Asphodelus fistulosus*		
Asteraceae	*Angianthus micropodioides*		P3
	Angianthus preissianus		
	Angianthus pygmaeus		
	**Arctotheca calendula*	Capeweed	
	Asteridea pulverulenta		
	Brachyscome bellidioides		
	Brachyscome iberidifolia		
	Brachyscome pusilla		
	**Cotula coronopifolia*		
	Cotula cotuloides		
	Euchiton sphaericus		
	Gnephosis drummondii		
	**Hypochaeris glabra*		
	Lagenophora huegelii		
	Olearia axillaris		
	Olearia rudis		
	Podolepis capillaris		
	Podolepis gracilis		
	Podotheca angustifolia		
	Podotheca chrysantha		
	Podotheca gnaphalioides		
	Pogonolepis stricta		
	Pterochaeta paniculata		
	Quinetia urvillei		
	Senecio pinnatifolius var. latilobus		
	Siloxerus humifusus		
	**Sonchus asper*		
	**Sonchus oleraceus*		
	**Ursinia anthemoides*		
	**Vellereophyton dealbatum*		
	Waitzia suaveolens var. suaveolens		
Brassicaceae	**Brassica tournefortii*		
	**Heliophila pusilla*		
	Stenopetalum robustum		

Byblidaceae	*Byblis lamellata*		
Campanulaceae	*Isotoma hypocrateriformis*		
	Isotoma scapigera		
	Lobelia heterophylla		
	**Monopsis debilis*		
	**Wahlenbergia capensis*		
	Wahlenbergia preissii		
Caryophyllaceae	**Cerastium glomeratum*		
	**Polycarpon tetraphyllum*		
	Spergularia sp.		
Casuarinaceae	*Allocasuarina humilis*		
	Allocasuarina lehmanniana subsp. lehmanniana		
Celastraceae	*Stackhousia monogyna*		
	Tripterococcus brunonis		
Centrolepidaceae	*Aphelia cyperoides*		
	Centrolepis aristata		
	Centrolepis drummondiana		
	Centrolepis mutica		
	Centrolepis polygyna		
Chenopodiaceae	*Dysphania plantaginella*		
	Rhagodia baccata subsp. baccata		
	Tecticornia halocnemoides		
	Tecticornia indica subsp. bidens		
	Tecticornia syncarpa		
Colchicaceae	*Burchardia bairdiae*		
	Burchardia congesta		
	Wurmbea dioica		
Convolvulaceae	*Wilsonia humilis*		
Crassulaceae	*Crassula colorata var. acuminata*		
	Crassula colorata var. colorata		
	Crassula decumbens var. decumbens		
	**Crassula glomerata*		
	**Crassula natans var. minus*		
Cyperaceae	*Baumea juncea*		
	Bolboschoenus caldwellii		

	Caustis dioica		
	Cyperus gymnocaulos		
	**Cyperus tenellus*		
	Gahnia trifida		
	Isolepis cernua var. setiformis		
	**Isolepis marginata*		
	Lepidosperma longitudinale		
	Lepidosperma scabrum		
	Lepidosperma sp.		
	Lepidosperma squamatum complex		
	Mesomelaena pseudostygia		
	Schoenus badius		P2
	Schoenus brevisetis		
	Schoenus clandestinus		
	Schoenus curvifolius		
	Schoenus grandiflorus		
	Schoenus pleiostemoneus		
	Schoenus plumosus		
	Schoenus subfascicularis		
	Tricostularia neesii var. neesii		
Dasypogonaceae	*Dasypogon obliquifolius*		
	Kingia australis		
Dilleniaceae	*Hibbertia aurea*		
	Hibbertia hypericoides		
	Hibbertia sp. Gnangara (J.R. Wheeler 2329)		
	Hibbertia stellaris		
	Hibbertia subvaginata		
Droseraceae	*Drosera closterostigma*		
	Drosera erythrorhiza		
	Drosera erythrorhiza subsp. magna		
	Drosera gigantea subsp. gigantea		
	Drosera humilis		
	Drosera menziesii subsp. penicillaris		
	Drosera menziesii subsp. thysanosepala		

	Drosera parvula		
Ericaceae	*Andersonia heterophylla*		
	Astroloma glaucescens		
	Conostephium pendulum		
	Leucopogon conostephioides		
	Leucopogon planifolius		
	Leucopogon propinquus		
	Leucopogon sp. Coujinup (M.A. Burgman 1085)		
	Leucopogon sp. Lesueur (B. Evans 530)		
	Leucopogon sprengelioides		
	Lysinema pentapetalum		
Fabiaceae	*Acacia cyclops*		
	Acacia lasiocarpa var. lasiocarpa		
	Acacia pulchella		
	Acacia saligna		
	Acacia sessilis		
	Acacia spathulifolia		
	Acacia stenoptera		
	Bossiaea eriocarpa		
	Daviesia angulata		
	Daviesia decurrens subsp. decurrens		
	Daviesia divaricata subsp. divaricata		
	Daviesia incrassata subsp. incrassata		
	Gompholobium tomentosum		
	Jacksonia floribunda		
	Jacksonia hakeoides		
	Jacksonia nutans		
	Jacksonia sternbergiana		
	**Lotus subbiflorus*		
	**Ornithopus pinnatus*		
	**Trifolium arvense*		
	Viminaria juncea		
Frankeniaceae	*Frankenia pauciflora*		
Gentianaceae	*Centaurium spicatum*		

	**Centaurium tenuiflorum*		
Geraniaceae	**Erodium cicutarium*		
	Geranium solanderi		
	Pelargonium littorale subsp. littorale		
Goodeniaceae	*Dampiera linearis*		
	Goodenia coerulea		
	Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)		
	Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)		
	Lechenaultia floribunda		
	Lechenaultia linarioides		
	Lechenaultia stenosepala		
	Scaevola phlebopetala		
	Velleia trinervis		
Gyrostemonaceae	*Gyrostemon subnudus*		
Haemodoraceae	*Anigozanthos humilis subsp. humilis*		
	Anigozanthos pulcherrimus		
	Blancoa canescens		
	Conostylis aculeata subsp. breviflora		
	Conostylis aurea		
	Conostylis candicans subsp. candicans		
	Conostylis festucacea subsp. festucacea		
	Conostylis juncea		
	Conostylis teretifolia subsp. teretifolia		
	Haemodorum spicatum		
	Phlebocarya ciliata		
	Phlebocarya filifolia		
	Tribonanthes brachypetala		
Hemerocallidaceae	*Arnocrinum preissii*		
	Corynotheca micrantha		
	Hensmania stoniella		P2

	Tricoryne elatior		
Iridaceae	*Patersonia occidentalis*		
Juncaceae	**Juncus bufonius*		
	**Juncus capitatus*		
	Juncus pallidus		
Juncaginaceae	*Triglochin centrocarpa*		
	Triglochin minutissima		
	Triglochin mucronata		
	Triglochin nana		
	Triglochin sp. A Flora of Australia (G.J. Keighery 2477)		
Lamiaceae	*Hemiandra linearis*		
	Pityrodia bartlingii		
Lauraceae	*Cassytha flava*		
	Cassytha racemosa		
Lentibulariaceae	*Utricularia multifida*		
	Utricularia tenella		
Loganiaceae	*Phyllangium paradoxum*		
Loranthaceae	*Nuytsia floribunda*		
Lythraceae	**Lythrum hyssopifolia*		
Malvaceae	*Lawrencia squamata*		
Menyanthaceae	*Liparophyllum*		
	capitatum		
Molluginaceae	*Macarthuria apetala*		
	Macarthuria australis		
Myrtaceae	*Astartea scoparia*		
	Baeckea grandiflora		
	Calothamnus quadrifidus subsp. quadrifidus		
	Calytrix depressa		
	Calytrix flavescens		
	Calytrix fraseri		
	Calytrix leschenaultii		
	Calytrix sapphirina		
	Eremaea asterocarpa subsp. asterocarpa		
	Eremaea beaufortioides var. beaufortioides		
	Eremaea pauciflora var. lonchophylla		

	Eucalyptus rudis	Flooded gum	
	Eucalyptus todtiana	Prickly bark	
	Hypocalymma aff. xanthopetalum		
	Leptospermum spinescens		
	Melaleuca acutifolia		
	Melaleuca brevifolia		
	Melaleuca clavifolia		P3
	Melaleuca concreta		
	Melaleuca cuticularis		
	Melaleuca leuropoma		
	Melaleuca preissiana		
	Melaleuca rhaphiophylla		
	Melaleuca seriata		
	Melaleuca systena		
	Melaleuca teretifolia		
	Melaleuca viminea subsp. viminea		
	Regelia ciliata		
	Scholtzia umbellifera		
	Verticordia densiflora		
	Verticordia densiflora var. cespitosa		
	Verticordia densiflora var. densiflora		
	Verticordia pholidophylla		
	Verticordia plumosa var. brachyphylla		
Onagraceae	*Epilobium hirtigerum*		
Orchidaceae	*Caladenia flava subsp. flava*		
	Caladenia longicauda subsp. borealis		
	Caladenia nobilis		
	Eriochilus dilatatus subsp. multiflorus		
	Microtis alboviridis ms		RS
	Microtis media		
	Prasophyllum gracile		
	Pterostylis aff. vittata		
	Pyrorchis nigricans		

Orobanchaceae	**Orobanche minor*		
Philydraceae	*Philydrella pygmaea subsp. pygmaea*		
Phyllanthaceae	*Phyllanthus calycinus*		
	Poranthera microphylla		
Poaceae	**Aira cupaniana*		
	Amphipogon turbinatus		
	Austrodanthonia occidentalis		
	Austrostipa compressa		
	Austrostipa elegantissima		
	**Briza maxima*	Blowfly grass	
	**Briza minor*		
	**Bromus diandrus*		
	**Bromus hordeaceus*		
	**Ehrharta calycina*	Perennial veldt grass	
	**Ehrharta longiflora*	Annual veldt grass	
	**Hainardia cylindrica*		
	**Hordeum geniculatum*	Mediterranean barley grass	
	**Lolium perenne*	perennial rye grass	
	**Lolium temulentum*		
	Microlaena stipoides		
	Neurachne alopecuroidea		
	**Polypogon monspeliensis*	Annual beardgrass	
	Sporobolus virginicus		
	**Vulpia bromoides*	silver grass	
	**Vulpia muralis*		
Polygalaceae	*Comesperma integerrimum*		
	Comesperma volubile		
Portulacaceae	*Calandrinia corrigioloides*		
	Calandrinia granulifera		
	Calandrinia liniflora		
	Calandrinia sp. Kenwick (G.J. Keighery 10905)		
Primulaceae	**Lysimachia arvensis*	formerly Anagallis arvensis	
	Samolus junceus		
	Samolus repens var. paucifolius		

Proteaceae	*Adenanthos cygnorum subsp. cygnorum*		
	Banksia attenuata		
	Banksia dallanneyi var dallanneyi	formerly Dryandra lindleyana var. lindleyana	
	Banksia ilicifolia		
	Banksia menziesii		
	Banksia nivea	formerly Dryandra nivea	
	Banksia platycarpa	formerly Dryandra platycarpa	P4
	Banksia prionotes		
	Banksia telmatiaea		
	Conospermum crassinervium		
	Conospermum scaposum		P3
	Conospermum stoechadis subsp. stoechadis		
	Conospermum triplinervium		
	Grevillea thelemanniana subsp. Cooljarloo (B.J. Keighery 28 B)	P1	
	Hakea costata		
	Hakea obliqua subsp. parviflora		
	Hakea prostrata		
	Hakea ruscifolia		
	Hakea trifurcata		
	Hakea varia		
	Isopogon panduratus subsp. palustris	formerly *Ispopogon* sp. Badgingarra	P2
	Persoonia comata		
	Petrophile drummondii		
	Petrophile linearis		
	Petrophile macrostachya		
	Petrophile megalostegia		
	Petrophile rigida		
	Petrophile seminuda		
	Stirlingia latifolia		
	Stirlingia simplex		
Ranunculaceae	*Clematis linearifolia*		

Restionaceae	*Alexgeorgea nitens*		
	Anarthria laevis		
	Chaetanthus aristatus		
	Chordifex sinuosus		
	Desmocladus sp.		
	Hypolaena exsulca		
	Lepidobolus preissianus		
	Lyginia barbata		
	Lyginia imberbis		
	Meeboldina cana		
	Meeboldina coangustata		
	Onychosepalum nodatum		P3
Rhamnaceae	*Stenanthemum notiale subsp. notiale*		
Rubiaceae	*Opercularia vaginata*		
Rutaceae	*Boronia ramosa subsp. anethifolia*		
	Philotheca spicata subsp. Moore River National Park (G. & D. Woodman OP 47)		
Santalaceae	*Exocarpos sparteus*		
Scrophulariaceae	**Dischisma capitatum*		
	Myoporum insulare		
	**Parentucellia latifolia*		
Stylidiaceae	*Levenhookia preissii*		RS
	Levenhookia stipitata		
	Stylidium aceratum		P2
	Stylidium araeophyllum		
	Stylidium bicolor		
	Stylidium crossocephalum		
	Stylidium cygnorum		
	Stylidium dichotomum		
	Stylidium longitubum		P3
	Stylidium mimeticum		
	Stylidium rigidulum		
Thymelaeaceae	*Pimelea imbricata var. piligera*		
	Pimelea sulphurea		
Typhaceae	**Typha orientalis*		
Violaceae	*Hybanthus calycinus*		
Xanthorrhoeaceae	*Xanthorrhoea preissii*		

APPENDIX FIVE

Significant Flora Records from the Atlas Tenement Survey

Taxon, Name	Status	Easting	Northing	Number	Site	Specimen Nos, Field No	Specimen (this record) Notes / Comments
Grevillea thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332673	6618604			CBGC166	scattered in *Melaleuca* flow area (heath), not flowering
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332059	6619957				
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332250	6619238		CQ16	CQ16-5	
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	331837	6619542		CQ26	CQ26-8	
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332145	6618790		CBR11		
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	331392	6619196		CBR13		
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	331325	6620026		CBR15		
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332587	6620218		CBR16		
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332566	6618630		CBM5		
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332633	6619368		CBM6		
G. thelemanniana subsp. Coojarloo (B.J. Keighery 28 B)	P1	332045	6620031		CBM7		

Isopogon panduratus subsp. palustris	P2	332429	6619932		CQ27	CQ27-X2	
Isopogon panduratus subsp. palustris	P2	332047	6617472			CBGC7	
Isopogon panduratus subsp. palustris	P2					CBGC29	
Isopogon panduratus subsp. palustris	P2	332360	6617939	2		CBGC120	
Isopogon panduratus subsp. palustris	P2	332654	6618334	6			
Isopogon panduratus subsp. palustris	P2	331089	6619030		CQ15	CQ15-4	
Isopogon panduratus subsp. palustris	P2	332284	6620778		CQ22		
Isopogon panduratus subsp. palustris	P2	332092	6619744		CBR14	CBR14	
Schoenus badius	P2	332104	6619087		CQ12	CQ12-4	
Stylidium aceratum	P2	332270	6618770		est.	CBGC39	estimated location - near CBR2
Stylidium aceratum	P2	332250	6619238		CQ16	CQ16-30	
Stylidium aceratum	P2	331837	6619542		CQ26	CQ26-6	
Stylidium aceratum	P2	332429	6619932		CQ27	CQ27-14	
Angianthus micropodioides	P3	331582	6619000		CBGC50	CBGC50	in veg=CQ12
Angianthus micropodioides	P3	331937	6620190		CBR4	CBR4-2	sub-dominant
Angianthus micropodioides	P3	332045	6620031		CBM7	CBM7-1	sub-dominant
Angianthus micropodioides	P3	332250	6619238		CQ16	CQ16-13	
Angianthus micropodioides	P3	331739	6619032	5% cov	CQ17	CQ17-10	
Angianthus micropodioides	P3	331837	6619542	2% cov	CQ26		
Angianthus micropodioides	P3	332406	6619635	4% cov	CQ28	CQ28-5	
Angianthus micropodioides	P3	331648	6619268	1% cov	CCR1		
Conospermum scaposum	P3	331408	6618085	>30		CBGC28	
Conospermum scaposum	P3	332250	6620755	1			
Conospermum scaposum	P3	332647	6617570	>20		CBGC107	

Conospermum scaposum	P3	332491	6617873	>~20			
Conospermum scaposum	P3	332458	6617974	20			
Conospermum scaposum	P3	332567	6617985	8			
Conospermum scaposum	P3	332217	6618047	>20			
Conospermum scaposum	P3	332164	6618017	>200			
Conospermum scaposum	P3	331413	6618081	~30			on track verge
Conospermum scaposum	P3	332463	6618395				
Conospermum scaposum	P3	332273	6618347	1			
Conospermum scaposum	P3	332262	6618441	50			
Conospermum scaposum	P3	332180	6618395	5			
Conospermum scaposum	P3	332170	6618396	>5			
Conospermum scaposum	P3	332475	6618822	>50			
Conospermum scaposum	P3	331420	6618794	>30			
Conospermum scaposum	P3	332507	6619402	>5			
Conospermum scaposum	P3	332448	6619400	>200			
Conospermum scaposum	P3	331933	6619757	>5			
Conospermum scaposum	P3	331509	6620363	x10			
Hensmania stoniella	P3	332386	6617423	1		CBGC2	
Melaleuca clavifolia	P3	331961	6618245		CBR1	CBR1-6	
Melaleuca clavifolia	P3	332134	6617483		CBR7	CBR7-9	
Melaleuca clavifolia	P3	332056	6617089		CBM1	CBM1-1	
Melaleuca clavifolia	P3	331939	6618241		CQ10	CQ10-17	scattered
Melaleuca clavifolia	P3	331602	6619601		CQ25	CQ25-6	scattered
Melaleuca clavifolia	P3	330951	6617201		CQ8	CQ8-3	50% cover

