

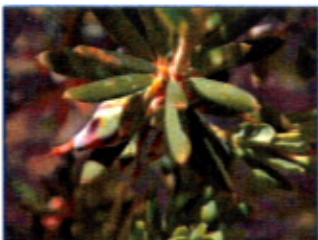
RPS Australia Asia Pacific

Waddi Solar Farm



Spring Flora and Vegetation Survey and
Black Cockatoo Habitat Survey

November 2013



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Spring Flora and Vegetation Survey and Black Cockatoo Habitat Survey

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Executive Summary

RPS contracted Outback Ecology, a division of MWH Australia Pty Ltd to undertake a Spring Flora and Vegetation Survey and Black Cockatoo Habitat Survey of the proposed Waddi Solar Farm. The survey was undertaken from 29th October to 1st November 2013. The Study Area as illustrated in **Figure 2** is summarised in the table below. The aim of the Solar Farm surveys and assessment is to:

1. Undertake a Target Level 1 Flora and Vegetation Assessment;
2. Complete targeted surveys for significant flora;
3. Undertake a significant fauna habitat assessment for the Black Cockatoo.

	Study Area	Survey Scope
1.	Solar Farm area (Land Volume 1780 Folio 892)	> Level 1 Spring Flora Survey
2.	Solar Farm Distribution Line – Option 1 (50 metre corridor) (Land Volume 1780 Folio 891)	> Search for conservation significant flora and vegetation including rare flora listed in the <i>Wildlife Conservation (Rare Flora) Notice</i> and <i>priority flora</i> and flora and vegetation listed under the EPBC Act
3.	Solar Farm Distribution Line – Option 2* (50 metre corridor) (Land Volume 2685 Folio 985)	> Significant fauna habitat assessment for the Black Cockatoo

* An alternative route for the Solar Farm Distribution Line - Option 1 was drafted and provided to Outback Ecology in March 2014 after the completion of the field survey in November 2013. This new area has been included in the report based on aerial photo interpretation and extrapolation of vegetation assessed in adjacent areas. No field assessment of the presence of conservation significant flora has been undertaken for this alternative route (Figure 2 – orange shaded polygon).

No Threatened Flora species as listed under the *Environment Protection and Biodiversity Conservation Act 1999*, or Threatened Flora species listed under the *Wildlife Conservation Act 1950* (WA) were recorded within the Study Area. There were three Priority Flora recorded in the Study Area:

- *Lepidobolus quadratus* – Priority 3;
- *Stylidium aeonioides* – Priority 4; and
- *Tetratheca angulata* – Priority 3.

The Priority Flora detected in this survey were previously known from only a *single* collection within eight kilometres of the Study Area, therefore the data of this survey represents new populations that may extend beyond the boundaries of the Study Area. To determine the impact on the populations of Priority Flora that cannot be avoided; further census of individuals immediately adjacent to the Study

Area (to determine population extent and overall proportion to be taken from the local area and the region) would be required. These Priority Flora should be avoided as a precautionary principle in any proposal until impacts on populations in the immediate vicinity and/or subregion is further determined. A 30 m avoidance buffer is the standard used by Department of Parks and Wildlife for species of conservation significance.

There are no described Threatened or Priority Ecological Community types known from within 15 km of the Study Area. A single relevé was established in the only intact vegetation community of the Study Area, the Vegetation Unit; Proteaceous Heath (1). It was recorded throughout to largely be in Excellent Condition.

Conservation Significant Vegetation of the Study Area includes:

- Vegetation containing Priority Flora records;
- Proteaceous Heath (Kwongan) recognised nationally and internationally as a hotspot for biodiversity; and
- Roadside vegetation (remnant vegetation along Mullering Road) that provides an ecological linkage between Minyulo Nature Reserve and Badgingarra National Park.

Avoidance and minimisation of disturbance in the Vegetation Types above is recommended. The project will need to address this strategy to meet the Environmental Protection Authority (EPA) Position Statement 2 (2000). Due to the high level of clearing in agricultural areas, the EPA published Position Statement 2: *Environmental Protection of Native Vegetation in Western Australia* which states that "...the EPA is of the view that it is unreasonable to expect to be able to continue to clear native vegetation from land within the agricultural area other than relatively small areas and where alternative mechanisms for protection biodiversity are addressed."

The Study Area is within the known distribution of the Carnaby's Black-cockatoo, and within the modelled breeding range (DSEWPac 2012), however it lies 140km north of the modelled distribution of Baudin's and Forest Red-tailed Black Cockatoos, and these two species were not considered by this assessment. This area contains suitable foraging habitat that persists at over 30% of its pre-European extent within the Lesueur Subregion, which is above the threshold for biodiversity conservation. No current or future breeding habitat for the Carnaby's Cockatoo was found within the Study Area.

As the Solar Farm Distribution Line - Option 1 proposes to avoid any significant vegetation from the proposed development; any impact to Black Cockatoo habitat will be negligible. Based on the survey assessments undertaken, the quantity of proposed vegetation clearing will be 0.6% (<0.1 ha) (for Option 1 only) and therefore a EPBC referral may not be warranted; however the Department of Environment (DoE) will be responsible for determining if a referral is recommended.

The permit holder should ensure that:

- No clearing of identified priority flora occurs (unless approval is granted);

- No clearing occurs within 30 metres of identified priority flora (unless approval is granted);
and
- No clearing of more than 1 ha of suitable breeding habitat is removed as stated in the *Department of Sustainability Environment Water Population and Communities Environmental Protection and Biodiversity Conservation Act 1999 referral guidelines for three threatened Black Cockatoo species* (2012).

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1. INTRODUCTION

██████████ is proposing to develop the Waddi Solar Farm within the Shire of Dandaragan in Western Australia. The Waddi Solar Farm (Solar Farm) is located on the following properties listed below (Table 1) and as shown in Figure 1. RPS contracted Outback Ecology, a division of MWH Australia Pty Ltd, to undertake a Spring Flora and Vegetation Survey, targeted flora survey and Black Cockatoo Habitat Survey of the proposed Solar Farm (Study Area) including areas for the following components (Table 1 and Figure 2).

Table 1: Study Area and Survey Scope

	Study Area	Survey Scope
1.	Solar Farm area (Land Volume 1780 Folio 892)	> Level 1 Spring Flora Survey
2.	Solar Farm Distribution Line – Option 1 (50 metre corridor) (Land Volume 1780 Folio 891)	> Search for conservation significant flora and vegetation including rare flora listed in the <i>Wildlife Conservation (Rare Flora) Notice</i> and <i>priority flora</i> and flora and vegetation listed under the EPBC Act
3.	Solar Farm Distribution Line – Option 2* (50 metre corridor) (Land Volume 2685 Folio 985)	> Significant fauna habitat assessment for the Black Cockatoo

* An alternative route for the Solar Farm Distribution Line - Option 1 was drafted and provided to Outback Ecology in March 2014 after the completion of the field survey in November 2013. This new area has been included in the report based on aerial photo interpretation and extrapolation of vegetation assessed in adjacent areas. No field assessment of the presence of conservation significant flora has been undertaken for this alternative route (Figure 2 – orange shaded polygon).