Onychosepalum nodatum	P3	332284	6620778		CQ22	CQ22-11	
Stylidium longitubum	P3	331613	662007		CBR3	CBR3-9	
Stylidium longitubum	P3	332250	6619238		CQ16		
Stylidium longitubum	P3	331739	6619032		CQ17	CQ17-13	
Stylidium longitubum	P3	331837	6619542		CQ26		
Banksia platycarpa	P4	332683	6617250			CBGC80	45cm
Banksia platycarpa	P4	331415	6618142			CBGC135	scattered; 60cm
Banksia platycarpa	P4	332164	6618594		CQ11	CQ11-5	heath;60cm; 2% cover
Banksia platycarpa	P4	331089	6619030		CQ15		heath;70cm; 1% cover
Levenhookia preissii	RS	332207	6618034			CBGC130	Range extension
Levenhookia preissii	RS	332476	6618797	1		CBGC174	on track
Levenhookia preissii	RS	332033	6618817	1			on track
Levenhookia preissii	RS	332060	6618809	16			
Levenhookia preissii	RS	331651	6618897	>10			scat along track
Microtis alboviridis	RS	332353	6620205		CCR2	CCR2-2	Range extension - previously only know to be as far north as Gingin

APPENDIX SIX

Quadrat Descriptions and Species Lists for the Atlas Tenement Survey Area

CERVANTES SITE: CQ1					
Described by	BRM	**Date**	29/10/2011	**Type**	Quadrat 10m x 10m
Season	E				
Location	Atlas Tenement				
MGA Zone	50	332438 mE		6616905 mN	
Habitat	Flat Plain.				
Soil	Grey sand.				
Rock Type	na				
Vegetation	*Banksia attenuata*, *Banksia menziessii*, *Eucalyptus todtiana* low woodland over *Xanthorrhoea preissii* open shrubland over *Calytrix fraseri*, *Melaleuca leuropoma* low open shrubland.				
Veg Condition	(BF) Pristine (very few weeds)				
Fire Age	Greater than 5 years since last fire.				
Notes					

QUAD NAME: CQ1				
SPECIES NAME	COVER C CLASS	HEIGHT	SPECIMEN	NOTES
Alexgeorgea nitens	+	20	CQ1-29	?*Alexgeorgea nitens* copper bark
Allocasuarina lehmanniana subsp. lehmanniana	+	25	CQ1-20	*Allocasuarina humilis*
Amphipogon turbinatus	+	5	CQ1-31	Grass
Lysimachia arvensis	+	5		*Anagallis arvensis* blue
Anigozanthos humilis subsp. humilis	+	10	CQ1-12	*Anigozanthos humilis*
Arctotheca calendula	+	10		*Arctotheca calendula*
Asteridea pulverulenta	+	30	CQ1-13	daisy white linear
Austrostipa compressa	+	50	CQ1-10	*Austrostipa*
Banksia attenuata	18			*Banksia attenuata*
Banksia menziesii	17	400		*Banksia menziesii*
Bossiaea eriocarpa	1	35		*Bossiaea eriocarpa*
Burchardia congesta	+	40		*Burchardia congesta*
Calytrix flavescens	+	20	CQ1-4	*Calytrix ?flavescens*
Calytrix fraseri	3	40	CQ1-3	*Calytrix ?fraseri*
Centrolepis drummondiana	+	2	CQ1-9	*Centrolepis*
Conostephium pendulum	+	80	CQ1-11	*Conostephium pendulum*
Conostylis juncea	+		CQ1-25	lily hairy leaf margins
Crassula colorata var. colorata	+	4	CQ1-8	*Crassula colorata*

Dasypogon bromeliifolius	1	40		*Dasypogon bromeliifolius*
Daucus glochidiatus	+	20		Dorcaus
Drosera closterostigma	+	10	CQ1-6	Pygme *Drosera*
Drosera erythrorhiza	+	1		*Drosera erythrorhiza*
Drosera menziesii subsp. thysanosepala	+	20	CQ1-2	*Drosera straggler*
Eremaea asterocarpa subsp. asterocarpa	+	35	CQ1-28	*Eremaea* ?
Eucalyptus todtiana	6	350		Euc tod
Gompholobium tomentosum	+	5	CQ1-27	Gompholobium
Goodenia coerulea	+	35	CQ1-16	? Goodeniacea
Hibbertia hypericoides	+	40		Hibbertia hypericoides
Hypocalymma aff. xanthopetalum	+	20	CQ1-15	Hypocalymma xanth
Hypochaeris glabra	+	10		Hypochaeris glabra
Isolepis marginata	+	3		Isolepis marginata
Jacksonia nutans	+	35	CQ1-24	Jacksonia
Leucopogon conostephioides	+	12	CQ1-22	Epacrid
Lomandra hermaphrodita	+	12	CQ1-18a	Lomandra suaveolens
Lyginia barbata	+	30	CQ1-23	Perotis hairy bracts
Melaleuca leuropoma	2	50	CQ1-5	Melaleuca seriata
Patersonia occidentalis	1-2	70		Pat occ
Petrophile linearis	+	35		Petrophile linearis
Petrophile rigida	+	45	CQ1-18	Isopogon
Phlebocarya filifolia	+	30	CQ1-21	Phlebocarya terete
Phyllangium paradoxum	+	3	CQ1-1	Phyllangium
Podotheca angustifolia	+	5		Podotheca angustifolia
Poranthera microphylla	+	2	CQ1-17	Poranthera
Siloxerus humifusus	+	1	CQ1-7	Siloxerus
Stylidium araeophyllum	+	5	CQ1-30	Stylid (grazed)
Stylidium rigidulum	+	10	CQ1-19	Stylidium
Thysanotus thyrsoideus	+	45	CQ1-14	Thysanotus sht band lf ?thyrsoideus
Trachymene pilosa	+	6		*Trachymene pilosa*
Wahlenbergia capensis	+	30		*Wahlenbergia capensis*
Xanthorrhoea preissii	4	130		*Xanthorrhoea preissii*
Xanthosia huegelii	+	12	CQ1-26	*Xanthosia*

CERVANTES SITE: CQ2					
Described by	CH	**Date**	29/10/2011	**Type**	Quadrat 10m x 10m
Season	E				
Location	Atlas Tenement				
MGA Zone	50	332700 mE		6617826 mN	
Habitat	Flat low lying dampland.				
Soil	Dark brown clayey sand (saturated).				
Rock Type	na				
Vegetation	*Melaleuca rhaphiophylla* low woodland over *Melaleuca teretifolia* open scrub over **Polypogon monspeliensis*, **Cotula coronopifolia* grassland/herbland.				
Veg Condition	(BF) Very Good.				
Fire Age	Greater than 5 years.				
Notes	4m- 90%				
	0.5m- 80%				

QUAD NAME CQ2				
SPECIES NAME:	COVER C CLASS	HEIGHT	SPECIMEN	NOTES
Lysimachia arvensis	+	15		blue
Centaurium spicatum	+	40	CQ2-11	Square swamp
Cerastium glomeratum	+	15	CQ2-2	*Cerastium* glands
Cotula coronopifolia	15	25	CQ2-9	*Cotula* cot
Crassula natans	+	5	CQ2-1	*Galium* oppo
Ehrharta longiflora	2	35		*Ehrharta longiflora*
Geranium solanderi	+	40	CQ2-6	*Geranium malle*
Hordeum geniculatum	1	30	CQ2-8	*Hordeum* swamp
Lolium perenne	25	50	CQ2-10	*Lolium* swamp
Melaleuca rhaphiophylla	15	400	CQ2-7	Mel rhaph
Melaleuca teretifolia	75	250		*Melaleuca teretifolia*
Polypogon monspeliensis	35	40	CQ2-5	Phalaris swamp
Rhagodia baccata subsp. baccata	1	150	CQ2-3	*Rhagodia baccata*
Sonchus oleraceus	+	25		*Sonchus oleraceus*
Vulpia muralis	1	20	CQ2-4	*Vulpia* myuros

CERVANTES SITE: CQ3					
Described by	CH	**Date**	29/10/2011	**Type**	Quadrat 10m x 10m
Season	E				
Location	Atlas Tenement				
MGA Zone	50	332608 mE		6617708 mN	
Habitat	Very gently sloping lower slopes on margin of wetland.				
Soil	Dry grey sand.				
Rock Type	na				
Vegetation	*Eucalyptus rudis* open woodland to woodland over *Melaleuca raphiophylla* open scrub over **Ehrarta longiflora*, **Brassica tournefortii* annual grassland/herbland.				
Veg Condition	(BF) Good.				
Fire Age	Greater than 5 years.				
Notes	10m 65% 0.5m 80%				

QUAD NAME: CQ3				
SPECIES NAME	COVER C CLASS	HEIGHT	SPECIMEN	NOTES
Arctotheca calendula	5	25		*Arctotheca calendula*
Brassica tournefortii	20	50	CQ3-2	*Brassica tournefortii*
Cassytha racemosa	+		CQ3-3	*Cassytha racemosa*
Ehrharta longiflora	40	30		*Ehrharta longiflora*
Erodium cicutarium	+	25	CQ3-5	*Erodium* fine
Eucalyptus rudis	10	1000	CQ3-1	*Eucalyptus rudis*
Geranium solanderi	+	25	=CQ2-6	*Geranium* molle
Hypochaeris glabra	5	35		*Hypochaeris glabra*
Lolium perenne	2	35	=CQ2-10	*Lolium* swamp
Melaleuca rhaphiophylla	55	450	=CQ2-7	*Melaleuca rhaph*
Microlaena stipoides	+	30	CQ3-4	*Microlaena stipoides*
Orobanche minor	+	20		*Orobanche minor*
Polycarpon tetraphyllum	5	15	CQ3-6	*Cerastium* stripes
Vulpia muralis	+	20	=CQ2-4	*Vulpia myuros*

CERVANTES SITE: CQ4					
Described by	BRM	**Date**	29/10/2011	**Type**	Quadrat 10m x 10m
Season	E				
Location	Atlas Tenement				
MGA Zone	50		332299 mE	6617556 mN	
Habitat	Flat Plain.				
Soil	Grey brown sand.				
Rock Type	na				
Vegetation	*Banksia attenuata*, *Banksia menziesii*, low woodland over *Adenanthos cygnorum* subsp. *cygnorum* scattered tall shrubs to high open shrubland over *Melaleuca seriata*, *Hibbertia hypericoides*, *Bossiaea eriocarpa* low shrubland over *Austrostipa compressa* scattered grasses and *Dasypogon obliquifolius*, *Blancoa canescens* very open herbland.				
Veg Condition	(BF) Excellent (signs of some general disturbance in area and old track).				
Fire Age	7 years since fire.				
Notes					

QUAD NAME: CQ4				
SPECIES NAME	COVER C CLASS	HEIGHT	SPECIMEN	NOTES
Acacia pulchella	1	20		*Acacia pulchella*
Actinotus leucocephalus	+	30	=CBGC1	White feather flower ? Apiaceae
Adenanthos cygnorum subsp. cygnorum	8	300	CQ4-3	*Adenanthos cygnorum*
Alexgeorgea nitens	+	15	=CQ1-29	*?Alexgeorgea*
Anigozanthos humilis subsp. humilis	+	25	CQ4-17	Anigozanthos humilis
Arnocrinum preissii	+	35	CQ4-28	*Agrostocrinum*
Austrodanthonia occidentalis	+	5	CQ4-10	*Neurachne alopec* (sterile, juv)
Austrostipa compressa	+	45	=CQ1-10	*Austrostipa*
Banksia attenuata	23	350		*Banksia attenuata*
Banksia menziesii	8	300		*Banksia menziesii*
Blancoa canescens	3	20	CQ4-1	*Blanchonostylis* (grey hairy long flowers)
Boronia ramosa subsp. anethifolia	+	20	CQ4-18	? *Boronia* 3 or 4 frt; divided (x3) lves linear

Bossiaea eriocarpa	3	30		*Bossiaea eriocarpa*
Burchardia congesta	+	30		*Burchardia congesta*
Caladenia flava subsp. flava	+	20	CQ4-23	*Pterostylis*?
Calytrix flavescens	+	40	CQ1-4	*Calytrix* ?fras ?pink
Centrolepis drummondiana	+	3	=CQ1-9	*Centrolepis*
Conostephium pendulum	+	40	=CQ1-11	*Conostephium*
Conostylis teretifolia subsp. teretifolia	+	5		Lost (=) *Conostylis* semi-terete long white hairs
Crassula colorata var. colorata	+	2	=CQ1-8	*Crassula colorata*
Dasypogon obliquifolius	4	35	CQ4-2	*Dasypogon*
Drosera closterostigma	+	10	=CQ1-6	pygmy Drosera white
Drosera erythrorhiza	+	1		*Drosera erythrorhiza*; desiccated
Drosera menziesii subsp. penicillaris	+	35	CQ4-7	*Drosera* (climber? Pink flower, flower dried up)
Eremaea asterocarpa subsp. asterocarpa	+	60	=CQ1-28	*Eremaea ?astrocarpa*
Eremaea pauciflora var. lonchophylla	2	70	CQ4-26	*Eremaea pauciflora*
Goodenia coerulea	+	25	CQ4-22	?*Goodeniaceae lanceolate* lf
Hibbertia hypericoides	1	35		*Hibbertia* hyp
Hypocalymma aff. xanthopetalum	+	35	=CQ1-15	*Hypocalymma*
Isolepis marginata	+	3	CQ4-9	*Isolepis* marg
Jacksonia nutans	+	40	=CQ1-24	*Jacksonia*
Lomandra caespitosa	+	20	CQ4-5	*Lomandra* linear thin
Lyginia barbata	+	40	=CQ1-23	rush hairy bract
Melaleuca seriata	1	35	CQ4-11	*Melaleuca serriata*
Melaleuca systena	+	45	CQ4-25	shrub
Mesomelaena pseudostygia	+	35	CQ4-24	?*Mesomelaena ?pseudosty*
Opercularia vaginata	+	20	CQ4-12	*Opercularia* vag
Patersonia occidentalis	+	50		*Patersonia occidentalis*
Petrophile linearis	+	35		*Petrophile linearis*
Petrophile rigida	+	40	CQ4-19	*Petrophile ylw divaricate*
Phyllangium paradoxum	+	3	=CQ1-1	*Phyllangium*
Podotheca chrysantha	+	25	CQ4-4	*Podotheca grac*
Poranthera microphylla	+	2	CQ4-14	*Poranthera*
Siloxerus humifusus	+	2	=CQ1-7	*Siloxerus ?humilis*
Sonchus oleraceus	+	20		*Sonchus oleraceus*
Stirlingia latifolia	1	45	CQ4-11A	*Stirlingia ?lat*
Stylidium araeophyllum	+	20	=CQ4-X1	*Stylid glaucous* ovate

Stylidium rigidulum	+	15	CQ4-13	Stylid linear rosette, long fruits
Trachymene pilosa	+	10		*Trachymene pilosa*
Vulpia muralis	+	20	(=	*Vulpia* sp.; LOST
Wahlenbergia capensis	+	6		*Wahlenbergia capensis*
Xanthorrhoea preissii	1	130		*Xanthorrhoea* ?pries (diamond shape TS; 'snappy')
Xanthosia huegelii	+	12	CQ4-6	Xanthosia

CERVANTES SITE: CQ5					
Described by	BRM	**Date**	30/10/2011	**Type**	Quadrat 10m x 10m
Season	E				
Location	Atlas Tenement				
MGA Zone	50		331997 mE	6617621 mN	
Habitat	Flat Plain.				
Soil	Grey-brown sand.				
Rock Type	na				
Vegetation	*Banksia attenuata*, *Banksia menziesii* low woodland over *Adenanthos cygnorum* subsp. *cygnorum* scattered tall shrubs to high open shrubland over *Xanthorrhoea preissii* scattered shrubs over *Eremaea pauciflora* var. *lonchophylla*, *Eremaea asterocarpa* subsp. *asterocarpa*, *Hibbertia hypericoides* low shrubland over *Mesomelaena pseudostygia* scattered sedges.				
Veg Condition	(BF) Excellent (disturbance such as old tracks in surrounding area; low weed cover).				
Fire Age	Greater than 7 years since fire.				
Notes	*Eucalyptus todtiana* sparsely scattered in area.				

QUAD NAME: CQ5				
NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Stylidium bicolor			CQ5-10A	*Stylid ciliate* rosette
Acacia pulchella	+	60-40 +		*Acacia pulchella*
Adenanthos cygnorum subsp. cygnorum	3	350	=CQ4-3	*Adenanthos cygnorum*
Alexgeorgea nitens	+	12	=CQ1-29	*?Alexgeorgea*
Allocasuarina humilis	1	180	CQ5-18	*Alloca humilis*
Amphipogon turbinatus	+	35	CQ5-19	*Amphipogon turbinatus*
Austrodanthonia occidentalis	+	35	CQ5-2	*Austrodanthonia*
Austrostipa compressa	+	30-40	=CQ1-10	*Austrostipa*
Banksia attenuata	27	400		*Banksia attenuata*
Banksia menziesii	1	210		*Banksia menziesii*
Blancoa canescens	+	12	=CQ4-1	*Blancoa* grey pillose lf
Boronia ramosa subsp. anethifolia	+	25	=CQ4-18	*Boronia* palmate linear

Bossiaea eriocarpa	+	30	CQ5-1	*Bossiaea eriocarpa*
Burchardia congesta	+	45		*Burchardia congesta*
Calytrix flavescens	+	30		
Calytrix leschenaultii	2-3	60	CQ5-5	*?Baeckea/Beaufortia small ovate*
Centrolepis drummondiana	+	3	=CQ1-9	*Centrolepis ?drum*
Conostylis juncea	+	20	CQ5-14	lily type herb
Conostylis teretifolia subsp. teretifolia	+	6	CQ5-8	*Conostylis semi terete* obtuse white hrs
Crassula colorata var. colorata	+	2	=CQ1-8	*Crassula*
Dasypogon obliquifolius	+	40	=CQ4-2	*Dasypogon*(dessicated leaves)
Drosera erythrorhiza	+	1		
Drosera menziesii subsp. penicillaris	+	10	CQ5-9	*Drosera* twinner *(dessicated)*
Drosera parvula	+	10	CQ5-21	Pygmae *Drosera*
Eremaea asterocarpa subsp. asterocarpa	3	130	=CQ1-28	*Eremaea asterocarpa*
Eremaea pauciflora var. lonchophylla	2	120	=CQ4-26	*Eremaea pauciflora*
Hibbertia hypericoides	3-4	30		
Hibbertia subvaginata		30	CQ5-4	*Hibbertia* ?subvag
Hypocalymma aff. xanthopetalum	+	20	=CQ1-15	*Hypocalymma*
Isolepis marginata	+	4	=CQ4-9	*Isolepis ?marg*
Jacksonia nutans	+	35	CQ5-16	*Jacksonia*
Laxmannia sp.	+	5	CQ5-7	*Laxmannia*
Levenhookia stipitata	+	6	CQ5-17	*Levenhookia ?stipitata*
Lomandra hermaphrodita	+	20	CQ5-12	*Lomandra ?hermaphrodita x 3*
Lyginia barbata	+	40	CQ5-11	*Lyginea*, Restio hairy
bracts				
Melaleuca leuropoma	1-2	50-60	=CQ1-5	*Melaleuca ?serriata*
Melaleuca systena	+	50	CQ5-22	Shrub ?*Melaleuca* ser.

Mesomelaena pseudostygia	+	30	CQ5-6	*Mesomelaena pseudostygia*
Patersonia occidentalis	+	35		*Patersonia occidentalis*
Petrophile linearis	+	40		
Petrophile rigida	+	35	=CQ4-19	*Isopogon/petrophile*
Phyllangium paradoxum	+	4	=CQ1-1	*Phyllangium*
Poranthera microphylla	+	3	=CQ1-17	*Poranthera*
Pyrorchis nigricans	+	2	Not flrg	
Schoenus curvifolius	+	30	CQ5-13	*Schoenus curvifolius*
Stirlingia latifolia	+	40	=CQ4-11	*Stirlingia ?lat*
Stylidium araeophyllum	+	30	=CQ4-X1	*Stylid glaucous lanc- ovate, pk flr*
Thysanotus manglesianus	+	1	CQ5-10	
Trachymene pilosa	+	4	Trachymene pilosa	
Xanthorrhoea preissii				
Xanthosia huegelii				

CERVANTES SITE: CQ6					
Described by	CH	**Date**	30/10/2011	**Type**	Quadrat 10m x 10m
Season	E				
Location	Atlas Tenement				
MGA Zone	50		332566 mE		6617450 mN
Habitat	Flats				
Soil	Light grey sand (dry).				
Rock Type	na				
Vegetation	*Banksia telmotiaea*, *Regelia ciliata*, *Hakea obliqua* subsp. *parviflora*, *Adenanthos cygnorum* subsp. *cygnorum* open scrub over *Eremaea pauciflora* var. *lonchophylla* scattered low shrubs over *Conostylis festucacea* subsp. *festucacea* low open herbland.				
Veg Condition	(BF) Excellent.				
Fire Age	Greater than 4 years since fire.				
Notes	2m- 70% 0.5m- 15%				

QUAD NAME: CQ6				
NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Adenanthos cygnorum subsp. cygnorum	1	200		*Adenanthos cygnorum*
Arctotheca calendula	+	20		
Austrostipa compressa	+	35	CQ6-9	*Austrostipa flav*
Banksia telmatiaea	65	150	CQ6-1	*Banksia sphaerocarpa*
Bromus diandrus	+	25		
Chordifex sinuosus	+	30	CQ6-11	*Restio hairs*
Conostylis festucacea subsp. festucacea	5	30	CQ6-8	*Conostylis clump*
Daucus glochidiatus	+	35	CQ6-4	*Daycus tall*
Eremaea pauciflora var. lonchophylla	+	110	CQ6-7	*Eremaeae pauciflora*
Hakea obliqua subsp. parviflora	1	170	CQ6-2	*Hakea arida*
Hypochaeris glabra	1	20	Some achens beaked	
Hypolaena exsulca	+	30	CQ6-5	*Hypolaena exsulca*
Isolepis marginata	+	5	CQ6-14	*Isolepis marginata*
Lagenophora huegelii	+	25	CQ6-6	*Lagenophora*
Melaleuca seriata	+	70	CQ6-12	*Melaleuca seriata*
Phlebocarya ciliata	+	25	CQ6-10	*Patersonia occ*

Regelia ciliata	2	130	CQ6-13	*Regelia*
Rhagodia baccata subsp. baccata	+	50	=CQ2-3	*Rhagodia baccata*
Senecio pinnatifolius var. latilobus	+	30	CQ6-3	*Senecio lautus*
Sonchus oleraceus	+	20		
Thysanotus manglesianus	+	c	CQ6-16	*Thysanotus mang*
Trachymene pilosa	5	15		
Trifolium arvense	+	10	CQ6-15	*Trifolium arvense*
Ursinia anthemoides	3	30		
Wahlenbergia capensis	+	30		

CERVANTES SITE: CQ7						
Described by	BRM	**Date**	30/10/2011	**Type**	Q	10m x 10m
Season	E Uniformity					
Location						
MGA Zone	50	331622 mE	6617351 mN			
Habitat	Flat sandplain.					
Soil	Grey-brown sand.					
Rock Type	na					
Vegetation	*Banksia attenuata, Banksia menziesii*, (*Eucalyptus todtiana* (sparsely scatttered)) low woodland over *Melaleuca seriata* shrubland over *Eremaea pauciflora* var. *lonchophylla*, *Eremaea asterocarpa* subsp. *asterocarpa* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.					
Veg Condition	(BF) Pristine (very low weed cover; little sign of disturbance in immediate area (however tracks nearby).					
Fire Age	Greater than 7 years since fire.					
Notes						

QUAD NAME: CQ7				
SPECIES NAME	COVER C CLASS	HEIGHT	SPECIMEN	NOTES
Xanthosia huegelii	+	10	=CQ4-6	*Xanthosia*
Alexgeorgea nitens	+	12	=CQ1-29	*?Alexgeorgia*
Anigozanthos humilis subsp. humilis	+	20	=CQ4-17	*Anigozanthos humilis*
Banksia attenuata	14	350		*Banksia attenuata*
Banksia dallanneyi var dallanneyi	+	20	CQ7-2	*Dryandra prostrate*
Banksia menziesii	2	400		*Banksia menziesii*
Blancoa canescens	+	70	=CQ4-1	*Blancoa grey ???*
Boronia ramosa subsp. anethifolia	+	20	=CQ4-18	*?Boronia palmate*
Bossiaea eriocarpa	+	20		
Burchardia congesta	+	40		*Burchardia congesta*
Cassytha flava	+	110	CQ7-15	*Cassytha* hairy
Conostephium pendulum	+	35	=CQ1-11	*Conostephium*
Conostylis juncea	+	20	CQ7-11	*Conostylis aculeata*
Conostylis teretifolia subsp. teretifolia	+	10	CQ7-6	*Conostylis semi-terete;* white hairs.

Dasypogon obliquifolius	+	20	=CQ4-2	*Dasypogon*
Drosera erythrorhiza	+	1		*Drosera erythrorhiza* (desicated)
Drosera menziesii subsp. penicillaris	+	20	CQ7-7	*Drosera twinner*
Drosera parvula	+	5	CQ7-9	*Drosera pygmae*
Eremaea asterocarpa subsp. asterocarpa	2	60	CQ7-1	*Eremaea astero*
Eremaea pauciflora var. lonchophylla	4	70		*Eremaea pauciflora*
Hibbertia aurea	+	20-45	CQ7-4	*? Hibbertia small plane ovate*
Hibbertia hypericoides	+	20		
Hypocalymma aff. xanthopetalum	+	20	=CQ1-15	*Hypocalymma*
Leucopogon sp. Lesueur (B. Evans 530)	+	30	CQ7-5	Strge shrub
Lomandra caespitosa	+	12	CQ7-3	*Lomandra* linear flat
Lomandra hermaphrodita	+	20	CQ7-10	*Lomandra ?hermaphrodita x 7*
Lomandra preissii	+	60	CQ7-14	*Lomandra preissii*
Melaleuca seriata	25	70-130	CQ7-16	Melaleuca pink flower small rounded leaf
Mesomelaena pseudostygia	2-3	35	=CQ5-6	*Mesomelaena pseudostygia*
Opercularia vaginata	+	15	=CQ4-12	*Operculera* vag.
Patersonia occidentalis	2-3	45	=CQ5-X7	*Patersonia occid Petrophile linearis*
Petrophile linearis	+	35		
Petrophile rigida	+	35	=CQ4-19	*Isopogon/ Petrophile*
Pimelea sulphurea	+	30	CQ7-8	*Pimelea*
Poranthera microphylla	+	3	=CQ1-17	*Poranthera*
Pyrorchis nigricans	+	7		
Stirlingia latifolia	+	40	=CQ4-11	*Stirlingia ?lat*
Stylidium dichotomum	+	1	CQ7-13	*Stylidium*
Stylidium rigidulum	+	4	=CQ4-13	*Stylid* linear leaf rosette
Thysanotus manglesianus	+	60		*Thysanotus* mang/pat
Thysanotus thyrsoideus	+	25	=CQ5-X1	*Thysanotus* upright
Trachymene pilosa	+	6		
Xanthorrhoea preissii	+	140		*Xanthorrhoea preissii*; no trunk

CERVANTES SITE: CQ8						
Described by	CH	**Date**	30/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	330951 mE		6617201 mN		
Habitat	Flat sandplain.					
Soil	Light brown-grey sand (dry).					
Rock Type	na					
Vegetation	*Banksia attenuata*, *Banksia menziessii* low woodland over *Melaleuca clavifolia*, *Eremaea pauciflora* var. *lonchophylla*, *Petrophile rigida*, *Hibbertia hypericoides* low open heath.					
Veg Condition	(BF) Pristine.					
Fire Age	Greater than 5 years since fire.					
Notes	Search intensity: Intense					

QUAD NAME: CQ8				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Acacia sessilis	1	25 cm	CQ8-1	*Acacia short sharp*
Alexgeorgea nitens	+	15 cm	(=CQ1-)	*?Alexgeorgia*
Austrostipa compressa	+	20 cm	(=CQ6-9)	*Austrostipa flav*
Banksia attenuata	8	500 cm		
Banksia menziesii	7	500 cm		
Blancoa canescens	1	15 cm	CQ8-2	*Blancoa mat*
Bossiaea eriocarpa	+	20 cm		
Conostephium pendulum	1	60 cm	(=CQ1-)	*Conostephium*
Conostylis teretifolia subsp. teretifolia	+	10 cm	(=CQ7-6)	*Conostylis semi terete*
Dasypogon obliquifolius	2	20 cm	(=CQ1-)	*Dasypogon ?brom*
Drosera menziesii subsp. penicillaris	+	45 cm	CQ8-5	*Drosera menziesii*
Eremaea asterocarpa subsp. asterocarpa	+	45 cm	(=CQ1-)	*Eremaea astrocarpa*
Eremaea pauciflora var. lonchophylla	3	80 cm	(=CQ1-)	*Eremaea pauciflora*
Hibbertia aurea	+	20 cm	CQ8-7	*Hibbertia*, soft grey

Hibbertia hypericoides	2	40 cm		
Hibbertia sp. Gnangara (J.R. Wheeler 2329)	1	50 cm	CQ8-4	*Hibbertia* big hyp
Hypocalymma aff. xanthopetalum	+	25 cm	(=CQ1-)	*Hypocalymma* ?
Xanthium				
Jacksonia floribunda	+	40 cm	CQ8-9	*Jacksonia floribunda*
Jacksonia hakeoides	+	50 cm	CQ8-10	*Jacksonia* cross
Leucopogon sp. Coujinup (M.A. Burgman 1085)	+	15 cm	CQ8-6	*Leucopogon hyaline*
Leucopogon sprengelioides	CQ8-11a			
Melaleuca clavifolia	50	90 cm	CQ8-3	*Melaleuca* linear
Mesomelaena pseudostygia	+	70 cm	(=CQ4-)	*Mesomelaena ?pseudostygia*
Opercularia vaginata	+	15 cm		
Petrophile linearis	1	50 cm		
Petrophile rigida	4	70 cm	(=CQ4-)	*Isopogon/* Petrophile yellow
Phlebocarya filifolia	+	30cm	CQ8-11	*Phlebocarya terete*
Pimelea sulphurea	+	35 cm	CQ8-8	*Pimelia* short nodding
Poranthera microphylla	+	5 cm	(=CQ1-)	*Poranthera*
Stirlingia latifolia	+	50 cm	(=CQ4-)	*Stirlingia* ?lat (narrow leaves)
Trachymene pilosa	+	10 cm		
Vulpia muralis	+	20 cm	(=CQ2-4)	*Vulpia myuros*

CERVANTES SITE CQ9						
Described by	CH	**Date**	30/10/2011	**Type**	Q	10m x 10m
Season	E Uniformity					
Location						
MGA Zone	50	331658 mE		6618268 mN		
Habitat	Flats					
Soil	Fine pink sand.					
Rock Type	na					
Vegetation	*Banksia telmatiaea*, *Hakea obliqua* subsp. *parviflora,Xanthorrhoea preissii, Regelia ciliata* closed scrub over *Melaleuca seriata*, *Jacksonia hakeoides* low open shrubland over *Schoenus subfascicularis* open sedgeland.					
Veg Condition	(BF) Pristine.					
Fire Age	Greater than 4 years.					
Notes	1- 8m- 95%					

QUAD NAME: CQ9				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Astroloma glaucescens	+	25	CQ9-6	*Astroloma*
Austrostipa compressa	+	25	(=CQ6-9)	*Austrostipa* flav
Conospermum stoechadis subsp. stoechadis	+	90	CQ9-1	*Conospermum* stoech
Conostylis festucacea subsp. festucacea	1	35	(=CQ6-8)	*Conostylis* clump
Jacksonia hakeoides	1	40	CQ9-2	*Jacksonia* short
Melaleuca rhaphiophylla	1	160	CQ9-3	*Melaleuca* white stout
Melaleuca seriata	1	100	(=CQ6-12)	Mel seriata
Podotheca angustifolia	+	15	CQ9-5	*Podolepis* swamp
Schoenus subfascicularis	+	35	CQ9-4	*Schoenus*
subfascicularis				
Trachymene pilosa	+	5		*Trachymene pilosa*
Adenanthos cygnorum subsp. cygnorum	1	160		*Adenanthos cygnorum*
Banksia telmatiaea	50	120	(=CQ6-1)	*Banksia sphaerocarpa*
Hakea obliqua subsp.	30	150	(=CQ6-2)	*Hakea* arida

parviflora				
Hakea trifurcata	+	130		*Hakea trifurcata*
Regelia ciliata	4	110	(=CQ6-13)	*Regelia*
Xanthorrhoea preissii	2	190		*Xanthorrhoea preissii*

CERVANTES SITE CQ10						
Described by	BRM	**Date**	30/10/2011	**Type**	Q	10m x 10m
Season	**Uniformity**					
Location						
MGA Zone	50	331939 mE	6618241 mN			
Habitat	Broad, flat to very gently undulating plain.					
Soil	Grey (brown) sand.					
Rock Type	na					
Vegetation	*Eucalyptus todtiana*, (Banksia prionotes) low open forest over *Jacksonia sternbergiana*, *Allocasuarina humilis* high open shrubland over *Hibbertia hypericoides* low shrubland over *Austrostipa* compressa scattered grasses.					
Veg Condition	(BF) Pristine (low weed cover).					
Fire Age	Greater than 7 years since fire.					
Notes	Search Intensity: thorough. This quadrat was recorded in Eucalyptus todtiana clump (~4 trees). 4 x fence droppers capped.					

QUAD NAME: CQ10				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Acacia lasiocarpa var. lasiocarpa	+	35 cm	CQ10-24	*Acacia* ?lasio
Aira cupaniana	+	12 cm	CQ10-16	*Aira*
Allocasuarina humilis	4	190 cm	CQ10-1	*Allocasuarina humilis*
Allocasuarina humilis	+	210 cm	CQ10-28	Allocas
Asteridea pulverulenta	+	20 cm	(=CQ1-13	White daisy linear, thin *bracts*
Austrodanthonia occidentalis	+	40 cm	CQ10-18	*Austrodanthonia*
Austrostipa compressa	+	35 cm	CQ10-2	*Austrostipa*
Banksia attenuata	1	160 cm		
Banksia prionotes	5	450 cm	CQ10-14	*Banksia prionotes* (spikey frt)
Blancoa canescens	2	15 cm	(=CQ4-1)	*Blancoa* grey lf
Caladenia flava subsp. flava	+	20 cm	CQ10-8	*Caladenia*
Caladenia nobilis	+	30 cm	CQ10-32	*Caladenia* narrow lf
Caladenia sp.	+	20 cm	CQ10-9	Orchid narrow lf

Calandrinia corrigioloides	+	3 cm	CQ10-4	Herb
Conostylis candicans subsp. candicans	+	25 cm	CQ10-12	? *Conostylis candicans*
Corynotheca micrantha	+	35 cm	CQ10-10	Divericate *Thysanotus/Corynotheca*
Crassula colorata var. colorata	+	4 cm	(=CQ1-8)	*Crassula*
Daucus glochidiatus	+	30 cm	(=CQ6-4)	*Daucus* tall
Drosera humilis	+	6 cm	(=CQ4-X2)	*Drosera* upright brchy
Drosera menziesii subsp. penicillaris	+	45 cm	CQ10-22	*Drosera* climber
Eremaea pauciflora var. lonchophylla	+	40 cm	CQ10-29	? *Eremaea*
Eucalyptus todtiana	40- 45	550 cm		
Euchiton sphaericus	+	15 cm	CQ10-30	Daisy
Hakea obliqua subsp. parviflora	+	130 cm	CQ10-25	?*Hakea*
Hibbertia hypericoides	21	30-45 cm		
Hypocalymma aff. xanthopetalum	+	60 cm	CQ10-21	*Hypocalymma*
Hypochaeris glabra	+	1 cm		
Isolepis marginata	+	2 cm	(=CQ4-9)	*Isolepis* marg
Jacksonia sternbergiana	2	240 cm	CQ10-15	*Jacksonia* sternberg
Lagenophora huegelii	+	5 cm		*Lagenphora*
Lepidosperma squamatum complex	+	40 cm	CQ10-23	*Lepidosperma*
Lysimachia arvensis	+	12 cm		*Anagallis arvensis* blue
Melaleuca clavifolia	+	40 cm	CQ10-17	*Melaleuca*
Mesomelaena pseudostygia	+	30 cm	(=CQ5-6)	*Mesomelaena*
Petrophile linearis	+	40 cm		
Phyllangium paradoxum	+	4 cm	(=CBGC11)	*Phyllangium*
Podotheca angustifolia	+	4 cm	CQ10-7	*Podotheca* angust
Schoenus grandiflorus	+	20 cm	CQ10-20	V leaf
Scholtzia umbellifera	+	90 cm	CQ10-11	*Baeckea*?
Siloxerus humifusus	+	1 cm	CQ10-5	*Siloxerus humilis* dome
flower				
Siloxerus humifusus	+	1 cm	CQ10-3	? *Siloxerus*
Thysanotus manglesianus/patersonii	+	75 cm		*Thysanotus* mang/pat (no flower)
Trachymene coerulea subsp. coerulea	+	30 cm	CQ10-13	*Apiaceae* / flannel flr
Trachymene pilosa	+	6 cm		
Ursinia anthemoides	+	10 cm		
Vulpia muralis	+	20 cm	CQ10-19	*Vulpia*