The proposed construction of the Solar Farm area has the potential to impact the entire footprint that was surveyed within the Study Area. Both the Solar Farm Options 1 and 2 of the Distribution Lines will require some disturbance to the corridor within the Study Area to accommodate either an underground cable or vehicle access to construct an overhead cable. If an overhead cable is constructed, it would also require disturbance to an area around the location of each pole. It is worth noting that the Study Area for the proposed Solar Farm (Options 1 and 2) lies wholly within that previously surveyed for the Waddi Wind Farm. If construction of the wind farm proceeds, the residual impact of the Solar Farm would therefore be largely limited to the Solar Farm area with the route of the Distribution Line shared with other wind farm infrastructure.

1.1. Objectives

The project scope is to complete a Spring Flora and Vegetation Survey and Black Cockatoo Habitat Survey for the Study Area provided and to complete targeted flora surveys required to fulfil Condition

8 of the Vegetation Clearing Permit Condition already in existence for parts of the Study Area. The aim of the surveys and assessment is to:

1. Undertake a Target Level 1 Flora and Vegetation Assessment;
2. Complete targeted surveys for significant flora;
3. Undertake a significant fauna habitat assessment for the Black Cockatoo.

The methods adopted for this Project were aligned with the:

- Environmental Protection Authority (EPA) Position Statement No. 3, *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA, 2002);
- EPA Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004);
- EPA Guidance 56, *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004);
- Department of Parks and Wildlife (DPaW)/EPA's *Technical Guide – Terrestrial Vertebrate Fauna Surveys*;
- DEWHA's *Survey Guidelines for Australia's Threatened Birds*; and
- DSEWPac's *Environment Protection and Biodiversity Conservation Act 1999 Referral Guidelines for Three Threatened Black Cockatoo Species*.

It was proposed to survey the vegetation of the Study Area to Guidance Statement 51 (EPA 1994) standard of 'Level 1'. A Level 1 Survey involves background research or a 'desktop' study and a reconnaissance survey to verify this information with a "target area visit by suitably qualified personnel to undertake selective low intensity sampling of the flora and vegetation to produce maps of vegetation units and vegetation condition at an appropriate scale".

The objectives of the 'Level 1' or reconnaissance survey of the Study Area were to:

- verify the accuracy of a desktop study (search of literature, data and map based information);
- record all vascular flora species, including introduced species within the Study Area as encountered;
- describe the vegetation communities and vegetation condition;
- undertake targeted searches for flora species and vegetation communities of conservation significance with grid based systematic sampling at appropriate spacing intervals;
- produce maps of vegetation units at an appropriate scale; and
- provide general recommendations regarding any species or communities of conservation significance and weeds recorded in the Study Areas.

The objectives of the Black Cockatoo habitat assessment were to provide:

- brief summary of the context of the Study Area with respect to black cockatoo distribution and records;

- the findings of the field survey with respect to the nature and extent of black cockatoo habitat;
- any required maps or figures, as appropriate; and
- a conclusion as to the nature of habitat use in the Study Area by black cockatoos with respect to the EPBC Act referral guidelines (DSEWPac 2012) .



Figure 1: Regional location of the Waddi Solar Farm Study Area



Figure 2: The Waddi Solar Farm Study Area

2. EXISTING ENVIRONMENT

2.1. Biogeographic Region

Thackway and Cresswell (1995) describe a refined system of 85 'biogeographic regions' (bioregions) and 403 biological subregions covering the whole of Australia; resulting from collaboration between all state conservation agencies and coordinated by the Commonwealth Department of Environment (DoE). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna. The Study Area is located in the Geraldton Sandplain Bioregion and the Lesueur Sandplain Subregion (GES03) (Thackway and Cresswell 1995) (**Figure 3**).

The Geraldton Sandplain bioregion is composed mainly of proteaceous scrub-heaths, rich in endemics on the sandy earths of an extensive, undulating lateritic sandplain mantle. The area is known Australia-wide and internationally as having particularly high floristic diversity and levels of endemism. Over 250 species of sandplain flora are endemic to this subregion in the heaths and scrub-heaths. The subregion is listed as one of Australia national biodiversity hotspots, the Mount Lesueur-Eneabba hotspot (Department of Environment 2013a).

2.2. Land Uses

The primary land use of the Geraldton Sandplain is dryland agriculture. There are also a number of conservation reserves in the west of the subregion (**Figure 4**). The closest conservation reserve to the Study Area is the Minyulo Nature Reserve immediately to the east of the Solar Farm.

2.3. Climate

The Geraldton Sandplain, Lesueur Sandplain subregion has a Mediterranean climate with winter rainfall. The nearest weather station to the Study Area with an extensive history of records is the Badgingarra Research Station (approximately 25 km to the north of the Study Area). The mean average annual rainfall is 544 mm. Data collected from Badgingarra indicates that rainfall mostly falls in the winter months from June to August (**Figure 5**) (BOM 2013). Highest average monthly temperatures for Badgingarra are recorded from November to March, with October starting to warm and the vegetation dry out. Dandaragan West (a closer BOM station with some rainfall records) received 276 mm in the three months prior to the planned flora survey, which is 50% over the average for those months; therefore the season was considered good. There was a majority of plants still in flower at the end of October despite the warm temperatures (above 30°C) (**Figure 6**).