Wahlenbergia capensis	+	30 cm		

CERVANTES SITE: CQ11						
Described by	CH	**Date**	31/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332164 mE	6618594 mN			
Habitat	Flat sand.					
Soil	Grey Sand.					
Rock Type	na					
Vegetation	*Banksia telmatiaea*, *Hakea obliqua subsp. parviflora, Regelia ciliata* closed heath over *Melaleuca seriata*, *Jacksonia hakeoides*, *Dryandra platycarpa* low open shrubland over *Conostylis aculeate subsp. breviflora* very open herbland.					
Veg Condition	(BF) Pristine.					
Fire Age	4 years since fire.					
Notes						

QUADN NAME: CQ11				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Acacia sessilis	+	110 cm	CQ11-8	*Acacia* short heath
Austrostipa compressa	+	30 cm	(=CQ6-9)	*Austrostipa* flav
Banksia platycarpa	2	60 cm	CQ11-5	*Dryandra* heath
Banksia telmatiaea	50	110 cm	(=CQ6-1)	*Banksia* sphae
Baumea juncea	+	40 cm	CQ11-10	? *Baumea juncea*
Caustis dioica	+	25 cm	CQ11-2	*Caustis*
Chordifex sinuosus	+	30 cm	CQ11-9	*Loxocarya* branched
Conostylis aculeata subsp. breviflora	2	25 cm	CQ11-4	*Conostylis aculeata*
Daviesia incrassata subsp. incrassata	+	40 cm	CQ11-7	*Daviesia* dec short
Hakea obliqua subsp. parviflora	30	150 cm	(=CQ6-2)	*Hakea arida*
Hypocalymma aff. Xanthopetalum ?xanthium	+	50 cm	(=CQ1-15)	*Hypocalymma*
Hypochaeris glabra	+	10 cm		
Jacksonia hakeoides	1	30 cm	(=CQ9-2)	*Jacksonia* short
Melaleuca seriata	1	100 cm	(=CQ6-12)	Mel seriata

Regelia ciliata	10	130 cm	(=CQ6-13)	*Regelia*
Scholtzia umbellifera	+	40 cm	CQ11-3	*Sholtzia* heath
Stirlingia latifolia	+	30 cm		
Trachymene coerulea subsp. coerulea	+	40 cm	CQ11-1	*Apium*
Trachymene pilosa	2	10 cm		
Ursinia anthemoides	+	30 cm		
Verticordia densiflora var. cespitosa	1	80 cm	CQ11-6	*Verticordia* buds
Wahlenbergia capensis	+	20 cm		

CERVANTES SITE: CQ12						
Described by	BRM	**Date**	31/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332287 mE		6618867 mN		
Habitat	Low lying area adjacent to a shallow narrow flow line on broad flat.					
Soil	Pale grey-brown sand.					
Rock Type	na					
Vegetation	*Regelia ciliata*, *Melaleuca seriata*, *Banksia telmatiaea*, *Callitris arenaria* open to closed low heath.					
Veg Condition	(BF) Pristine (a few weeds in this unit; farmland 300m to east).					
Fire Age	Greater than 7 years since fire.					
Notes	Search intensity: thorough.					

QUAD NAME: CQ12				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Actinotus leucocephalus	+	5 cm	CQ12-16	*Apiaceae* / flannel plat (juv)
Aira cupaniana	+	12 cm	CQ12-18	*Aira*
Arctotheca calendula	+	5 cm		cape weed
Austrostipa compressa	+	15 cm	CQ12-12	? *Microlaena* grass
Banksia nivea	+	35 cm	CQ12-2	*Dryandra*
Banksia telmatiaea	25	35 cm	CQ12-8	*Banksia*
Burchardia sp.	+	20 cm	CQ12-25	*Burchardia* cong
Caladenia flava subsp. flava	+	12 cm	CQ12-20	?*Caladenia flava* slender lf
Callitris arenaria	5	60 cm	CQ12-1	*Actinostrobus*
Centrolepis aristata	+	3 cm	CQ12-5	Big red ?*Centralepis*
Centrolepis mutica	+	2 cm	CQ12-9	*Centrolepis* short
Chordifex sinuosus	+	15 cm	CQ12-15	?rush brown bracts
Conostylis aculeata subsp. breviflora	+	15 cm	CQ12-11	*Conostylis* ?*aculeata*
Drosera closterostigma	+	5 cm	CQ12-23	*Drosera pygmaea*
Drosera gigantea	+	30 cm	#NAME?	*Drosera* gigantic
Haemodorum sp.	+	20 cm	CQ12-24	*Haemodorum*
Hypocalymma aff. xanthopetalum	+	30 cm	CQ12-26	*Hypocalymma*
Hypochaeris glabra	+	1 cm		
Isolepis marginata	+	2 cm	CQ12-10	*Isolepis* ?magr
Melaleuca seriata	25	30-35 cm	CQ12-7	*Melaleuca* pk flwr
Pterostylis sp.	+	4 cm	CQ12-14	*Pterostylis* bare
Regelia ciliata	+	45 cm	CQ12-27	Shrub *Myrtaceae*
Restionaceae sp.	+	12 cm	CQ12-6	rush hairy nodes
Schoenus badius	+	5 cm	CQ12-4	*Cyperus* small slender
Schoenus clandestinus	+	2 cm	CQ12-22	*Schoenus* ?clandes
Siloxerus humifusus	+	1 cm	-7	*Siloxerus* ?humi
Trachymene pilosa	+	3 cm		
Ursinia anthemoides	+	15 cm		*Ursinia* sp.
Verticordia densiflora var. cespitosa	+	120 cm	CQ12-13	*Verticordia*
Vulpia muralis	+	20 cm	CQ12-19	*Vulpia*
Wahlenbergia capensis	+	25 cm	CQ12-17	*Wahlenbergia*

CERVANTES SITE: CQ13						
Described by	BRM	**Date**	31/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332429 mE		6619035 mN		
Habitat	Broad, flat to very gently undulating plain.					
Soil	Pale grey-brown sand.					
Rock Type	na					
Vegetation	*Banksia menziesii, Banksia attenuata* low woodland over *Allocasuarina humilis*, *Hakea ruscifolia* open shrubland over *Hibbertia hypericoides*, *Jacksonia hakeoides* low shrubland over *Mesomelaena pseudostygia* scattered sedges.					
Veg Condition	(BF) Pristine (or nearly so; low weed cover of *Ursinia*, etc).					
Fire Age	Greater than 7 years since fire.					
Notes	Search intensity: Thorough. NB: No *Eucalyptus todtiana* seen in area of CQ13.					

QUAD NAME: CQ13				
NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Actinotus leucocephalus	+	20 cm	CQ13-3	flannel flr
Alexgeorgea nitens	+	15 cm	=CQ1-29	*Alexgeorgea*
Allocasuarina humilis	3	250 cm	CQ13-1	*Allocasuarina humilis*
Amphipogon turbinatus	+	40 cm	CQ13-18	*Amphipogon*
Anigozanthos humilis subsp. humilis	+	30 cm	=CQ4-17	*Anigozanthos humilis*
Arctotheca calendula	+	10 cm		Capeweed
Asteridea pulverulenta	+	30 cm	=CQ1-13	White daisy linear bracts
Austrodanthonia occidentalis	+	35 cm	CQ13-24	*Austrodanthonia*
Austrostipa compressa	+	35 cm	=CQ1-8	*Austrostipa*
Banksia attenuata	13	400 cm		
Banksia dallanneyi var dallanneyi	+	12 cm	CQ13-8	*Dryandra* lind
Banksia menziesii	21	350 cm		
Burchardia congesta	+	45 cm		*Burchardia congesta*
Calandrinia corrigioloides	+	3 cm	CQ13-16	*Calandrinia* upright small red one
Calytrix flavescens	+	30 cm	=CQ1-4	*Calytrix* flav
Centrolepis drummondiana	+	3 cm	=CQ1-9	*Centrolepis*
Conostylis festucacea subsp. festucacea	+	20 cm	CQ13-9	*Conostylis* linear flat, no marg brittles
Conostylis teretifolia subsp. teretifolia	+	8 cm	=CQ5-8	*Conostylis* semi terete whte hrs

Corynotheca micrantha	+	30 cm	CQ13-2	*Corinotheca* mic
Crassula colorata var. colorata	+	2 cm	=CQ1-	*Crassula*
Dasypogon obliquifolius	2	20-40 cm	=CQ4-2	*Dasypogon*
Drosera erythrorhiza	+	1 cm		Drosera erythrorhiza (descicated)
Drosera menziesii subsp. penicillaris	+	40 cm	CQ13-13	*Drosera* climber
Hakea ruscifolia	2	160 cm	CQ13-20	*Hakea ruscifolia*
Hibbertia hypericoides	13	90 cm		Hib hyp
Hibbertia sp. Gnangara (J.R. Wheeler 2329)	+	30 cm	CQ13-7	*Hibbertia* soft long narrow linear recurved
Hypochaeris glabra	+	10 cm		
Jacksonia hakeoides	8	60-90 cm	CQ13-11	*Jacksonia* sht phyllode
Jacksonia nutans	+	90 cm	CQ13-23	*Jacksonia* tall long phyll?
Lepidosperma squamatum complex	+	40 cm	CQ13-17	? *Lepidosperma*
Levenhookia stipitata	+	4 cm	=CQ5-17	*Levenhookia* ?stip
Lomandra hermaphrodita	+	30 cm	CQ13-10	*Lomandra* ?hermaph x
Melaleuca systena	2-3	45 cm	CQ13-6	*Melaleuca*
Mesomelaena pseudostygia	+	30 cm	=CQ4-24	*Mesomelaena*
pseudostygia				
Petrophile linearis	+	40 cm		
Phyllangium paradoxum	+	4 cm	=CBGC11	*Phyllangium*
Podotheca angustifolia	+	5 cm	CQ13-14	*Podotheca* angust
Podotheca gnaphalioides	+	25 cm	CQ13-15	*Podotheca* graph
Poranthera microphylla	+	3 cm	(=CQ4-14)	*Poranthera*
Pterochaeta paniculata	+	6 cm	CQ13-22	*Pterochaeta panceal*
Scaevola phlebopetala	+	10 cm	CQ13-21	Prple? Scaev herb
Schoenus clandestinus	+	2 cm	CQ13-4	*Schoenus* ?clandest
Siloxerus humifusus	+	2 cm	=CQ1-7	*Siloxerus* hum?
Stackhousia monogyna	+	35 cm	CQ13-5	*Stackhousia monogyna*
Stirlingia latifolia	+	70 cm	=CQ4-11	*Stirlingia* lat
Stylidium rigidulum	+	10 cm	=CQ4-13	Stylid linear mostly long frt
Thysanotus manglesianus/patersonii	+	20 cm		*Thysanotus* mang/pat no flwrs
Trachymene pilosa	+	4-10 cm		
Ursinia anthemoides	+	25 cm		*Ursinia sp.*
Wahlenbergia preissii	+	20 cm	CQ13-12	*Wahlenbergia preissii*
Xanthosia huegelii	+	5 cm	=CQ4-6	*Xanthosia*

CERVANTES SITE CQ14						
Described by	CH	**Date**	31/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332175 mE		6618968 mN		
Habitat	Flat shallow flow line.					
Soil	Grey sand (damp).					
Rock Type	na					
Vegetation	*Melaleuca brevifolia* open shrubland over *Tecticornia indica subsp. bidens* low samphire shrubland over **Lotus subbiflorus*, **Cotula coronopifolia*, *Cotula cotuloides*, **Polypogon monspeliensis* open herbland/grassland.					
Veg Condition	(BF) Very Good.					
Fire Age	Greater than 5 years since fire.					
Notes	Search intensity: Thorough					

QUAD NAME: CQ14				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Carpobrotus edulis	+	15 cm		*Carpobrotus edulis* (check C.modestus and C. Virescens)
Centaurium spicatum	1	20 cm		Scroph square stem
Centrolepis polygyna	+	2 cm	CQ14-6	*Centrolepis* drum
Cotula coronopifolia	20	10 cm	=CQ2-9	*Cotula* cot
Cotula cotuloides	5	7 cm	CQ14-9	*Cotula* narrow
Crassula colorata var. acuminata	+	5 cm	CQ14-4	*Crassula* colo colo
Crassula decumbens var. decumbens	+	2 cm	CQ14-8	*Crassula* natens
Crassula glomerata	+	3 cm	CQ14-5	*Crassula* orange
Isolepis cernua var. setiformis	1	3 cm	CQ14-7	*Isolepis cernua*
Juncus capitatus	+	3 cm	CQ14-10	*Juncus* cap
Lotus subbiflorus	25	10 cm	CQ14-2	*Lotus* sub
Melaleuca brevifolia	3	150 cm	=CO-5	Mel Short yellow
Monopsis debilis	+	5 cm	=CO-6	purple trumpets
Polypogon monspeliensis	3	15 cm	=CQ2-5	*Phalaris* swamp
Spergularia sp.	+	2 cm	CQ14-11	*Calandrinia* tiny
Sporobolus virginicus	+	20 cm	CQ14-3	*Couch phaloris*

Tecticornia indica subsp. bidens	24	50 cm	CQ14-1	*Tecticornia bidens*

CERVANTES SITE: CQ15						
Described by	CH	**Date**	31/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	331089 mE		6619030 mN		
Habitat	Sandy flats.					
Soil	Pink-yellow sand (dry).					
Rock Type	na					
Vegetation	*Hakea obliqua subsp. parviflora*, *Hakea prostrata* open shrubland over *Banksia telmatiaea*, *Melaleuca seriata*, *Regelia ciliata* low closed heath.					
Veg Condition	(BF) Pristine.					
Fire Age	4 years since fire.					
Notes	Search intensity: extremely intense.					

QUAD NAME: CQ15				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Acacia stenoptera	+	30 cm		
Asteridea pulverulenta	+	10 cm	CQ15-2	Daisy whiskers
Austrostipa compressa	+	25 cm	=CQ6-9	*Austrostipa* flav
Banksia nivea	1	25 cm	=CQ12-2	*Dryandra* small teeth
Banksia platycarpa	35	70 cm	=CQ11-5	*Dryandra* heath
Banksia telmatiaea	+	80 cm	=CQ6-1	*Banksia* sphaer
Cassytha flava	+	6 cm	CQ15-1	Dodder hairy
Centaurium spicatum	+	10 cm	=CQ	Scroph square stem
Conostylis aculeata subsp. breviflora	+	30 cm	=CQ11-4	*Conostylis aculeata*
Conostylis festucacea subsp. festucacea	1	30 cm	=CQ6-8	*Conostylis* clump
Hakea costata	2	110 cm	=CBGC-27	*Hakea* prickly
Hakea obliqua subsp. parviflora	2	120 cm	=CQ6-2	*Hakea arida*

Hakea prostrata	+	170 cm		
Isopogon panduratus subsp. palustris	+	50 cm	CQ15-4	*Petrophile* bacca
Jacksonia hakeoides	35	20 cm	=CQ9-2	*Jacksonia* short
Melaleuca seriata	+	110 cm	=CQ6-12	Mel seriata
Opercularia vaginata	+	15 cm		*Opercularia vaginata*
Podolepis gracilis	+	10 cm	CQ15-3	*Podolepis* pink
Podotheca angustifolia	12	10 cm	=CQ1-	*Podotheca* angust
Regelia ciliata	+	80 cm	=CQ6-13	*Regelia*
Trachymene coerulea subsp. coerulea	+	20 cm	=CQ11-1	*Apium*
Trachymene pilosa	+	10 cm		
Vulpia bromoides	+	15 cm		*Vulpia bromoides*
Wahlenbergia capensis	+			

CERVANTES SITE: CQ16						
Described by	BRM	**Date**	31/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332250 mE		6619238 mN		
Habitat	Small dampland in broad low lying depression in broad plain.					
Soil	Yellow-brown sand.					
Rock Type	na					
Vegetation	*Melaleuca brevifolia* scattered shrubs over *Verticordia plumosa var. brachyphylla, Grevillea thelemanniana subsp*. Coojarloo (B.J. Keighery 28 B), *Melaleuca systena* low shrubland over *Drosera menziesii subsp. thysanosepala, Centrolepis aristata* open herbland.					
Veg Condition	(BF) Excellent (some weeds).					
Fire Age	Greater than 7 years since fire.					
Notes	Search intensity: thorough.					

QUAD NAME: CQ16				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Lysimachia arvensis	+	10 cm		blue
Angianthus micropodioides	+	6 cm	CQ16-13	Daisy yellow top
Arctotheca calendula	+	10 cm		Cape Weed
Banksia nivea clumped	+	25 cm	=CQ12-2	?*Dryandra* fine leaf
Brachyscome pusilla	+	10 cm	CQ16-9	Wte daisy
Briza minor	+	20 cm		
Caladenia longicauda subsp. borealis	+	35 cm	CQ16-4	*Caladenia* tall
Calandrinia granulifera	+	2 cm	CQ16-14	Small flr ?Calind
Calandrinia sp. Kenwick (G.J. Keighery 10905)	+	1 cm	CQ16-18	*Calandrinia*
Carpobrotus virescens	+	4 cm	CQ16-26	pigface
Centrolepis aristata	4	4 cm	=CQ12-	*Centrolepis* big red
Centrolepis polygyna	+	1 cm	=CBR2-8	*Centrolepis* sht
Chaetanthus aristatus	+	30 cm	CQ16-24	rush coppery head
Cotula turbinata	+	4 cm		*Cotula turbinata*
Drosera menziesii subsp. thysanosepala	3	15 cm	CQ16-8	*Drosera* erec red, not flowering
Frankenia pauciflora	+	6 cm	CQ16-21	shrub red stem, opp lvs
Gnephosis drummondii	+	3 cm	CQ16-12	*Gnephosis*

Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)	+	6 cm	CQ16-27	*Goodenia*
Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)	+	3 cm	CQ16-19	ylw flr herb
Grevillea thelemanniana subsp. Cooljarloo (B.J. Keighery 28 B)	9	45 cm	CQ16-5	*Grevillea* red flr
Heliophila pusilla	+	15 cm	CQ16-37	*Branii*
Hydrocotyle alata	+	2 cm	CQ16-17	*Hydrocotyle*
Hypochaeris glabra	+	10 cm		
Isolepis cernua var. setiformis	+	4 cm	CQ16-31	*Isolepis*
Isolepis marginata	+	+	CQ16-43	*Isolepis* slender
Juncus bufonius	+	10 cm	CQ16-15	red v 'v' head part
Juncus capitatus		4 cm	CQ16-11	*Cyperus* multi head
Lawrencia squamata	+	12 cm	CQ16-20	Grey l*anceolate* lf shrub, grazed
Lotus subbiflorus	+	5 cm	=CBR2-2	*Lotus*
Melaleuca brevifolia	+	120 cm	CQ16-2	*Melaleuca* ribbed frt
Melaleuca seriata	+	30 cm	CQ16-38	*Myrtaceae*
Melaleuca systena	3	35 cm	CQ16-3	*Melaleuca*
Monopsis debilis	+	5 cm	CQ16-40	mauve ?flr herb
Petrophile rigida	+	20 cm	CQ16-32	*Proteaceae*
Podolepis capillaris		12 cm	CQ16-10	*Candelabra*
Quinetia urvillei	+	6 cm	CQ16-39	*Urvillea quinetia*
Restionaceae sp.	+	20 cm	CQ16-46	rush hry nodes
Samolus repens var. paucifolius	+	30 cm	CQ16-6	*Samolus*
Schoenus plumosus	+	4 cm	CQ16-45	?*Schoenus*
Siloxerus humifusus	+	2 cm	CQ16-35	*Sitopithus* ?hum
Sonchus oleraceus	+	30 cm		
Stylidium aceratum	+	3 cm	CQ16-30	Stylid smll wte
Stylidium longitubum	+	3 cm	=CQ17-13	*Stylidium* succulent pk 'nude'
Stylidium mimeticum	+	3 cm	CQ16-23	Stylid sht pink, white
Thysanotus sp.	+	15 cm	CQ16-29	*Thysanotus*
Trachymene pilosa	+	12 cm		
Tribonanthes brachypetala	+	15-20 cm	=CBGC45	*Tribonanthes*
Triglochin minutissima	+	3 cm	CQ16-16	?*Triglochin*

Triglochin mucronata	+	6 cm	CQ16-41	?*Triglochin* horned 3 carpels
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	7 cm	CQ16-28	herb witches hats
Ursinia anthemoides	+	20 cm		
Utricularia multifida	+	10 cm	CQ16-7	*Utricularia* pk
Utricularia tenella			CQ16-33B	*Utricularia*
Verticordia plumosa var. brachyphylla	4	40 cm	CQ16-1	*Verticordia*
Vulpia bromoides	+	20 cm	CQ16-25	grass
Vulpia muralis	+	40 cm	CQ16-36	?barley grass
Wahlenbergia capensis	+	30 cm		

CERVANTES SITE: CQ17						
Described by	CH	**Date**	31/10/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	331739 mE		6619032 mN		
Habitat	Sandy flats.					
Soil	Grey sand (damp).					
Rock Type	na					
Vegetation	*Melaleuca cuticularis* scattered shrubs over *Tecticornia indica subsp. bidens* low shrubland over *Cotula coronopifolia*, *Isolepis cernua var. setiformis*, *Cotula cotuloides*, *Liparophyllum capitatum*, *Poaceae sp.* (CQ17-3) closed herbland/grassland.					
Veg Condition	(BF) Very Good.					
Fire Age	Greater than 5 years.					
Notes	Search Intensity: rigorous					

QUAD NAME: CQ17				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Angianthus micropodioides	5	8 cm	CQ17-10	*Angianthus* red wire
Angianthus pygmaeus	5	7 cm	CQ17-11	*Angianthus* flat
Apium prostratum var. prostratum	1	30 cm	CQ17-14	*Hydrocotyl* erect
Brachyscome pusilla	+	10 cm	CQ17-8	*Brachyscome* single
Briza minor	+	20 cm		
Calandrinia sp. Kenwick (G.J. Keighery 10905)	2	2 cm	CQ17-7	*Calandrinia* low red
Carpobrotus edulis (check C.modestus and C.virescens)	+	10 cm		*Carpobrotus edulis*
Centaurium spicatum	+	10 cm	=CQ	Scroph square stem
Centrolepis polygyna	+	5 cm	=CQ14-6	*Centrolepis* drum
Cotula coronopifolia	8	15 cm	=CQ2-9	*Cotula* cot
Cotula cotuloides	8	10 cm	=CQ14-9	*Cotula* narrow
Crassula decumbens var. decumbens	1	5 cm	=CQ14-8	*Crassula natans*
Crassula glomerata	+	5 cm	=CQ14-5	*Crassula* orange

Crassula natans var. minus trumpet	2	5 cm	CQ17-12	*Crassula* opposite
Eryngium pinnatifidum	+	25 cm	=CQ	*Eryngium*
Isolepis cernua var. setiformis	10	5 cm	=CQ14-7	*Isolepis cernva*
Isolepis marginata	+	6 cm	CQ17-4	*Isolepis marginata*
Juncus bufonius	+	7 cm	CQ17-9	*Juncus* branched
Juncus capitatus	+	5 cm	=CQ14-10	*Juncus* cap
Lawrencia squamata	+	15 cm	CQ17-5	Thorny scaly
Liparophyllum capitatum	20	15 cm	CQ17-2	*Villarsia* cap
Lolium perenne	+	15 cm	=CQ2-10	*Lolium* swamp
Melaleuca cuticularis	1	100 cm		*Melaleuca cuticularis*
Monopsis debilis	+	25 cm	=CO6	Purple trumpets
Polypogon monspeliensis	1	25 cm	=CQ2-5	Phalaris swamp
Samolus repens var. paucifolius	+	20 cm	CQ17-16	*Samelus* grey
Senecio pinnatifolius var. latilobus	+	30 cm	=CQ6-3	*Senecio lautus*
Sonchus asper	+	20 cm		
Sonchus oleraceus	+	20 cm		
Spergularia sp.	2	15 cm	CQ17-6	*Calandrinia* straight
Stylidium longitubum	+	5 cm	CQ17-13	*Stylidium* nude
Tecticornia indica subsp. bidens	24	100 cm	=CQ14-1	*Tectiornia bidens*
Triglochin minutissima	2	5 cm	CQ17-1	*Triglochin* mini
Triglochin mucronata	+	15 cm	CQ17-15	*Triglochin emex*

CERVANTES SITE: CQ18						
Described by	CH	**Date**	1/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	331743 mE		6619385 mN		
Habitat	Atop low rise.					
Soil	Light yellow brown sand (very slight moisture).					
Rock Type	na					
Vegetation	*Banksia telmatiaea, Scholtzia umbellifera, Calothamnus quadrifidus subsp. quadrifidus* closed heath over *Jacksonia hakeoides* scattered low shrub.					
Veg Condition	(BF) Pristine.					
Fire Age	Greater than 5 years since fire.					
Notes	Search Intensity: rigorous.					

QUAD NAME: CQ 18				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Allocasuarina humilis	+	100 cm	CQ18-2	*Allocasuarina humilis*
Austrostipa compressa	+	30 cm	=CQ6-9	*Austrostipa* flav
Banksia telmatiaea	75	160 cm	=CQ6-1	*Banksia* spaher
Burchardia congesta	+	30 cm		*Burchardia congesta*
Calothamnus quadrifidus subsp. quadrifidus	5	180 cm	CQ18-4	*Calothamnus* quad
Drosera humilis	+	6 cm	CQ18-8	*Drosera stolon* mini
Hakea obliqua subsp. parviflora	1	180 cm	CQ18-5	*Hakea arid* short
Jacksonia hakeoides	+	25 cm	=CQ9-2	*Jacksonia* short
Lepidobolus preissianus	+	40 cm	CQ18-3	*Lyginia* curls
Leucopogon planifolius	+	50 cm	CQ18-6	*Leucopogon styphelia*
Levenhookia stipitata	+	5 cm	CQ18-1	*Levenhookia* maroon
Lysimachia arvensis	+	10 cm		*Anagallis arvensis*
Melaleuca seriata	+	110 cm	=CQ6-12	Mel seriata
Neurachne alopecuroidea	+	30 cm		*Neurachne*
alopecuroidea				
Schoenus	+	2 cm	CQ18-7	*Schoenus clandestine*

clandestinus				
Scholtzia umbellifera	5	150 cm	=CQ11-3	*Scholtzia* heath
Thysanotus manglesianus	+	=CQ6-16		*Thysanotus* mangles
Trachymene pilosa	+	10 cm		

CERVANTES SITE: CQ19						
Described by	BRM	**Date**	1/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	331323 mE		6619016 mN		
Habitat	Crest of low dune.					
Soil	Yellow-brown sand.					
Rock Type	na					
Vegetation	*Banksia prionotes* low woodland (regrowth after fire) over *Acacia spathulifolia* high shrubland over *Scholtzia umbellifera*, *Hibbertia hypericoides*, *Conospermum stoechadis subsp. stoechadis* low shrubland to low open heath over *Lepidobolus preissianus* scattered sedges.					
Veg Condition	(BF) Pristine (low weed cover, track 20m to south).					
Fire Age	Greater than 7 years since fire.					
Notes	Search Intensity: thorough.					

QUAD NAME CQ19				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Acacia sessilis	+	50 cm	CQ19-14	*Acacia* spikey linear lf
Acacia spathulifolia	12	210 cm	CQ19-1	Shrub- *Acacia*
Allocasuarina humilis	1	190 cm	CQ19-16	*Allocasuarina ?humilis*
Lysimachia arvensis	+	6 cm		not flowering
Anigozanthos humilis subsp. humilis	+	20 cm	CQ19-5	*Anigozanthos humilis*
Austrodanthonia occidentalis	+	40 cm	CQ19-6	*Austrodanthonia*
Austrostipa compressa	+	35 cm	CQ19-4	*Austrostipa*
Banksia prionotes	11	300 cm	=CQ10-14	*Banksia prionotes* (regrowth after fire?)
Burchardia congesta	+	30 cm		*Burchardia congesta*
Calothamnus quadrifidus subsp. quadrifidus	+	70 cm	CQ19-19	*Calothamnus* ?quad
Conospermum stoechadis subsp. stoechadis	3	45 cm	CQ19-13	*Conospermum* sterile lf
Conospermum triplinervium	+	30 cm	CQ19-12	*Conospermum*
Conostylis candicans subsp. candicans	+	20 cm	=CQ10-12	*Conostylis candicans*

Conostylis teretifolia subsp. teretifolia	+	6 cm	=CQ5-8	*Conostylis* semi terete obtuse wte hairs
Daviesia divaricata subsp. divaricata	+	60 cm	CQ19-18	*Daviesia divaricate* (LOST?)
Drosera erythrorhiza	+	1 cm		*Drosera erythrorhiza*(descicated)
Drosera humilis	+	12 cm	=CQ4-X2	*Drosera* upright bchg
Drosera menziesii subsp. penicillaris	+	40 cm	CQ19-3	*Drosera* climber pk flrs
Eriochilus dilatatus subsp. multiflorus	+	10 cm	CQ19-15	Orchid spade leaf
Eucalyptus todtiana	2	250 cm		
Hibbertia hypericoides	4	30 cm		Hib hyp
Hypochaeris glabra	+	10 cm		
Isolepis marginata	+	3 cm	=CQ4-9	*Isolepis* marg
Lepidobolus preissianus	+	45 cm	CQ19-11	rush
Leptospermum spinescens	+	80 cm		*Leptospermum spinescens*
Melaleuca systena	+	30 cm	CQ19-17	*Melaleuca*
Petrophile macrostachya	+	30 cm	CQ19-10	*Petrophile macrostachya*
Phyllangium paradoxum	+	4 cm	=CBGC11	*Phyllangium*
Podotheca angustifolia	+	5 cm	CQ19-8	*Podotheca* slender
Pyrorchis nigricans	+	2 cm		
Schoenus clandestinus	+	2 cm	CQ19-2	*Schoenus* clandes
Scholtzia umbellifera	25	70 cm	CQ19-7	*Sholtzia*
Sonchus oleraceus	+	30 cm		
Thysanotus manglesianus/patersonii	+	30 cm		*Thysanotus* mang/pat; *not flowering*
Trachymene coerulea subsp. coerulea	+	15 cm	CQ19-9	flannely flr
Trachymene pilosa	+	10 cm		

CERVANTES SITE: CQ20						
Described by	CH	**Date**	1/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	331892 mE		6620649 mN		
Habitat	Samphire flats with microrelief- quadrat on slightly raised ground.					
Soil	Grey clayey sand (moist).					
Rock Type	na					
Vegetation	*Tecticornia syncarpa*, *Frankenia pauciflora*, *Verticordia plumosa var. brachyphylla*, *Tecticornia indica subsp. bidens* low shrubland over *Angianthus pygmaeus*, *Brachyscome pusilla*, *Isotoma scapigera* low open herbland.					
Veg Condition	(BF) Excellent.					
Fire Age	No recent fire.					
Notes	Search Intensity: intense.					

QUAD NAME: CQ20				
NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Angianthus pygmaeus	5	10 cm	=CQ17-11	*Angianthus* flat
Apium prostratum var. prostratum	+	15 cm	=CQ17-14	*Hydrocotyl* erect
Brachyscome pusilla	2	10 cm	=CQ17-8	*Brachyscome* single
Calandrinia granulifera	2	2 cm	CQ20-12	*Crassula* white
Centaurium tenuiflorum	+	10 cm	CQ20-16	*Centaurium*
Centrolepis aristata	+	5 cm		*Centrolepis* aristata
Drosera menziesii subsp. thysanosepala	+	15 cm	CQ20-15	*Drosera* red salt
Frankenia pauciflora	5	15 cm	CQ20-1	*Frankenia*
Gahnia trifida	1	70 cm		
Heliophila pusilla	1	20 cm	CQ20-10	Irio
Hypochaeris glabra	+	10 cm		
Isolepis marginata	1	5 cm	=CQ17-4	*Isolepis marginata*
Isotoma scapigera	5	10 cm	CQ20-11	Lilac radial
Lawrencia squamata	+	15 cm	CQ20-5	Thorny scaly 2
Lolium perenne	+	20 cm	=CQ2-10	*Lolium* swamp
Philydrella pygmaea subsp. pygmaea	+	10 cm	CQ20-4	*Polypompholyx*
Podolepis capillaris	1	15 cm	CQ20-13	*Podolepis tenuissima*

Quinetia urvillei	1	10 cm	CQ20-7	*Quinetia*
Restionaceae sp.	+	10 cm	CQ20-17	Restio salt
Samolus junceus	+	30 cm	CQ20-2	Samola
Samolus repens var. paucifolius	+	30 cm	=CQ17-16	*Samolus* grey
Tecticornia indica subsp. bidens	+	25 cm	=CQ14-1	*Tecticornia bidens*
Tecticornia syncarpa	24	50 cm	CQ20-6	*Tecticornia* cod
Tribonanthes brachypetala	+	10 cm	CQ20-14	*Tribonanthes*
Triglochin centrocarpa	1	5 cm	CQ20-8	*Triglochin* horns
Utricularia multifida	+	5 cm	CQ20-3	*Utricularia*
Verticordia plumosa var. brachyphylla	1	30 cm	=CCR1-2	*Verticordia* flori
Vulpia bromoides	+	15 cm		*Vulpia bromoides*
Wurmbea dioica	+	10 cm	CQ20-9	*Triglochin* short emex

CERVANTES SITE: CQ21					
Described by	BRM	**Date**	11/11/1931	**Type**	Q
Season	Uniformity				
-Location					
MGA Zone	50	331620 mE		6620889 mN	
Habitat	Very gently, NW-facing broad crest of low dune.				
Soil	Grey brown sand.				
Rock Type	na				
Vegetation	*Banksia attenuata, Banksia menziesii, (Eucalyptus todtiana)* low woodland over *Xanthorrhoea preissii* open shrubland over *Melaleuca systena, Hibbertia hypericoides* low open shrubland over *Lyginia imberbis, Mesomelaena pseudostygia* very open sedgeland.				
Veg Condition	(BF) Very Good (very low weed cover, but some *Ursinia*).				
Fire Age	Greater than 7 years since fire.				
Notes	NB: *Eucalyptus todtiana* cover in broader area is scattered (<2%).				