Figure 3: IBRA Bioregions of the Waddi Solar Farm Study Area

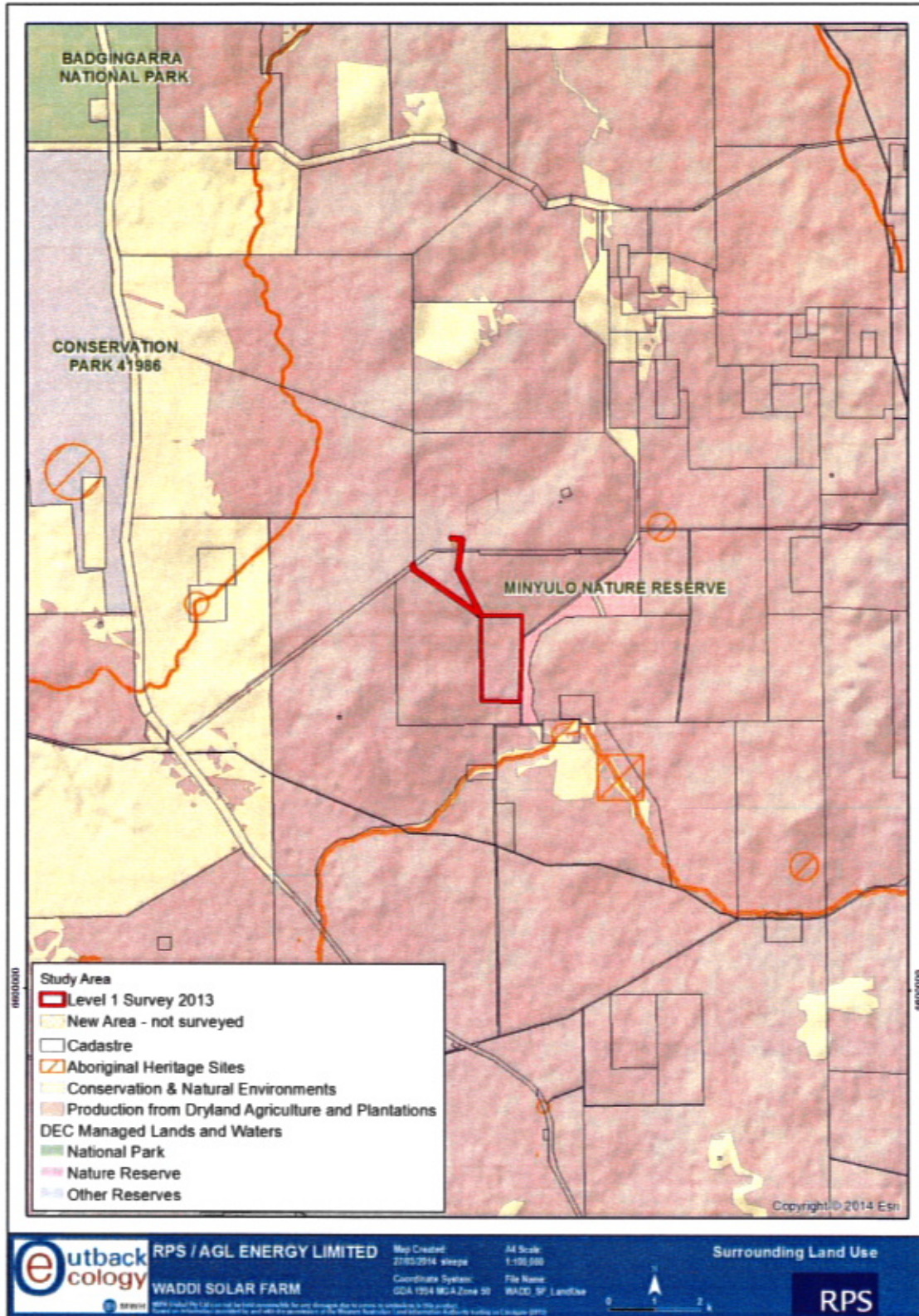


Figure 4: Land Use of the Waddi Solar Farm Study Area

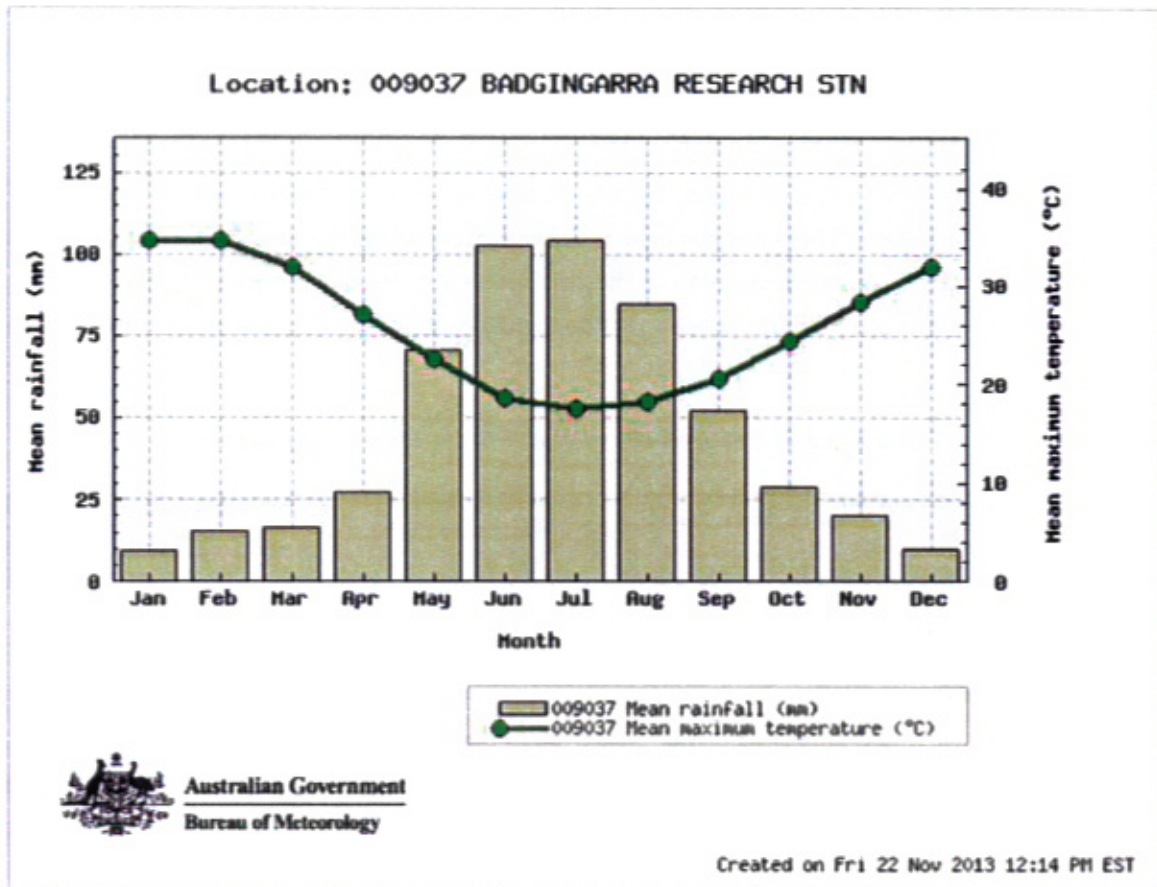


Figure 5: Mean Monthly Rainfall and Temperature for Badgingarra Weather Station

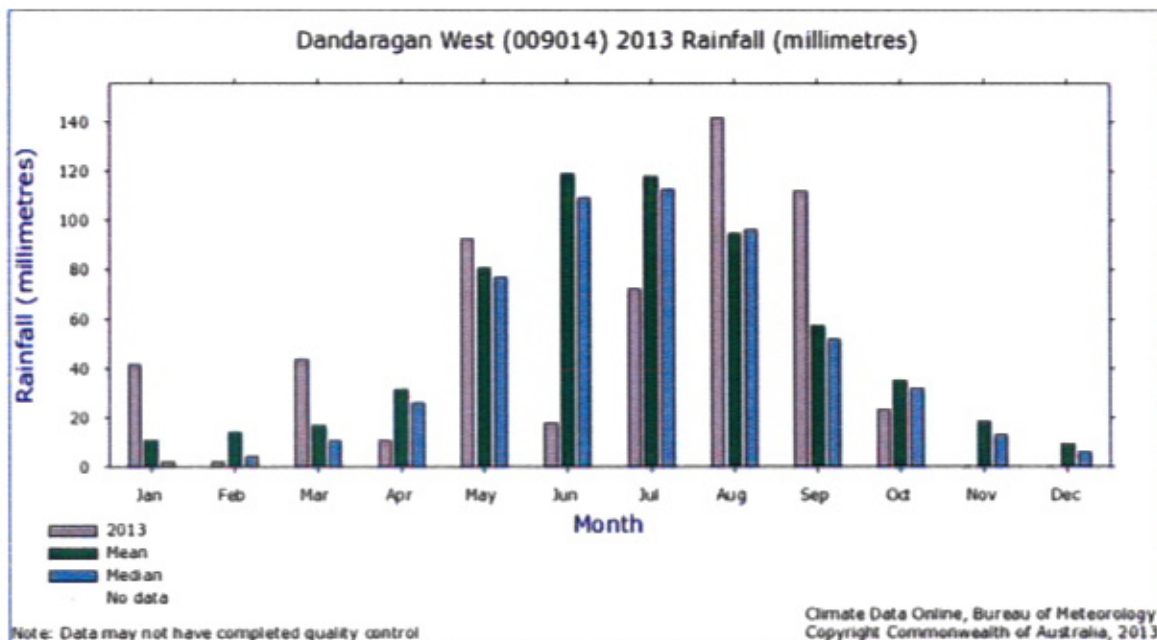


Figure 6: Monthly Rainfall Data for Dandaragan West

2.4. Land Systems

A land system includes a number of land units and is classified by the recurring pattern of topography, soils and vegetation. These recurring patterns can be seen using aerial photography or other remotely-sensed imagery and are typically confirmed with field surveys. Land systems across the Western Midlands have been mapped by the Natural Resources Assessment Group of the Department of Agriculture. There are two land systems present within the Study Area (**Figure 7** and **Table 2**). The majority of the Study Area (82%) falls within the Yerramullah Land System which is characterised by a dissected lateritic plateau with deep pale sand, supporting *Banksia* woodlands and Heathland.

Table 2: Land Systems of the Waddi Solar Farm Study Area

Land System	Description	Hectares (% of Study Area)
Nylagarda System	Alluvial plains and terraces of the Hill River and major creeks of the north coastal plain. Brown deep sands and brown sandy earths predominate, with minor pale deep sand and saline wet soil. Woodlands.	17.71%
Yerramullah System	Subdued dissected lateritic plateau, undulating low hills and rises on lateritised weathered sandstone. Pale deep sand, sandy gravels and yellow deep sand. <i>Banksia</i> woodlands on lower slopes/depressions, heathlands elsewhere.	82.28%

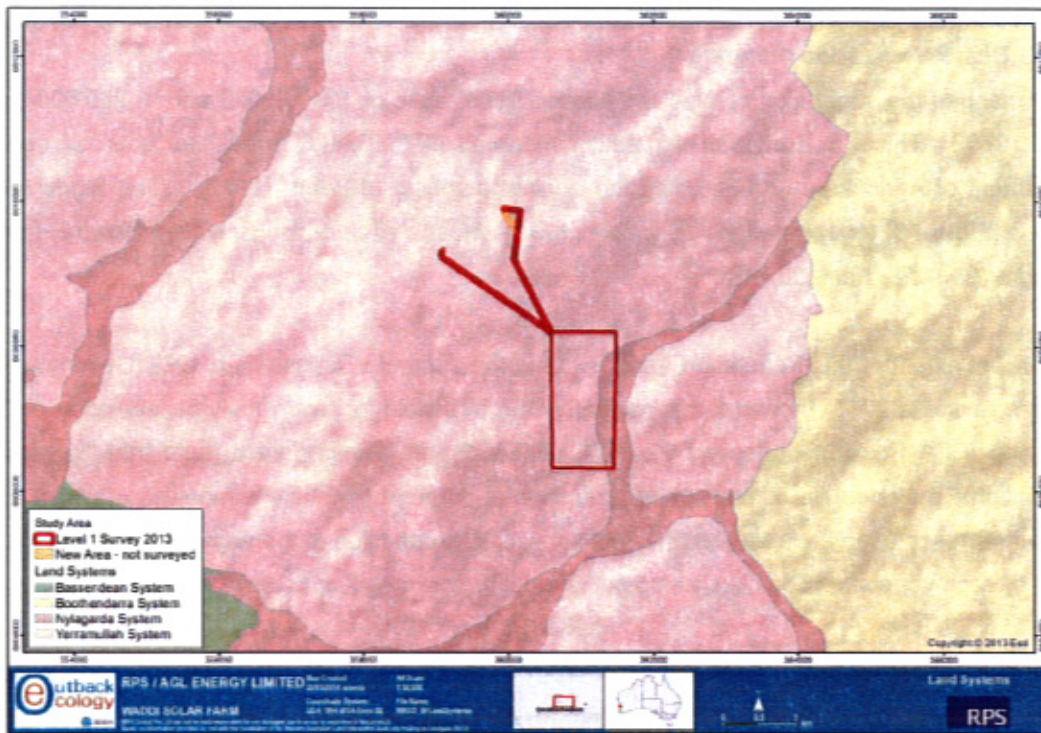


Figure 7: Land Systems of the Waddi Solar Farm Study Area

2.5. Beard Vegetation Mapping

Beard mapped the vegetation of Western Australia at a scale of 1:1,000,000 and 1: 250,000 (Beard 1972, 1975). This Pre-European vegetation mapping of the Study Area was sourced from the Department of Agriculture (2005), using the original mapping of Beard (1972). The Study Area is mapped (**Figure 8**) as *Vegetation Association 1031 – Mosaic of Shrublands; Hakea Scrub-Heath and Dryandra (Banksia) Heath*.

The current extent of this Vegetation Association in the subregion is less than 40% (Government of Western Australia 2013), however it is not below the threshold for biodiversity conservation of 30% remaining (EPA Position Statement 2, 2000) (**Table 2**). It is important to note that "Vegetation Associations" may contain complexes or groupings of different floristic communities of which more detailed representation and reservation is not known. The condition of the vegetation throughout the extent of each vegetation complex is also not taken into consideration in these reported figures.

Table 3: Beard Vegetation Associations mapped within the Study Area and their extent within the Lesueur Subregion.

Beard Vegetation Association	Current extent (hectares) in all subregions	Study Area (hectares) [%]	Lesueur Subregion		
			Current extent (hectares)	Percentage of pre-European extent still extant (2009)	Percentage of pre-European extent in DPaW managed lands
1031	89,577.17	251.11	73,768.82	32.82	12.35