QUAD NAME: CQ21				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Alexgeorgea nitens	+	10 cm	=CQ1-	*Alexgeorgea*
Amphipogon turbinatus	+	45 cm	=CQ	*Amphipogon*
Anigozanthos humilis subsp. humilis	+	30 cm		*Anigozanthos humilis*
Arnocrinum preissii	+	40 cm	=	*Agrostocrinum*
Austrodanthonia occidentalis	+	40 cm	CQ21-27	*Austrodanthonia*
Austrostipa compressa	+	30 cm	=CQ-	*Austrostipa*
Banksia attenuata	11	400 cm		
Banksia menziesii	8	450 cm		
Blancoa canescens	1	15 cm	=CQ	*Blancoa*
Bossiaea eriocarpa	+	35 cm		*Bossiaea eriocarpa*
Burchardia congesta	+	40 cm		*Burchardia congesta*
Caladenia longicauda subsp. borealis	+	40 cm	CQ21-9	*Caladenia* x 2
Calytrix flavescens	+	30 cm		*Calytrix flavescens*
Calytrix fraseri	+	30 cm	CQ21-17	*Calytrix* fras
Cassytha racemosa	+	30 cm	CQ21-10	*Cassytha*
Conostylis aurea	+	20 cm	CQ21-4	*Conostylis*
Conostylis teretifolia subsp. teretifolia	+	10 cm	=CQ5-	*Conostylis* semi terete obtuse white hrs

Crassula colorata var. colorata	+	3 cm	=CQ1-	*Crassula*
Dampiera linearis	+	30 cm	=CBGC61	*Dampiera linearis*
Dasypogon obliquifolius	11	35 cm	=CBGC	*Dasypogon*
Drosera erythrorhiza	+	1 cm		*Drosera erythrorhiza*
Drosera menziesii subsp. penicillaris	+	35 cm	CQ21-18	*Drosera* climber
Drosera parvula	+	1 cm	=	*Drosera pygmae*
Eremaea asterocarpa subsp. asterocarpa	1	30 cm		*Eremaea asterocarpa*
Eucalyptus todtiana	8	500 cm		
Gompholobium tomentosum	+	40 cm	CQ21-26	*Gompholobium*
Hibbertia hypericoides	1	30 cm		Hib hyp (dead plants to *70cm)*
Hibbertia sp. Gnangara (J.R. Wheeler 2329)	+	20 cm	=CQ23-5	*Hibbertia* straggly long leaves.
Hypocalymma aff. xanthopetalum	+	35 cm	=CQ	*Hypocalymma*
Hypochaeris glabra	+	10 cm		
Hypolaena exsulca	+	20 cm	CQ21-6	*Hypolaena exsulca*
Isolepis marginata	+	3 cm	=CQ4-	*Isolepis* marg
Jacksonia nutans	+	60 cm	CQ21-21	*Jacksonia*
Lepidosperma squamatum complex	+	40 cm	CQ21-16	*Lepidosperma* linear flat/
Lomandra caespitosa	+	15 cm	CQ21-14	*Lomandra* linear flat
Lomandra hermaphrodita	+	15 cm	CQ21-20	*Lomandra* hem
Lomandra preissii	+	20 cm	CQ21-5	?*Lomandra preissii*
Lyginia barbata	1	20 cm	=CQ	(?*Lyginia*)
Lyginia imberbis	7	35 cm	CQ21-7	*Lygnia*
Melaleuca systena	3	30 cm	CQ21-25	*Melaleuca*
Mesomelaena pseudostygia	+	35 cm	=CQ-	*Mesomelaena* pseudo
Patersonia occidentalis	2	60 cm		*Patersonia occidentalis*
Petrophile linearis	+	30 cm		
Phlebocarya ciliata	+	40 cm	CQ21-11	*Phlebocarya* cil
Platysace xerophila	+	30 cm	CQ21-22	*Platysace/ Xanthosia*
Polypogon monspeliensis	+	20 cm	CQ21-24	*Lagurus*
Poranthera microphylla	+	2 cm	=	*Poranthera*

Schoenus brevisetis	+	35 cm	CQ21-15	*Lepidosperma* fine terete
Schoenus curvifolius	+	40 cm	CQ21-28	?*Schoenus curvifolius*
Stirlingia latifolia	+	45 cm		
Stylidium rigidulum	+	12 cm	=CQ4-	Stylid linear rosette hairy frts
Thysanotus thyrsoideus	+	25 cm	=CQ5-	*Thysanotus* upright
Trachymene pilosa	+	4 cm		
Ursinia anthemoides	+	30 cm		
Vulpia muralis	+	20 cm	=CQ	*Vulpia*
Wahlenbergia capensis	+	30 cm		
Xanthorrhoea preissii	4	120 cm	CQ21-1	Xanth preis (Photo BM100:29; flr spike~40% of stalk+spike; square TS, crisp break).
Xanthosia huegelii	+	4 cm	=CQ4-	*Xanthosia*

CERVANTES SITE: CQ22						
Described by	CH	**Date**	1/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332284 mE		6620778 mN		
Habitat	Flats.					
Soil	Grey sand.					
Rock Type	na					
Vegetation	*Regelia ciliata, Banksia telmatiaea, Hakea obliqua subsp. parviflora* closed heath over *Melaleuca seriata*, *Jacksonia hakeoides* scattered low shrubs over *Lyginia imberbis* very open sedgeland.					
Veg Condition	(BF) Pristine.					
Fire Age	Greater than 5 years since fire.					
Notes	Search Intensity: thorough.					

QUAD NAME: CQ22				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Andersonia heterophylla	+	15 cm	CQ22-1	*Andersonia* white
Arctotheca calendula	+	10 cm		
Arnocrinum preissii	+	30 cm	CQ22-10	Acting sp.
Astartea scoparia	1	100 cm	CQ22-9	*Verticordia lineas*
Austrostipa compressa	+	30 cm	=CQ6-9	*Austrostipa* flav
Banksia nivea	3	40 cm	=CQ	*Dryandra lindleyana* long lvs (long lt green lvs, small teeth, clump)
Banksia telmatiaea	30	120 cm	=CQ6-1	*Banksia* sphaer
Burchardia congesta	+	30 cm		*Burchardia congesta*
Callitris arenaria	+	180 cm	CQ22-3	*Actinostrobus*
Cassytha flava	+		=CQ15-1	Dodder hairy
Chordifex sinuosus	1	30 cm	CQ22-8	Restio tears
Conospermum stoechadis subsp. stoechadis	+	80 cm	=CQ9-1	*Conospermum* stoech
Conostylis aculeata subsp. breviflora	1	25 cm	=CQ11-4	*Conostylis aculeata*
Conostylis juncea	+	20 cm	CQ22-14	*Patersonia* saw
Drosera erythrorhiza subsp. magna	+	1 cm	CQ22-5	*Drosera* erythro

Hakea obliqua subsp. parviflora	20	180 cm	=CQ6-2	*Hakea arida*
Hypocalymma aff. xanthopetalum	1	30 cm	=CQ	*Hypocalymma* ?*Xanthium*
Hypochaeris glabra	+	10 cm		beaked achenes
Hypolaena exsulca	+	25 cm		
Isolepis marginata	+	5 cm	CQ22-12	*Isolepis* marg2
Isopogon panduratus subsp. palustris	+	130 cm	=CQ15-4	*Petrophile* bacca
Jacksonia hakeoides	1	25 cm	=CQ9-2	*Jacksonia* short
Lechenaultia stenosepala	+	20 cm	CQ22-16	*Scaevola* recurved.
Lepidosperma sp.	+	20 cm	CQ22-13	*Lepidosperma* terete
Lomandra sp.	+	15 cm	CQ22-6	*Lomandra hermaphrodita*
Lyginia imberbis	1	40 cm	CQ22-2	*Lyginia barbata*
Melaleuca seriata	1	110 cm		*Melaleuca seriata*
Onychosepalum nodatum	+	20 cm	CQ22-11	Restio small knobs
Opercularia vaginata	+	20 cm		
Podotheca gnaphalioides	+	15 cm	CQ22-15	*Podotheca* gnaph
Ptilotus manglesii	+	10 cm	CQ22-7	*Ptilotus manglesii*
Regelia ciliata	30	140 cm	=CQ6-13	*Regelia*
Stylidium cygnorum	+	15 cm	CQ22-4	*Stylidium* repens
Ursinia anthemoides	+	30 cm		
Wahlenbergia capensis	+	30 cm		

CERVANTES SITE: CQ23						
Described by	BRM	**Date**	1/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332550 mE		6620751mN		
Habitat	Gentle, east-facing upper slope of low dune.					
Soil	Pale, yellow-brown sand.					
Rock Type	na					
Vegetation	*Banksia attenuata, Banksia menziesii, (Eucalyptus todtiana)* low woodland over *Hibbertia hypericoides, Melaleuca systena* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.					
Veg Condition	(BF) Pristine (low weed cover).					
Fire Age	Greater than 7 years since fire.					
Notes	Search Intensity: Thorough.					

QUAD NAME:CQ23				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Adenanthos cygnorum subsp. cygnorum	+	130 cm		*Adenanthos cygnorum* dead
Alexgeorgea nitens	+	10 cm	=CQ1	*Alexgeorgea*
Amphipogon turbinatus	+	40 cm	=CQ	*Amphipogon*
Anigozanthos humilis subsp. humilis	+	25 cm	CQ23-19	*Anigozanthos humilis*
Austrostipa compressa	+	40 cm	=	*Austrostipa*
Banksia attenuata	9	350 cm		
Banksia menziesii	6	300 cm		
Blancoa canescens	+	10 cm	=CQ4-	*Blancoa*
Bossiaea eriocarpa	+	30 cm	=	*Bossiaea eriocarpa*
Burchardia congesta	+	40 cm		*Burchardia congesta*
Conostylis juncea	+	20 cm	CQ23-16	*Conostylis* yellow flr
Conostylis teretifolia subsp. teretifolia	+	10 cm	=	*Conostylis* semi terete obtuse white hrs
Corynotheca micrantha	+	30 cm	=CQ10-	*Corinotheca*
Crassula colorata var. colorata	+	1 cm	=CQ1-	*Crassula*
Dasypogon obliquifolius	2	35 cm	=	*Dasypogon*
Drosera menziesii subsp. penicillaris	+	40 cm	CQ23-18	*Drosera* climber
Eremaea beaufortioides	+	90 cm	CQ23-8	*Eremaea* lge nut

var. beaufortioides				
Eucalyptus todtiana	4	450 cm		(part of multi-trunk trees in quadrat)
Goodenia coerulea	+	35 cm	CQ23-17	*Goodeniaceae* pale blue
Haemodorum spicatum	+	80 cm	=CBGC	*Haemodorum spicatum*
Hakea obliqua subsp. parviflora	+	170 cm	CQ23-20	*Hakea* long lf long nut
Hakea ruscifolia	+	170 cm		
Hibbertia hypericoides	5	40 cm		Hib hyp (tops of plants have died back)
Hibbertia sp. Gnangara (J.R. Wheeler 2329)	+	30 cm	CQ23-5	*Hibbertia* straggler, long dk green lf
Hypocalymma aff. xanthopetalum	+	30 cm	=	*Hypocalymma*
Hypochaeris glabra	+	10 cm		
Isolepis marginata	+	3 cm	=CQ	*Isolepis* marg
Jacksonia nutans	2	110-130	CQ23-2	*Jacksonia*
Lepidosperma squamatum complex	+	35 cm	CQ23-4	*Lepidosperma*
Leucopogon sp. Coujinup (M.A. Burgman 1085)	+	20 cm	CQ23-1	*Epiacrid*
Lomandra caespitosa	+	20 cm	CQ23-3	*Lomandra* linear flat
Lyginia barbata	+	30 cm	=	Restio hairy bracts
Melaleuca systena	1	30 cm	=CQ21-	*Melaleuca*
Mesomelaena pseudostygia	3	50 cm	CQ23-14	*Mesomelaena pseudostygia*
Patersonia occidentalis		60 cm		*Patersonia occidentalis*
Petrophile linearis	+	45 cm		
Pimelea sulphurea	+	35 cm	CQ23-6	*Pimelea*
Podotheca gnaphalioides	+	20 cm	CQ23-9	*Podotheca*
Poranthera microphylla	+	3 cm	=	*Poranthera*
Pterostylis aff. vittata	+	20 cm	CQ23-11	*Pterostylis*
Schoenus pleiostemoneus	+	15 cm	CQ23-7	*Schoenus*
Siloxerus humifusus	+	2 cm	=CQ1-	*Siloxerus humilis*
Stylidium araeophyllum	+	2 cm	=CQ4-	Stylid tall pk glauc
Thysanotus manglesianus/patersonii	+	110 cm		*Thysanotus* mang/pat
Thysanotus thyrsoideus	+	30 cm	=CQ5-	*Thysanotus* upright
Trachymene pilosa	+	5 cm		
Tricoryne elatior	+	40 cm	CQ23-12	*Tricoryne* elatior
Ursinia anthemoides	+	20 cm		*Ursinia* sp.
Vulpia muralis	+	20 cm	=	*Vulpia*

Wahlenbergia capensis	+	35 cm		
Xanthosia huegelii	+	15 cm	=CQ4-	*Xanthosia*

CERVANTES SITE: CQ24						
Described by	CH	**Date**	2/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332104 mE		6620101 mN		
Habitat	Flats.					
Soil	Sandy loam (damp).					
Rock Type	na					
Vegetation	*Melaleuca viminea subsp. viminea* open to closed scrub over *Lepidosperma longitudinale* scattered sedges with **Polypogon monspeliensis*, **Lotus subbiflorus*, **Lolium perenne*, **Hordeum geniculatum* closed grassland/herbland.					
Veg Condition	(BF) Good.					
Fire Age	Greater than 5 years since fire.					
Notes	Search Intensity: Thorough.					

QUAD NAME: CQ24				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Briza maxima	2			
Briza minor	1			
Bromus hordeaceus	+		CQ24-2	*Bromus* mad
Cotula coronopifolia	2		=CQ2-9	*Cotula* cot
Ehrharta longiflora	1			
Eryngium pinnatifidum	+		=CQ	*Eryngium*
Hordeum geniculatum	20		=CQ2-8	*Hordeum* swamp
Lepidosperma longitudinale	+			*Lepidosperma*
longitudinale				
Lolium perenne	20		=CQ2-10	*Lolium* swamp
Lotus subbiflorus	30		=CQ14-2	*Lotus* sub
Lysimachia arvensis	+			*Anagallis arvensis* blue
Meeboldina coangustata	1		CQ24-3	*Meeboldina coangustata*
Melaleuca viminea subsp. viminea	80	400 cm	CQ24-1	*Melaleuca viminea*
Polypogon monspeliensis	20		=CQ2-5	*Phaloris* swamp
Samolus repens var. paucifolius	1		=CQ17-16	*Samolus* grey

Sonchus asper	3			
Sonchus oleraceus	3			

CERVANTES SITE: CQ25						
Described by	BRM	**Date**	2/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	331602 mE		6619601 mN		
Habitat	Crest of low sand dune.					
Soil	Yellow-brown sand.					
Rock Type						
Vegetation	*Banksia* prionotes open scrub (regorwth after fire ??) over *Hakea obliqua subsp. parviflora*, *Acacia spathulifolia* high open shrubland over *Calothamnus quadrifidus subsp. quadrifidus*, *Scholtzia umbellifera* shrubland over *Hibbertia hypericoides*, *Conospermum stoechadis subsp. stoechadis* low shrubland over *Lepidobolus preissianus* scattered sedges.					
Veg Condition	(BF) Pristine (very low weed cover).					
Fire Age	Greater than 7 years since fire.					
Notes	Search Intensity: Thorough.					

QUAD NAME: CQ25				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Acacia spathulifolia	2	210 cm	=CQ	?*Acacia* succulent
Actinotus leucocephalus	+	10 cm	=CQ	flannel flr ?daisy whte
Anigozanthos humilis subsp. humilis	+	25 cm	=CQ23-	*Anigozanthos humilis*
Arnocrinum preissii	+	45 cm	=	*Agrostocrinum*
Austrostipa compressa	+	40 cm	=	*Austrostipa*
Banksia dallanneyi var dallanneyi	+	12 cm	=CQ4-	*Dryandra* brchg at ground level
Banksia prionotes	35-40	400 cm		*Banksia prionotes* regrowth after fire?
Burchardia congesta	+	50 cm		*Burchardia congesta*
Calothamnus quadrifidus subsp. quadrifidus	3- 4	150 (210)	CQ25-2	*Calothamnus* ?quad
Conospermum stoechadis subsp. stoechadis	2- 3	80- 100	=CQ	*Conospermum* terete lf
Conostylis candicans subsp. candicans	+	15 cm	=CQ10-	?*Conostylis candicans*
Conostylis teretifolia	+	6 cm	=	*Conostylis* semi terete

subsp. teretifolia				white hairs
Corynotheca micrantha	+	20 cm	=	*Corinotheca*
Hakea obliqua subsp. parviflora	2	250 cm	=CQ23-	*Hakea* long lf/ long frt
Hibbertia hypericoides	20	45 cm		Extreme dieback of Hib hyp
Lepidobolus preissianus	+	45 cm	=CQ	?*Lepidobolus* rush
Leucopogon planifolius	+	35 cm	CQ25-4	*Epacrid*
Melaleuca clavifolia	+	70 cm	CQ25-6	spade lf shrub spikey
Melaleuca systena	+	40 cm	=CQ23-	*Melaleuca*
Mesomelaena pseudostygia	+	30 cm	=CQ1-	*Mesomelaena* pseudo
Opercularia vaginata	+	30 cm	CQ25-7	*Operculum* vag
Poranthera microphylla	+	3 cm	=CQ	*Poranthera*
Schoenus clandestinus	+	3 cm	CQ25-5	*Schoenus* clandest
Scholtzia umbellifera	11	90-190 cm	CQ25-1	*Sholtzia*
Stylidium rigidulum	+	10 cm	=CQ4-	Stylid linear rosette, long frts
Thysanotus manglesianus/patersonii	+	170 cm		*Thysanotus* mang/pat (finished flowering)
Trachymene pilosa	+	10 cm		
Xanthosia huegelii	+	15 cm	=CQ	*Xanthosia*

CERVANTES SITE: CQ26						
Described by	CH	**Date**	2/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	331837 mE		6619542 mN		
Habitat	Flats.					
Soil	Brown sand (wet).					
Rock Type	na					
Vegetation	*Melaleuca brevifolia* open shrubland over *Verticordia plumosa var. brachyphylla, Frankenia pauciflora, Tecticornia indica subsp. bidens, Grevillea thelemanniana subsp*. Cooljarloo (B.J. Keighery 28 B) low open heath over *Brachyscome pusilla, Angianthus micropodioides* low open herbland.					
Veg Condition	(BF) Excellent.					
Fire Age	Greater than 5 years					
Notes	Search Intensity: Intense.					