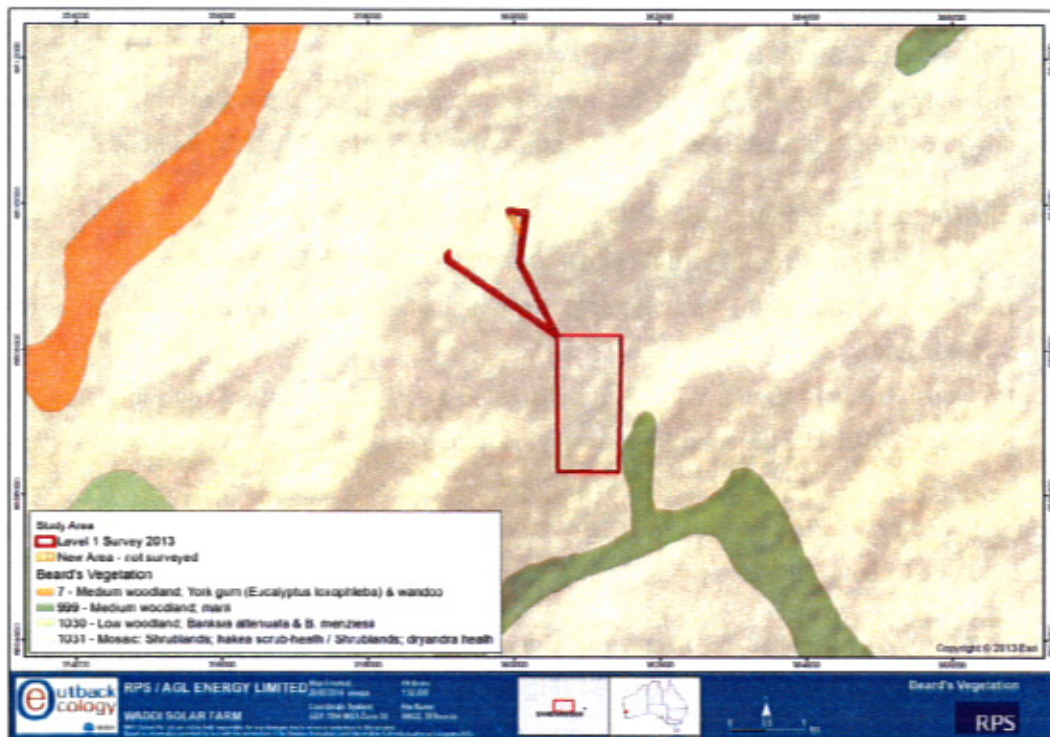


Figure 8: Beard Vegetation Associations of the Waddi Solar Farm Study Area

2.6. Conservation Significant Flora

The following sources were searched for records of conservation significant flora. The central coordinate -30.646565 (Lat.) and 115.521346 (Long.) was used for all database searches:

- EPBC Protected Matters (DSEWPC 2013) (15km radius);
- DPaW Priority and Threatened Flora (DPaW 2013b) (8km radius); and
- DPaW Threatened and Priority Ecological Communities (DPaW 2013c) 15km radius Ref:79-1013FL; and
- Previous Report – Waddi Wind Farm. Targeted Level 1 Vegetation and Flora Assessment (Outback 2010). Unpublished Report for RPS Australia for the Waddi Wind Farm Project.

The Department of Parks and Wildlife (DPAW) definitions for flora of Conservation Significance (Threatened and Priority Flora) are provided in **Appendix A** (DPaW 2010, 2013a).

The database review identified 86 species of Conservation Significance that had previously been recorded within up to 15 km of the Study Area (**Figure 9**). This includes 27 Threatened species also listed as Endangered under the *EPBC Act*. Forty-three of the 86 Conservation Significant species have been previously recorded within 10 km of the Study Area (**Figure 9**).

Habitat information for each of the Threatened and Priority Flora species was obtained from *FloraBase* (Western Australian Herbarium 2013) to determine the likelihood of their occurrence within the Study Area (**Table 4**). Aerial photographs were interpreted to assess the types of landforms and soil types within the Study Area. It was concluded that potential suitable habitat occurs in the Study Area for 43 Conservation Significant species and these species were rated as 'likely' to occur (**Table 4**).



Figure 9: Conservation Significant Flora known from the Waddi Solar Farm Study Area

Table 4: Potential Conservation Significant Flora Species of the Waddi Solar Farm Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Acacia cochlocarpa</i> subsp. <i>cochlocarpa</i>	T (CR)	EN	+			Glabrous sprawling shrub, 0.3-0.7(-1.5) m high. Fl. yellow. Clayey, sandy, often gravelly soils.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Acacia cummingiana</i>	3			+		Sprawling, straggly, rush-like shrub, 0.3-0.5 m high. Fl. yellow, May to Jun or Aug. Grey or yellow sand, lateritic gravel. Sandplains, lateritic breakaways.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Acacia epacantha</i>	3			+		Dense, bushy, spiny shrub, 0.2-0.5(-0.7) m high. Fl. yellow, Jul to Aug. Lateritic gravelly loam or clay.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable
<i>Acacia forrestiana</i>	T (VU)	VU	+	+		Erect, open, prickly shrub, 0.4-1 m high. Fl. yellow, Nov to Dec. Lateritic gravelly soils, clay loam over sandstone. Gullies, hills, breakaways.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable
<i>Acacia plicata</i>	3			+	+	Erect shrub, (0.3-) 0.9-2 m high. Fl. yellow, Aug to Oct. Loamy & clayey soils, often over sandstone or siltstone. Along drainage lines.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Acacia splendens</i>	T (CR)	EN	+	+		Tree or shrub, to 8 m high, bark dark grey, phyllodes acuminate, glaucous. Fl. yellow. May. White sand over clay, pale brown loam, cracked brown soil, gravel, laterite, ironstone. Slopes of breakaways, especially southern slopes, hills.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Allocasuarina ramosissima</i>	3			+		Dioecious, somewhat divaricate shrub, 0.3-1.2 m high. Lateritic soils, gravel.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Andersonia gracilis</i>	T (VU)	EN	+	+		Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple, Sep to Nov. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Anigozanthos humilis</i> subsp. Badgingarra (S.D. Hopper 7114)	2			+		Erect, hirsute rhizomatous, herb, to 0.9 m high. Grey-white sand, rich brown sandy loam, sandy clay, alluvial soils. Low plains, river-banks, winter-wet swamps.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Anigozanthos vindis</i> subsp. <i>terraspectans</i>	T (VU)	VU	+	+		Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. green/yellow-green, Aug to Sep. Grey sand, clay loam. Winter-wet depressions.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Amorcinum gracillimum</i>	2			+		Rhizomatous, perennial, herb, 0.2-0.4 m high. Fl. purple. Oct to Nov. White, grey, yellow or lateritic sand.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Asterolasia drummondii</i>	4			+		Slender erect shrub, 0.2-0.5 m high. Fl. white. Jul to Sep. Lateritic gravel & sand or loam. Lateritic hills & sandplains, breakaways	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Banksia fraseri</i> var. <i>crebra</i>	3				+	Low spreading shrub to 0.4 m. Fl. Yellow. Lateritic hill, white sand, sandplains.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Banksia pronophylla</i>	1			+		Lignotuberous, branching shrub, to 0.6 m high. Fl. yellow. Jul. Dry grey sand over laterite with surface boulders. Rises.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Banksia pteridifolia</i> subsp. <i>vernalis</i>	3			+		Prostrate, lignotuberous shrub, to 0.4 m high. Fl. cream-white/yellow. Sep to Oct. White/grey sand over laterite.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Banksia serratuloides</i> subsp. <i>perissa</i>	T (CR)	CR	+			Bushy, lignotuberous shrub, to 1 m high. Fl. yellow. Aug to Sep. Gravelly lateritic soils.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Beaufortia bicolor</i>	3			+		Dense shrub, 0.3-1 m high. Fl. red & yellow & orange. Nov to Dec. White sand over laterite. Sandplains.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Beaufortia eniocephala</i>	3			+		Dense shrub, 0.3-1 m high. Fl. red & yellow & orange. Nov to Dec. White sand over laterite. Sandplains	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Boronia tenuis</i>	4			+		Procumbent or erect & slender shrub, 0.1-0.5 m high. Fl. blue/pink-white. Aug to Nov. Laterite, stony soils, granite	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Caladenia huegelii</i>	T (CR)	EN	+			Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red. Sep to Oct. Grey or brown sand, clay loam.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Centrolepis caespitosa</i>	4	EN	+			Tufted annual, herb (forming a rounded cushion up to 25 mm across). Fl. Oct to Dec. White sand, clay. Salt flats, wet areas.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Chamelaudium</i> sp Gingin (N.G. Marchant 6)	T (VU)	EN	+			Erect open branching shrub with white flowers. White/grey sand, undulating yellow sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Chamaelucium</i> sp. Cataby (G.J. Keighery 11009)	T (VU)	VU	+	+		Low rounded shrub to 0.4 m. White/pink flowers. Laterite breakaways, yellow and grey sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Chondifex reseinans</i>	1			+		Rhizomatous, erect, tufted, dioecious herb. 0.6-0.9 m high. Fl. Mar to May. Dry sand. Heath.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable
<i>Comesperma rhadinocarpum</i>	2			+		Perennial, herb. Fl. blue. Oct to Nov. Sandy soils.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Conospermum densiflorum</i> subsp. <i>unicephalum</i>	T (EN)	EN	+			Erect, much-branched shrub, 0.3-0.6 m high, inflorescence a spike. Fl. creamwhite & blue. Sep to Nov. Clay soils. Low-lying areas	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Conospermum scaposum</i>	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.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Conostephium magnum</i>	4			+	+	Erect, compact, many-stemmed shrub, to 2 m high. Fl. pink-purple, Jul to Sep. White-grey sands sometimes associated with laterite gravels. Sand dunes, swampland, disturbed roadside, drainage channels, open woodland.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Dampiera tephrea</i>	2			+		Ascending to erect perennial, herb or shrub, 0.3-0.6 m high, with grey or yellowish hairs on abaxial surface of leaves. Fl. blue, Jul. Sand, gravelly loam.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Darwinia foetida</i>	T (EN)	CR	+			Low spreading shrub to 0.6 m. Winter wet flats, grey sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Desmodium elongatum</i>	4			+		Rhizomatous, perennial, herb (sedge-like), 0.25-0.5 m high. Fl. Aug to Dec. White or grey sand. Dry kwongan.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Drakaea elastica</i>	T (CR)	EN	+			Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow, Oct to Nov. White or grey sand. Low-lying situations adjoining winter-wet swamps.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Drosera marchanti</i> subsp. <i>prophylla</i>	3			+		Erect tuberous, perennial, herb, 0.1-0.3 m high. Fl. white. Jun to Jul. Laterite-silica sand soils. Hilltops.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Eleocharis keigheryi</i>	T (VU)	VU	+	+		Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green. Aug to Nov. Clay, sandy loam. Emergent in freshwater: creeks, claypans.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Eucalyptus abdita</i>	2			+		Mallee or shrub, 2-3 m high, bark smooth, grey. Latente, sandy clay with gravel over laterite. Slopes, breakaways.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Eucalyptus absita</i>	T (CR)	EN	+			Mallee or tree, 2.3-10 m high, rough, fibrous bark. Fl. white, Apr to Jul. White lateritic sand Paddocks.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Eucalyptus balanites</i>	T (CR)	EN	+			Mallee to 5 m high, bark rough, flaky. Fl. white. Oct to Dec or Jan to Feb. Sandy soils with lateritic gravel.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Eucalyptus dolosa</i>	T (CR)	EN	+	+		Mallee, 1.5-3 m high, bark rough, flaky. Fl. yellow, Feb to Mar. Laterite. Hillsides.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Eucalyptus impensa</i>	T (CR)	EN	+			Straggly mallee to 1.5 m high, bark smooth. Fl. pink, Jun to Jul. Yellow sand. Lateritic hills.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Eucalyptus leprophloia</i>	T (EN)	EN	+			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	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i>	4			+	+	Spreading or sprawling mallee, 0.8-4 m high, bark smooth, grey over salmon pink. Fl. red-pink, Aug to Sep or Nov to Dec. White or grey sand over laterite. Hillslopes, ridges, sandplains.