QUAD NAME: CQ26				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Angianthus micropodioides	2	10 cm	=CQ17-10	*Angianthus* red wire
Brachyscome pusilla	3	7 cm	=CQ17-8	*Brachyscome* single
Briza minor	+	20 cm		
Caladenia longicauda subsp. borealis	+	20 cm	CQ26-2	*Caladenia* branched
Calandrinia granulifera	1	1 cm	=CQ20-12	*Crassula* white
Centaurium spicatum	+	10 cm	=CQ2-11	Scroph square stem
Centrolepis aristata	1	5 cm		
Centrolepis mutica	+	3 cm	CQ26-4	*Centrolepis* awnless
Centrolepis polygyna	+	3 cm	=CQ14-6	*Centrolepus* drum
Conostylis aculeata subsp. breviflora	+	25 cm	=CQ11-4	*Conostylis aculeata*
Cotula cotuloides	+	15 cm	=CQ14-9	*Cotula* narrow
Drosera menziesii subsp. thysanosepala	+	10 cm	=CQ20-15	*Drosera* red salt
Eryngium pinnatifidum	+	25 cm		
Frankenia pauciflora	20	15 cm	=CQ20-1	*Frankenia*
Goodenia pulchella	+	3 cm	CQ26-9	*Goodenia* micro

subsp. Coastal Plain A (M. Hislop 634)				
Grevillea thelemanniana subsp. Cooljarloo (B.J. Keighery 28 B)	2	50 cm	CQ26-8	*Grevillea* low green
Hypochaeris glabra	+	15 cm		
Isolepis cernua var. setiformis	1	3 cm	=CQ14-7	*Isolepis cernua*
Isolepis marginata	+	8 cm	CQ26-10	*Isolepis* big marg
Juncus capitatus	+	6 cm	=CQ14-10	*Juncus* cap
Lawrencia squamata	+	15 cm	=CQ20-5	Thorny scaly
Lotus subbiflorus	+	5 cm	=CQ14-2	*Lotus* sub
Lysimachia arvensis	+	15 cm		*Anagallis arvensis* blue
Meeboldina cana	+	70 cm	CQ26-7	*Meeboldina cana*
Melaleuca brevifolia	6	140 cm	=CO-4	*Melaleuca* yellow short
Melaleuca seriata	+	45 cm	=CQ6-12	*Melaleuca seriata*
Monopsis debilis	+	6 cm	=CO-6	purple trumpets
Parentucellia latifolia	+	10 cm	CQ26-1	*Parentucellia* lat
Petrophile seminuda	+	30 cm	CQ26-12	*Petrophile* salt
Philydrella pygmaea subsp. pygmaea	+	10 cm	=CQ20-4	*Polypompholyx*
Polypogon monspeliensis	+	20 cm	=CQ2-5	*Phalaris* swamp
Quinetia urvillei	+	6 cm	=CQ20-7	*Quinetia*
Schoenus plumosus	+	12 cm	CQ26-14	*Schoenus sculptus*
Siloxerus humifusus	+	2 cm	CQ26-5	*Siloxerus humifusus*
Stylidium aceratum	+	4 cm	CQ26-6	*Stylidium calcaratum*
Stylidium dichotomum	+	15 cm	CQ26-13	*Stylidium* stilted
Stylidium longitubum	+	5 cm	=CQ17-13	*Stylidium* nude
Tecticornia indica subsp. bidens	10	30 cm	=CQ14-1	*Tecticornia bidens*
Tribonanthes brachypetala	+	20 cm	=CQ20-14	*Tribonanthes*
Triglochin minutissima	+	4 cm	=CQ17-1	*Triglochin* mini
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	8 cm	CQ26-3	*Triglochin* witches
Utricularia multifida	+	10 cm	=CQ20-3	*Utricularia*
Verticordia densiflora var. cespitosa	+	40 cm	CQ26-11	*Verticordia* white
Verticordia plumosa	20	50 cm	=CCR1-2	*Verticordia* flori

var. brachyphylla				
Vulpia muralis	+	20 cm		*Vulpia myuros*

CERVANTES SITE: CQ27						
Described by	BRM	**Date**	20/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50		332429 mE			6619932 mN
Habitat	Broad flat on very gently undulating plain.					
Soil	Light, grey brown sand.					
Rock Type	na					
Vegetation	*Melaleuca seriata, Banksia telmatiaea, (Regelia ciliata)* low open heath over *Conostylis aculeata subsp. breviflora, *Vulpia bromoides, *Juncus bufonius, Centrolepis aristida* open herbland/grassland/sedgeland.					
Veg Condition	(BF) Very Good (medium weed cover; maybe long term impacts of nearby farming on water tables/salt).					
Fire Age	Greater than 7 years.					
Notes	Search Intensity: Thorough					

QUAD NAME: CQ27				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
	+	160 cm		*Acacia saligna*
Aira cupaniana	+	10 cm	CQ27-11	*Aira*
Aphelia cyperoides	+	3 cm	CQ27-15	*Aphelia*
Austrostipa compressa	+	35 cm	CQ27-29	*Austrostipa*
Baeckea grandiflora	+	35 cm	CQ27-24	? *Baeckea* cryth
Banksia nivea	+	40 cm	=CQ12	*Dryandra* long thin lf *(some dying)*
Banksia telmatiaea	1.5	60 cm	=CBR14-2	*Banksia* ?sphaer (1.5% alive; 12% dead; numerous juveniles to15 cm seen)
Brachyscome pusilla	+	6 cm	CQ27-36	wte head herb
Briza maxima	+	30 cm		
Briza minor	+	15 cm		
Burchardia bairdiae	+	25 cm	CQ27-39	*Burchardia bairdiae*
Burchardia sp.	+	50 cm	CQ27-28	*Burchardia ?congesta*
Caladenia longicauda subsp. borealis	+	12 cm	CQ27-41	narrow lf, orchid
Calytrix flavescens	+	30 cm	CQ27-43	*Calytrix* yllw
Cassytha flava	+	50 cm	CQ27-2	*Cassytha*

Centaurium sp.	+	15 cm	=	*Centaurium*
Centrolepis aristata	2-3	4 cm	CQ27-8	*Centrolepus aristida*
Centrolepis polygyna	+	3 cm	CQ27-20	*Centrolepis* long awn
Chaetanthus aristatus	+	35 cm	CQ27-48	*Hypolaena*
Conostylis aculeata subsp. breviflora	7	20 cm	CQ27-6	*Conostylis*
Crassula colorata var. acuminata	+	6 cm	CQ27-26	*Crassula* col
Crassula decumbens var. decumbens	+	3 cm	CQ27-49	*Crassula #2*
Cyperus tenellus	+	2 cm	CQ27-17	*Cyperus*
Drosera closterostigma	+	3 cm	CQ27-37	*Pygmae Drosera*
Drosera menziesii subsp. thysanosepala	+	30 cm	CQ27-31	*Drosera* climber red
Ehrharta calycina	+	50 cm		Ehrh *calycina*
Hibbertia stellaris	+	20 cm	CQ27-45	*Hibbertia ?stellaris*
Hypochaeris glabra	+	2 cm		
Isolepis cernua var. setiformis	+	6 cm	CQ27-42	*Isolepis* c
Isolepis marginata	+	3 cm	CQ27-35	small sedge
Juncus bufonius	4-5	15 cm	CQ27-13	*Juncus*
Juncus capitatus	1	3 cm	CQ27-19	triangle head sedge
Lolium temulentum	+	20 cm	CQ27-38	cylinder grass (grass)
Lomandra ?caespitosa	+	20 cm	CQ27-5	*Lomandra*
Lotus subbiflorus	+	4 cm	CQ27-10	hairy lotus
Lysimachia arvensis	+	15 cm		*Anagallis arvensis* blue
Melaleuca seriata	40	50 cm	CQ27-3	*Melaleuca*
Monopsis debilis	2	4 cm	CQ27-12	purple flower herb
Ornithopus pinnatus	+	10 cm	CQ27-7	*Lotus* yellow flower
Pogonolepis stricta	+	3 cm	CQ27-16	*Blennospora*
Polypogon monspeliensis	+	20 cm	CQ27-25	*Phalaris*
Ptilotus manglesii	+	12 cm	CQ27-22	shiny lanceolate grn lf
Regelia ciliata	+	45 cm	CQ27-30	*Regelia*
Schoenus plumosus	+	5 cm	CQ27-21	pty head herb
Siloxerus humifusus	1	2 cm	CQ27-4	*Siloxerus*
Sonchus oleraceus	+	20 cm		
Stirlingia latifolia	+	30 cm	=CBGC	*Stirlingia dentate* lf
Stylidium aceratum	+	4 cm	CQ27-14	Stylid dentate rear petals
Tribonanthes	+	30 cm	CQ27-40	? *Tribonanthes*

brachypetala				
Triglochin nana	+	4 cm	CQ27-34	*Triglochin* fine
Ursinia anthemoides	+	20 cm		
Vellereophyton dealbatum	+	12 cm	CQ27-18	wte daisy
Verticordia densiflora var. cespitosa	+	45 cm	CQ27-1	?*Verticordia*
Vulpia bromoides	2-3	20 cm	CQ27-9	*Vulpia*
Vulpia muralis	+	35 cm	CQ27-33	Compact head grass
Wahlenbergia capensis	+	40 cm		

CERVANTES SITE: CQ28						
Described by	BRM	**Date**	21/11/2011	**Type**	Q	10m x 10m
Season	Uniformity					
Location						
MGA Zone	50	332406 mE		6619635 mN		
Habitat	Broad, shallow depression on broad very gently undulating plain					
Soil	Light brown sand.					
Rock Type	na					
Vegetation	*Tecticornia indica subsp. bidens* low shrubland over *Angianthus micropodioides*, **Juncus bufonius*, *Quinetia urvillei* open herbland/sedgeland/grassland.					
Veg Condition	(BF) ?Excellent (low weed cover?; probably LT water table due to farm clearing/irrigation on adjacent properties).					
Fire Age	Greater than 7 years since fire.					
Notes	Elevation: 43m; Search Intensity: thorough					

QUAD NAME: CQ28				
SPECIES NAME	C CLASS	HEIGHT	SPECIMEN	NOTES
Angianthus micropodioides	4	5 cm	CQ28-5	yellow top daisy
Angianthus preissianus	+	3 cm	CQ28-31	Daisy cmpd head
Apium prostratum var. prostratum	+	20 cm	CQ28-1	*Dorcaus/ Hydrocotyl*
Brachyscome pusilla	+	10 cm	=CQ27-44	wte daisy
Briza minor	+	20 cm		
Calandrinia granulifera	+	3 cm	CQ28-25	*Calandrinia* wte succ lf
Centaurium sp.	+	10 cm	=	*Centaurium*
Centrolepis aristata	+	5 cm	=CQ27	*Centrolepis aristata*
Centrolepis polygyna	+	4 cm	=CQ27-	*Centrolepis* fine
Drosera menziesii subsp. thysanosepala	+	5 cm	CQ28-9	*Drosera*
Frankenia pauciflora	+	15 cm	CQ28-23	?*Verticordia* red stems
Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)	+	5 cm	CQ28-26	sht *Goodeniaceae* type hb
Hainardia cylindrica	+	20 cm	CQ28-35	rye grass
Hypochaeris glabra	+	20 cm		
Isolepis marginata	+	3 cm	CQ28-29	*Cyperus*
Isotoma scapigera	+	10 cm	CQ28-3	*Lobelia*, red stem basal lf

Juncus bufonius	3	12 cm	=CQ27-	*Juncus*
Juncus capitatus	+	3 cm	CQ28-34	*Cyperus*
Lawrencia squamata	+	20 cm	CQ28-15	*Lanceolate* lf
Lysimachia arvensis	+	20 cm		*Anagallis arvensis* blue
Philydrella pygmaea subsp. pygmaea	+	4 cm	CQ28-16	herb
Polypogon monspeliensis	+	20 cm	CQ28-14	?*Phellaris* grass
Quinetia urvillei	2	4 cm	CQ28-6	*Urvillei* daisy
Sonchus oleraceus	+	20 cm		
Spergularia sp.	+	3 cm	CQ28-11	pk flr herb
Tecticornia indica subsp. bidens	15-20	30-40 cm	CQ28-2	Samphire cyl stack *Tecticornia lepidosperma*
Tribonanthes brachypetala	+	15 cm	CQ28-10	*Tribonanthes*
Triglochin centrocarpa	+	10 cm	CQ28-28	*Goodenia*
Triglochin mucronata	+	6 cm	CQ28-17	*Tribonanthes* block head
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	10 cm	CQ28-4	*Thiglochin* witches hats
Vulpia muralis	+	20 cm	CQ28-19	*Vulpia*
Wurmbea dioica	+	5 cm	CQ28-21	*Wumbea*

APPENDIX SEVEN

Releve descriptions and species lists for the Atlas Tenement survey area

Note: these sites descriptions were recorded for mapping notes and do not have a complete species list, but list representative species under 'Associated species'.

RELEVES

CERVANTES SITE: CBR1			
Described by	BM	**Date**	30/10/2011
Photo		BM100:11, 12	
AMG		Zone 50 331961mE, 6618245mN (WGS84)	
Habitat		Broad flat plain.	
Soil		Grey-brown sand	
Rock Type		na	
Vegetation:		(*Eucalyptus todtiana* (180cm), *Banksia prionotes* (300cm) scattered low trees) over *Adenanthos cygnorum* subsp. *cygnorum* scattered tall shrubs to high open shrubland over *Acacia pulchella*, *Conospermum triplinervium*, *Daviesia divaricata* subsp. *divaricata* scattered shrubs over *Melaleuca clavifolia*, *Hibbertia hypericoides*, *Jacksonia hakeoides* (40cm), *Conospermum stoechadis* subsp. *stoechadis*, *Allocasuarina humilis* (100cm), *Eremaea pauciflora* var. *lonchophylla* low heath.	
Assoc. species:		*Calothamnus quadrifidus subsp. quadrifidus* (100cm).	
Veg Condition (BF)		?Pristine (low weed cover)	
Fire Age:		More than 7 years since fire.	

CERVANTES SITE: CBR2			
Described by	BM	**Date**	30/10/2011
Photo		BM100:17-19	
AMG		Zone 50 332286mE, 6618790mN (WGS84)	
Habitat		Low lying flat flood banks of narrow shallow flow area	
Soil		Pale brown sand (saturated)	
Rock Type		na	
Vegetation		*Melaleuca viminea* subsp. *viminea* (50%), (*Callitris arenaria* 2-3%) open scrub over *Melaleuca brevifolia* scattered shrubs over **Lotus subbiflorus*, **Juncus bufonius*, *Centrolepis polygyna*, **Monopsis debilis*, **Cotula coronopifolia*, **Crassula glomerata*, *Crassula decumbens* var. *decumbens* herbland/sedgeland.	
Assoc. species		*Tecticornia indica* subsp. *bidens*, *Gahnia trifida*, *Velleia trinervis*, Lythrum hyssopifolia, *Eryngium pinnatifidum* (30cm), *Samolus junceus*.	
Veg Condition (BF)			
Fire Age		Greater than 7 years since fire.	
Notes		NB *Banksia* dying on edge of unit ?salt. NB flow line (Photo	

	BM100:19) veg is: *Melaleuca viminea* subsp. *viminea* over *Cyperus gymnocaulos*, *Tecticornia indica* subsp. *bidens* open herbland/sedgeland.

CERVANTES SITE: CBR3			
Described by	BM	**Date**	2/11/2011
Photo		BM100:30, 31	
AMG		Zone 50 331613mE,6620207mN (WGS84)	
Habitat		Large flat seasonal dampland (broad flat depression) on plain.	
Soil		Grey-brown sand	
Rock Type		na	
Vegetation		*Melaleuca viminea* subsp. *viminea* scattered shrubs (occasional patches of shrubland) over *Callitris arenaria*, *Banksia telmatiaea*, *Regelia ciliata* low closed heath over **Lotus subbiflorus*, **Monopsis debilis*, **Cotula coronopifolia*, *Isolepis cernua* var. *setiformis* herbland/sedgeland.	
Assoc. species		*Triglochin* sp. A Flora of Australia (G.J. Keighery 2477), *Melaleuca seriata, Verticordia densiflora*, *Brachyscome pusilla*, *Hakea obliqua* subsp. *parviflora*, *Podolepis gracilis*, *Cassytha flava*, *Banksia nivea*, **Lolium perenne*, **Arctotheca calendula* (Capeweed), *Thysanotus manglesianus*, *Stylidium longitubum*, *Melaleuca brevifolia*.	
Veg Condition (BF)		Good (high density of weeds ~80% in herb layer)	
Fire Age		7 or more years since fire.	

CERVANTES SITE: CBR4			
Described by	BM	**Date**	2/11/2011
Photo		BM100	
AMG		Zone 50 331937mE, 6620190mN (WGS84)	
Habitat		Broad, flat depression on plain.	
Soil		Grey-brown loamy sand (surface).	
Rock Type			
Vegetation		*Tecticornia indica* subsp. *bidens* open low shrubland over *Angianthus micropodioides*, **Cotula coronopifolia*, **Juncus bufonius*, *Isolepis cernua* var. *setiformis*, **Monopsis debilis*, **Polypogon monspeliensis*.	
Assoc. species		*Verticordia plumosa* var. *brachyphylla*, **Hypochaeris glabra*, **Ehrharta longiflora*, **Lolium perenne*, *Eryngium pinnatifidum*, **Briza minor*, *Lawrencia squamata*, *Samolus repens* var. *paucifolius*, *Tecticornia halocnemoides*.	

Veg Condition (BF)	Mostly G, VG in a few patches where less weeds.
Fire Age	Greater than 7 years since last fire.

CERVANTES SITE: CBR5			
Described by	BM	Date	15/11/2011
AMG		Zone 50 332713mE, 6617007mN (WGS84)	
Habitat		Broad flat plain	
Soil		Grey sand	
Rock Type		na	
Vegetation		*Banksia attenuata, Banksia menziesii, Eucalyptus todtiana* low woodland to low open forest over *Adenanthos cygnorum subsp. cygnorum* high shrubland to open scrub over *Hibbertia hypericoides* low shrubland.	
Assoc. species		*Burchardia congesta, Dasypogon obliquifolius, Trachymene pilosa, Stirlingia latifolia, Bossiaea eriocarpa, Patersonia occidentalis*.	
Veg Condition (BF)		Excellent (very low weed cover)	
Fire Age		Greater than 10 years since last fire.	
Notes		NB Especially close to the Eastern boundary track.	