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Eucalyptus x camabyi</i>	4			+		Mallee, 1.5-6 m high, bark smooth, grey over cream. Fl. pink-cream, Oct to Nov. Grey sand, sandy loam. Lateritic ridges.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Gastrolobium nudum</i>	2			+		Spreading, twiggly shrub, to 0.8 m high. Fl. Orange & red, Feb. Red-brown clay, brown loam, gravel, laterite, granite. Flats, slopes, hilltops, ridges, valleys, breakaways.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Gompholobium gairdnerianum</i>	3			+		Erect, slender, multi-stemmed shrub, to 0.5 m high. Fl. yellow. Sep to Nov. White, cream or brown sandy clay, white sand over sandstone, brown or grey sand over laterite, gravel. Hill summits and slopes, ridges.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Grevillea batrachiodes</i>	T (CR)	EN	+			Shrub, 0.5-1.5 m high. Fl. orange-red, Oct. Sandy loam. Sandstone outcrops.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Grevillea calliantha</i>	T (CR)	EN	+	+		Spreading, flat-topped shrub, 0.9-2.5 m high. Fl. red-brown, Apr or Jun or Aug. Grey or yellow sand over laterite, with gravel.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Grevillea florida</i>	3			+		Erect shrub, to 0.9 m high. Fl. cream-yellow, Jul to Sep. Sand, sandy clay, gravel, laterite. Sandplain, slopes, road verges.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Grevillea saccata</i>	4			+	+	Diffuse scrambling or trailing shrub, 0.25-0.5 m high, 1-2 m wide. Fl. red, Apr or Jun to Nov. Yellow or brown sand, often with lateritic gravel.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Grevillea synapheae</i> subsp. <i>minyulo</i>	1			+		Spreading to sprawling, lignotuberous shrub, 0.2-0.5 m high. Fl. white-cream-yellow. Aug to Sep. Gravel, laterite.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Grevillea tenuiloba</i>	3			+		Low spreading shrub, 0.4-0.6 m high, up to 3 m wide. Fl. orange-brown. Apr or Jul to Oct. Sand, clay loam. Granite outcrops.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Grevillea thelemanniana</i> subsp. <i>Cooljarloo</i> (B.J. Keighery 28 B)	1			+		Sprawling, singled stemmed shrub to 0.5 m. Flowers red-pink. Winter wet flats, grey sand, creekline, red brown clay loam.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Grevillea thyrsoides</i> subsp. <i>thyrsoides</i>	3			+		Spreading or procumbent shrub, 0.3-0.7 m high, up to 1.5 m wide. Fl. red-pink, Feb or Aug to Sep. Sand or sandy lateritic gravel	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Guchtenota alba</i>	3			+		Slender, lax, few-branched shrub, 0.1-0.45 m high. Fl. white. Jul to Aug. Sandy & gravelly soils. Low-lying flats, depressions.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Hakea megalosperma</i>	T (VU)	VU	+	+		Spreading, lignotuberous shrub, 1-2 m high. Fl. white-cream/pink, May to Jun. Grey sand, loam. Latent hills and rocks.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Hemiandra gardneri</i>	T (CR)	EN	+			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.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Hemigenia curvifolia</i>	2			+		Shrub, 0.2-0.7 m high. Fl. blue. Sep to Oct. Sandy soils.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Hibbertia helianthemoides</i>	4			+		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.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Hibbertia spicata</i> subsp. <i>leptotheca</i>	3			+		Erect or spreading shrub, 0.2-0.5 m high. Fl. yellow, Jul to Oct. Sand. Near-coastal limestone ridges, outcrops & cliffs.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Hypocalymma limifolium</i>	1			+		Low spreading shrub, to 0.6 m high. Sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Hypocalymma serrulatum</i>	3			+		Erect shrub, 0.45-1.7 m high. Fl. white-pink, Apr to May. Grey or white sand. Along drainage lines.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Hypocalymma</i> sp. Cataby (G.J. Keighery 5151)	2			+	+	Erect, spreading shrub, 0.5-1 m high, to 1 m wide. Fl. white, Aug. Grey sand.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Hypocalymma</i> sp. Dandaragan (C.A. Gardner 9014)	1			+		Multi-stemmed shrub to 0.3 m. Yellow flowers. Grey sand with lateritic pebbles.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Hypocalymma tetrapterum</i>	3			+		Shrub, 0.4-0.9 m high. Fl. white, Aug. Grey sand, loam, lateritic gravel. Riverbanks, breakaways.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Hypolaena robusta</i>	4			+		Dioecious rhizomatous, perennial, herb, ca 0.5 m high. Fl. Sep to Oct. White sand. Sandplains.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Isopogon drummondii</i>	3			+		Erect, lignotuberous shrub, 0.4-1 m high. Fl. yellow/cream-yellow, Feb to Jun. White, grey or yellow sand, often over laterite.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Isopogon panduratus</i> subsp. <i>palustris</i>	2			+		Erect shrub to 1.8 m, flowers pale pink. Winter wet flat pale yellow sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Lechenaultia galactites</i>	3			+		Erect, robust shrub (sub-shrub), to 0.6 m high. Fl. blue-white. Jun to Oct. Yellow sand, clay, gravel, laterite. Sandplains.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Lepidobolus quadratus</i>	3			+		Rhizomatous, caespitose perennial, herb (sedge-like), 0.15-0.3 m high. Fl. brown/red, Aug to Sep. Lateritic gravel, grey/white sand. Dry kwongan.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Leucopogon oblectus</i>	T (EN)	EN	+			Erect shrub, 0.5-1.7 m high. Fl. cream-yellow, Aug to Oct. Grey sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Lyginia excelsa</i>	1			+		Dioecious rhizomatous, erect, tufted herb, 0.6-1.5 m high, rhizomes on surface. Fl. Mar to Nov. Sand. Dry heath & Banksia woodland.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Macarthuria keigheryi</i>	T (EN)	EN	+	+		Erect or spreading perennial, herb or shrub, 0.2-0.4 m high, 0.3-0.6 m wide. Fl. Sep to Dec or Feb to Mar. White or grey sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Malleostemon</i> sp. Cooljarloo (B Backhouse s.n. 16/11/88)	1			+		Erect shrub, ca 0.4 m high. Fl. pink, Nov. Sand. Low-lying areas.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Meionectes tenuifolia</i>	3			+		Prostrate aquatic/semi-aquatic herb, red/green, trifid and linear leaves. Granite flats, shallow soil at margins.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Onychosepalum microcarpum</i>	2			+		Rhizomatous, tufted perennial, herb, 0.07-0.15 m high. Fl. Aug to Oct. White or yellow sand. Dry heath, low woodland.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Onychosepalum nodatum</i>	3			+		Caespitose grass-like or herb, forming small, many-culmed tussocks. Sand.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Ptychosema pusillum</i>	T (VU)	VU		+		Perennial, herb, mostly 0.05-0.1 m high. Fl. red & brown & yellow, Aug to Oct. Sand. Rises.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Regelia megacephala</i>	4				+	Shrub, 2-5 m high. Fl. purple-red, Oct to Dec. Red sand. Quartzite hills	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Schoenus griffiniianus</i>	3			+		Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high. Fl. Sep to Oct. White sand.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Schoenus pennisetis</i>	1			+		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.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Styidium aeonioides</i>	4			+		Rosetted perennial, herb, 0.05-0.4 m high. Leaves adpressed to soil, oblanceolate, 0.7-3 cm long, 1.5-5 mm wide, apex subacute, margin hyaline, glabrous. Scape glabrous. Inflorescence paniculate. Fl. cream-yellow. Sep to Nov. Sandy clay loam over laterite. Hillsides and breakaways. Low heath, open woodland.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Styidium hymenocraspedum</i>	2			+		Rosetted perennial, herb, 0.27-0.7 m high. Leaves adpressed to soil, spatulate, 1.5-7 cm long, 6-13 mm wide, apex subacute, margin hyaline, glabrous. Scape mostly glabrous, sparingly glandular near bract and pedicel axils. Inflorescence racemose. Fl. yellow, Sep to Oct. Sand over laterite. Hillslopes. Heath, Banksia and Eucalyptus low open woodland.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.

Species	Conservation Significance		Source			Description. Source: Florabase (DPaW, 2013)	Likelihood of Occurrence in Study Area
	WC Act 1950	EPBC Act 1999	Protected Matters Database	DPaW Database	OES (2009)		
<i>Synaphea endothena</i>	2			+		Erect, clumped shrub, to 0.6 m high. Fl. yellow, Aug to Sep. Gravelly loam, sand. Lateritic rises.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Tetralochea angulata</i>	3			+	+	Lax to erect, slender shrub (subshrub), 0.2-0.3 m high. Sandy to gravelly laterite soils. Low hill crests, breakaways with massive laterite boulders.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Thelymitra apiculata</i>	4			+		Tuberous, perennial, herb, 0.2-0.35 m high. Fl. purple & yellow, May to Jul. Grey sand, lateritic gravel.	May Occur - Previously recorded within 10 km of Study Area, habitat likely to be suitable.
<i>Thelymitra dedmaniarum</i>	T (CR)	EN	+			Tuberous, perennial, herb, to 0.8 m high. Fl. yellow, Nov to Dec or Jan. Granite.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area
<i>Thelymitra stelfata</i>	T (EN)	EN	+			Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow & brown, Oct to Nov. Sand, gravel, lateritic loam.	Unlikely to Occur - No previous recorded populations within 10 km of Study Area

2.7. Conservation Significant Vegetation

The following sources were searched for records of Conservation Significant vegetation. The central coordinate -30.646565 (Lat.) and 115.521346 (Long.) was used for all database searches:

- EPBC Protected Matters (DoE 2013b) (15km radius);
- DPaW Threatened and Priority Ecological Communities (DPaW 2013c) 15km radius; and
- Previous Report – Waddi Wind Farm. Targeted Level 1 Vegetation and Flora Assessment (Outback Ecology 2010). Unpublished Report for RPS Australia for the Waddi Wind Farm Project. Surveys undertaken in Nov 2008 and Jan 2009.