CERVANTES SITE: CBR6			
Described by	BM	Date	16/11/2011
Photo		BM100:11, 12	
AMG		Zone 50 331434mE, 6617352mN (WGS84)	
Habitat		Broad, very gently undulating plain.	
Soil		Grey-Brown sand.	
Rock Type		na	
Vegetation		*Banksia attenuata, Banksia menziesii, Eucalyptus todtiana* low woodland over *Adenanthos cygnorum* subsp. *cygnorum* scattered tall shrubs to high open shrubland over *Scholtzia umbellifera* open shrubland over *Hibbertia hypericoides*, *Eremaea asterocarpa* subsp. *asterocarpa*, *Melaleuca* sp. low open heath over *Mesomelaena pseudostygia* scattered sedges.	
Assoc. species		*Acacia sessilis*, *Calytrix sapphirina* (70cm), *Jacksonia nutans*, *Blancoa canescens*, *Acacia spathulifolia*, Bossiaea eriocarpa, *Conostylis candicans* subsp. *candicans*, *Allocasuarina humilis*, *Petrophile linearis*, *Banksia prionotes*.	
Veg Condition (BF)		Excellent to Pristine.	
Fire Age		Greater than 7-10 years.	

Notes	

CERVANTES SITE: CBR7			
Described by	BM	Date	16/11/2011
Photo	BM100:		
AMG	Zone 50 332134mE, 6617483mN (WGS84)		
Habitat	Shallow depression on very gently undulating plain.		
Soil	Light brown sand.		
Rock Type	na		
Vegetation	*Melaleuca rhaphiophylla* high open shrubland over *Regelia ciliata*, *Banksia telmatiaea* open to closed heath over *Philotheca spicata* subsp. Moore River National Park (G. & D. Woodman Op 47), *Melaleuca clavifolia* scattered low shrubs over *Lepidosperma longitudinale* scattered sedges to very open sedgeland.		
Assoc. species	*Phyllanthus calycinus*, *Allocasuarina lehmanniana* subsp. *lehmanniana* (280 cm), *Asteridea pulverulenta*, *Trachymene pilosa*, *Melaleuca teretifolia*, *Exocarpos sparteus*, *Olearia axillaris*, *Prasophyllum gracile*.		
Veg Condition (BF)	Excellent (low weed cover).		
Fire Age	More than 7-10 years since last fire.		

CERVANTES SITE: CBR8			
Described by	BM	Date	17/11/2011
Photo	BM100:23, 24 lk East		
AMG	Zone 50 332053mE, 6618086mN (WGS84)		
Habitat	Broad depression on very gently undulating plain		
Soil	Grey-brown sand.		
Rock Type	na		
Vegetation	*Allocasuarina lehmanniana* subsp. *lehmanniana* scattered tall shrubs to high open shrubland over *Melaleuca rhaphiophylla*, *Melaleuca teretifolia* open scrub over *Schoenus subfascicularis* open sedgeland.		
Assoc. species	*Conostylis festucacea* subsp. *festucacea*, *Eriochilus dilatatus* subsp. *multiflorus*, *Goodenia pulchella* subsp. Coastal Plain A (M. Hislop 634), *Samolus junceus*, *Calandrinia granulifera*, *Drosera gigantea*, **Centaurium tenuiflorum*, *Podolepis gracilis*, *Daucus glochidiatus*, *Hakea varia*, *Hakea trifurcata*, *Petrophile seminuda*, *Hibbertia stellaris*.		
Veg Condition (BF)	VG (quite low weed cover of **Lysimachia arvensis*, **Ursinia anthemoides*, ?*Aira* (5-10%)		
Fire Age	More than 7-10 years since fire.		

CERVANTES SITE: CBR9			
Described by	BM	**Date**	17/11/2011
Photo		BM100:25, 26	
AMG		Zone 50 331859mE, 6617990mN (WGS84)	
Habitat		Gentle, East-facing slope on very gently undulating plain (adjacent to seasonal dampland depression)	
Soil		Grey-brown sand.	
Rock Type		na	
Vegetation		*Eucalyptus todtiana* (2-10%), *Banksia attenuata*, *Banksia menziesii* (mostly regrowth Banksia) low open woodland to low woodland over *Adenanthos cygnorum* high open shrubland to high shrubland over *Jacksonia nutans* scattered shrubs over *Melaleuca systena*, *Petrophile rigida*, *Hibbertia hypericoides*, *Eremaea asterocarpa* subsp. *asterocarpa* low shrubland to low heath.	
Assoc. species			
Veg Condition (BF)		Excellent to Pristine (very low weed cover)	

CERVANTES SITE: CBR10			
Described by	BM	**Date**	18/11/2011
Photo		BM100:49, 50	
AMG		Zone 50 332243mE, 6618491mN (WGS84)	
Habitat		Low rise on plain	
Soil		Grey-brown sand	
Rock Type		na	
Vegetation		*Banksia prionotes* open scrub (50-60%) over *Hakea obliqua* subsp. *parviflora* scattered tall shrubs over *Banksia telmatiaea* open shrubland over *Melaleuca seriata*, *Hibbertia hypericoides*, *Eremaea pauciflora* var. *lonchophylla* low shrubland over *Austrostipa compressa* scattered grasses.	
Assoc. species		*Eucalyptus todtiana*, *Banksia attenuata*, *Banksia menziesii*, *Conostylis festucacea* subsp. *festucacea*.	
Veg Condition (BF)		Excellent (very low weed cover, no disturbance)	
Fire Age		More than 10 years since fire.	

CERVANTES SITE: CBR11			
Described by	BM	**Date**	19/11/2011
Photo	BM100:59, 60		
AMG	Zone 50 332145mE, 6618790mN (WGS84)		
Habitat	Broad shallow flow line on plain.		
Soil	Pale brown sand.		
Rock Type	na		
Vegetation	*Melaleuca rhaphiophylla*, *Melaleuca viminea* subsp. *viminea* high shrubland over *Melaleuca brevifolia* open shrubland over *Regelia ciliata*, *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B) low open shrubland over *Gahnia trifida*, *Schoenus subfascicularis* very open sedgeland (patchy) with **Cotula coronopifolia*, *Cotula cotuloides* (2cm), *Calandrinia* sp. Kenwick (G.J. Keighery 10905), *Dysphania plantaginella* open herbland.		
Assoc. species	*Isolepis cernua* var. *setiformis*, *Brachyscome iberidifolia*, *Melaleuca seriata* (40cm), *Petrophile seminuda*, *Senecio pinnatifolius* var. *latilobus*, *Samolus junceus*.		
Veg Condition (BF)	?G-VG (patches VG)		

CERVANTES SITE: CBR12			
Described by	BM	**Date**	19/11/2011
Photo	BM100:61		
AMG	Zone 50 332104mE, 6619087mN (WGS84)		
Habitat	Flats adjacent to flow line.		
Soil	Pale brown sand.		
Rock Type	na		
Vegetation	*Tecticornia indica* subsp. *bidens* low shrubland over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Lythrum hyssopifolia*, **Cotula coronopifolia*, **Lotus subbiflorus* herbland/sedgeland.		
Assoc. species	**Monopsis debilis*, **Arctotheca calendula*, **Hypochaeris glabra*, *Centaurium spicatum*, **Lysimachia arvensis*, **Polypogon monspeliensis*, **Crassula glomerata*, *Eryngium pinnatifidum*, **Asphodelus fistulosus*.		
Veg Condition (BF)	?Good (quite high weed cover)		

CERVANTES SITE: CBR13			
Described by	BM	Date	19/11/2011
Photo	BM100:62		
AMG	Zone 50 331392mE, 6619196mN (WGS84)		
Habitat	Edge of low flats on plain.		
Soil	Light brown clayey sand.		
Rock Type			
Vegetation	*Melaleuca acutifolia*, *Melaleuca cuticularis*, *Melaleuca brevifolia*, *Melaleuca viminea* subsp. *viminea* closed scrub over *Gahnia trifida* scattered sedges and very open herbland.		
Assoc. species	*Tecticornia indica* subsp. *bidens*, *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B), *Lawrencia squamata* (20cm)		
Veg Condition (BF)	Good-Very Good (high weed cover).		
Fire Age	More than 7-10 years since last fire.		

CERVANTES SITE: CBR14			
Described by	BM	Date	20/11/2011
Photo	BM100:64-66		
AMG	Zone 50 332092mE, 6619744mN (WGS84)		
Habitat	Low rise on broad plain and surrounded by large area of mostly Samphire flats.		
Soil	Yellow sand.		
Rock Type	na		
Vegetation	*Banksia prionotes*, *Hakea obliqua* subsp. *parviflora* scattered tall shrubs over *Calothamnus quadrifidus* subsp. *quadrifidus*, *Banksia telmatiaea*, *Eremaea pauciflora* var. *lonchophylla* (140cm) closed heath over *Hibbertia hypericoides* scattered low shrubs over *Lepidobolus preissianus* scattered sedges.		
Assoc. species	*Scholtzia umbellifera*, *Isopogon panduratus* subsp. *palustris*, *Eucalyptus todtiana*, *Conospermum stoechadis* subsp. *stoechadis*, *Thysanotus asper*, *Banksia dallanneyi* var. *dallanneyi*, *Neurachne alopecuroidea*, *Leucopogon planifolius* (45cm), *Hakea prostrata*.		
Veg Condition (BF)	Excellent to Pristine (very low weed cover, track near by)		
Notes	NB Most B prionotes dead suggests marginal environment.		

CERVANTES SITE: CBR15			
Described by	BM	Date	20/11/2011
Photo	BM100:68-72		
AMG	Zone 50 331325mE, 6620026mN (WGS84)		
Habitat	Low areas on broad plain.		
Soil	Grey sand with iron stains.		
Rock Type	na		
Vegetation	*Melaleuca brevifolia*, *Callitris arenaria* open heath over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Cotula coronopifolia*, **Lotus subbiflorus* herbland/sedgeland/grassland.		
Assoc. species	*Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B), *Centaurium* sp., **Crassula glomerata*, *Eryngium pinnatifidum*, *Hordeum* sp.		
Veg Condition (BF)	?Very Good (weeds present)		
Fire Age	More than 7 years since last fire.		

CERVANTES SITE: CBR16			
Described by	BM	Date	20/11/2011
Photo	BM100:80, 81		
AMG	Zone 50 332587mE, 6620218mN (WGS84)		
Habitat	Creek banks.		
Soil	Light brown sand.		
Rock Type	na		
Vegetation	*Melaleuca rhaphiophylla*, *Melaleuca concreta* high open shrubland to closed scrub (patchy) over *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B) scattered low shrubs over *Cyperus gymnocaulos*, *Lepidosperma longitudinale* sedgeland (on edge of banks) and **Lotus subbiflorus*, **Polypogon monspeliensis*, **Hordeum geniculatum* closed herbland/grassland.		
Assoc. species	Ac saligna.		
Veg Condition (BF)	Good to Degraded (large areas of banks are **Lotus* sp. herblands of weeds)		
Fire Age	More than 7 years since fire.		

CERVANTES SITE: CCR1			
Described by	CH	Date	1/11/2011
Photo	BM100: 0981/87		
AMG	Zone 50 331648mE, 6619268mN (WGS84)		
Habitat	Flats north of drainage line.		
Soil	Brown loamy sand (damp).		
Rock Type	na		
Vegetation	*Melaleuca brevifolia* open shrubland over *Tecticornia indica* subsp. *bidens* low shrubland over **Cotula coronopifolia*, **Lotus subbiflorus*, **Monopsis debilis*, *Isolepis cernua* var. *setiformis*, *Crassula decumbens* var. *decumbens*, **Vulpia bromoides* closed herbland/grassland.		
Assoc. species	*Lawrencia squamata*, *Epilobium hirtigerum*, *Verticordia plumosa* var. *brachyphylla*, *Angianthus micropodioides*, *Centaurium spicatum*.		
Veg Condition (BF)	Very Good.		
Fire Age	More than 5 years since fire.		

CERVANTES SITE: CCR2			
Described by	CH	Date	2/11/2011
Photo	BM100: 0987/93		
AMG	Zone 50 332353mE, 6620205mN (WGS84)		
Habitat	Flat ground on margin of watercourse.		
Soil	Brown damp silty sand.		
Rock Type	na		
Vegetation	*Melaleuca rhaphiophylla*, *Melaleuca concreta* open to closed scrub over **Lotus subbiflorus*, **Lolium perenne*, **Ornithopus pinnatus*, *Podolepis gracilis* closed herbland/grassland.		
Assoc. species	*Melaleuca brevifolia, *Aira cupaniana*, *Microtis alboviridis*, *Lepidosperma longitudinale*, **Cotula coronopifolia.*		
Veg Condition (BF)	Good		
Fire Age	Greater than 5 years.		
Notes	Mid-late spring. Moderate search intensity.		

MAPPING NOTES

CERVANTES SITE: CBM1			
Described by	BM	**Date**	15/11/2011
Photo		BM100:	
AMG		Zone 50 332056mE, 6617089mN (WGS84)	
Habitat		Flat plain	
Soil		Grey-brown sand	
Vegetation		*Banksia attenuata*, *Banksia menziesii*, *Eucalyptus todtiana* low woodland (lots of small Banksias (regrowth) ~ 150-250cm) over *Adenanthos cygnorum* subsp. *cygnorum* high shrubland over *Melaleuca clavifolia* heath over *Hibbertia* sp. Gnangara (J.R. Wheeler 2329), *Hypocalymma* aff. *xanthopetalum* scattered low shrubs.	
Assoc. species		*Nuytsia floribunda*, *Anigozanthos humilis* subsp. *humilis*, *Xanthosia huegelii*, *Conostylis teretifolia* subsp. *teretifolia*, *Petrophile linearis*	
Veg Condition (BF)		Excellent	
Fire Age			
Notes		NB I think *Melaleuca* heath makes dense green area on map	

CERVANTES SITE: CBM3			
Described by	BM	**Date**	18/11/2011
Photo		BM100:46-48	
AMG		Zone 50 332252mE, 6623207mN (WGS84)	
Habitat		Drains/flow lines between paddocks (formerly mounded watermelon cropping area)	
Vegetation		**Typha orientalis* tall sedgeland (not flrg) over *Bolboschoenus caldwellii*, *Juncus pallidus*, *Cyperus gymnocaulos* open sedgeland with **Cotula coronopifolia* herbland.	
Veg Condition (BF)		Degraded or Completely Degraded?	

CERVANTES SITE: CBM4			
Described by	BM	**Date**	18/11/2011
AMG		Zone 50 331822mE, 6618427mN (WGS84)	
Habitat		Low rise on very gently undulating plain.	
Soil		Yellow sand.	
Rock Type		na	

Vegetation	*Banksia prionotes* closed scrub over *Adenanthos cygnorum* subsp. *cygnorum*, *Jacksonia sternbergiana* scattered tall shrubs over *Acacia sessilis*, *Conospermum stoechadis* subsp. *stoechadis* shrubland over *Eremaea pauciflora* var. *lonchophylla*, *Hibbertia hypericoides* scattered low shrubs.
Assoc. species	*Calothamnus quadrifidus* subsp. *quadrifidus*, *Eucalyptus todtiana*.
Veg Condition (BF)	Excellent to Pristine.
Notes	Elevation of 41m

CERVANTES SITE: CBM5			
Described by	BM	Date	19/11/2011
Photo		BM100:56	
AMG		Zone 50 332566mE, 6618630mN (WGS84)	
Habitat		Flat to very gently sloping banks of narrow, shallow creekline on valley floor.	
Soil		Brown sand	
Vegetation		Acacia saligna scattered low trees over *Melaleuca brevifolia*, *Melaleuca viminea* subsp. *viminea* high shrubland to open scrub over *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B) scattered low shrubs over *Tecticornia indica* subsp. *bidens* low shrubland over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Lythrum hyssopifolia*, **Cotula coronopifolia*, **Lotus subbiflorus* herbland/sedgeland.	
Assoc. species			
Veg Condition (BF)		Good to Degraded (very weedy herb layer – closed herbland/sedgeland/grassland of weeds).	
Notes		NB these *Melaleuca* could all be the same?	

CERVANTES SITE: CBM6			
Described by	BM	Date	19/11/2011
Photo		BM100:63	
AMG		Zone 50 332633mE, 6619368mN (WGS84)	
Habitat		Very slight depression on broad plain.	
Soil		Pale brown sand (crusty).	
Vegetation		*Melaleuca brevifolia* heath over *Calytrix flavescens*, *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B), *Verticordia densiflora* var. *densiflora* scattered low shrubs over open herbland/sedgeland.	

Assoc. species	*Comesperma* sp., *Ptilotus manglesii*, *Austrostipa elegantissima*, *Verticordia pholidophylla* (70cm), *Pimelea imbricata* var. *piligera*, *Burchardia bairdiae*.

CERVANTES SITE: CBM7			
Described by	BM	**Date**	20/11/2011
Photo		BM100:67	
AMG		Zone 50 332045mE, 6620031mN (WGS84)	
Habitat		Broad low depression area adjacent to flow lines on plain.	
Soil		Light brown sand	
Vegetation		*Melaleuca viminea* subsp. *viminea, Melaleuca concreta* high shrubland to open scrub (patchy) over *Melaleuca brevifolia* scattered shrubs to open shrubland over *Grevillea thelemanniana* subsp. Coojarloo (B.J. Keighery 28 B) scattered low shrubs over *Tecticornia indica* subsp. *bidens* low shrubland over **Cotula coronopifolia*, *Angianthus micropodioides*, **Lotus subbiflorus*, *Isolepis cernua* var. *setiformis*, **Juncus capitatus* grassland/herbland/sedgeland.	
Veg Condition (BF)		?Good to Very Good (lot of weed cover in herb/grass layer).	
Fire Age		More than 7-10years since fire.	