A search of the DPaW Threatened Ecological Communities Database was requested on Monday 28th October 2013 Ref: 04-0513EC for the Study Area and a 15 km buffer. No Threatened Ecological Communities or Priority Ecological Communities were identified in the DPaW Database search.

No Threatened or Ecological Communities were identified in the EPBC Protected Matters Database Search (DoE 2013b).

EPA Guidance Statement 33 *Environmental Guidance for Planning and Development* (2008) lists the types of natural areas that the EPA considers are of high conservation significance and require a high level of protection in WA, including:

- state and regional conservation areas;
- areas where clearing would be at variance with the native vegetation clearing principles in schedule 5 of the *Environmental Protection Act 1986*;
- threatened ecological communities;
- significant flora and fauna;
- wetlands and buffers;
- rivers and foreshores;
- important landscapes and landforms;
- natural areas of heritage significance; and
- other natural areas, such as ecological linkages.

1.2. Black Cockatoo Habitat

One threatened species of black cockatoo is likely to occur within the study area:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*), which is listed as Endangered (EPBC Act) and Schedule 1 (WC Act);

The Study Area lies approximately 140 km north of the modelled distribution of Baudin's and Forest Red-tailed Black Cockatoo. It lies on the northern margin of the known breeding range and non-breeding range of Carnaby's (DSEWPaC 2012). Consequently, the Study Area may contain habitat that is important for breeding, night roosting and foraging by Carnaby's Cockatoos, and it may provide important connectivity between other areas of suitable habitat.

Carnaby's Cockatoo utilise a variety of woodland and forest habitats in south-western Western Australia. Their distribution is generally limited by the availability of large Eucalypt trees that contain large hollows for nesting. Comprehensive information about Carnaby's Cockatoo is available on the Australian Government's Species Profile and Threats Database (DSEWPaC 2013) and in the EPBC Act referral guidelines for the three species (DSEWPaC 2012).

Overall, populations Carnaby's Cockatoo are in decline and this is largely due to habitat loss and alteration through large-scale clearing. Carnaby's Cockatoos are primarily threatened by habitat loss and a shortage of nest hollows resulting from habitat degradation and competition from other species. They are also impacted by illegal shooting, illegal trade and fire. Due to a relatively late breeding age and low fecundity, Carnaby's Cockatoos have limited capacity to recover from the effects of these threatening processes.

2. FIELD METHODOLOGY

2.1. Level 1 Vegetation Survey

From the 30th October to the 1st of November 2013, a total of 5 hours were spent in the Study Area by two Outback Ecology botanists; Vanessa Yeomans (SOPP License SL010736) and Alex Sleep (SOPP License SL010658).

Any intact native vegetation throughout the Study Area was sampled using relevés (unbounded floristic sampling) and the vegetation type and condition was mapped on foot. Whilst traversing the Study Area, the botanists undertook subsampling for targeted conservation significant flora species with the potential to be found in the Study Area as shown in **(Table 4)**.

For each relevé, the following information was recorded:

- GPS Location (recorded in GDA94 UTM 50K);
- a photograph taken of the vegetation;
- habitat type;
- vegetation condition, using the Keighery Scale (Keighery 1994) (**Appendix B**);
- vegetation description, based on the vegetation structural table of Keighery (1994) (**Appendix B**);
- dominant species present;
- topographic position;
- slope and aspect;
- soil type;
- presence of outcropping and exposed rock type;
- bare ground and litter percentages;
- estimated time since fire; and
- disturbance level and description.

An alternative route for the Solar Farm Distribution Line - Option 2 was drafted and provided to Outback Ecology in March 2014 after the completion of the field survey in November 2013. This new area has been included in the report based on aerial photo interpretation and extrapolation of vegetation assessed in adjacent areas. No field assessment of the presence of conservation significant flora was been undertaken for this area.

2.8. Targeted Flora Survey

The latest aerial imagery of the Study Area was examined for the presence of vegetation other than crops intersecting with the solar distribution lines. These locations supporting remnant vegetation were visited, where photographs and general vegetation descriptions were taken along with a targeted search on foot by the Botanists for any species of conservation significance (Section 2.6).

2.9. Black Cockatoo Targeted Habitat Assessment

As stated in the referral guidelines, habitat assessment is the primary technique used to inform decisions on significant impact for black cockatoos (DSEWPac 2012). These assessments detail the extent, type and quality of plant species and vegetation known to be used by Carnaby's Cockatoos (DSEWPac 2012). Surveys should especially aim to identify the presence of large tree hollows or the habitat potential for large hollows to form. Searches for indirect evidence of species presence, such as feeding debris, droppings and feathers, should also be conducted.

Carnaby's Cockatoos are known to breed from July/August in the semi-arid to the sub-humid arid interior or 'wheatbelt' and from September/October in some locations along the south and west coasts (DSEWPac 2012). Carnaby's Cockatoos are most likely to occur within the vicinity of the Study Area during January – June (non-breeding season).

The Study Area was assessed for potential for significant breeding, night roosting, and foraging habitat. Habitat assessments were conducted by qualified botanists. The locations of hollow-bearing trees were recorded and the presence of potential food-bearing flora species was noted. While not forming the core of the assessment, searches for evidence of black cockatoo presence were conducted around trees that potentially act as foraging or roost trees.

2.10. Constraints and Limitations

A number of factors can influence the design and intensity of a flora survey. All flora surveys are limited to some degree by time and seasonal factors, and ideally a number of surveys should be undertaken over a number of years and appropriately timed with the flowering seasons. Possible survey constraints as identified by the EPA were addressed (**Table 5**) and no significant constraints were identified for the Survey as undertaken.

Table 5: Summary of Survey Constraints and Limitations

Aspect	Constraint	Comment regarding the flora and vegetation survey
Competency/experience of consultants	No	Members of the survey team were flora specialists employed by Outback Ecology, and have many years' experience undertaking flora surveys of this kind within WA.
Scope	No	The scope was clearly defined.
Proportion of flora identified	No	Of the 78 taxa detected during this survey, 3 species (4%) could not be identified with confidence, due to inadequate specimen material (sterile). Unidentified specimens were compared to known conservation significant species to ensure conservation significant species were identified.
Information sources (e.g. historic or recent)	No	Limited regional studies have been carried out. Available data was reviewed prior to commencement of the survey.
Completeness	No	The survey entailed sub-sampling the vegetation types (as anticipated from aerial photo interpretation) at opportune points.
Timing / weather / season / cycle	No	The survey was undertaken within approximately 4 weeks after the seasonal rainfall in August-September. Ephemeral flora and flowering of plant taxa would be expected.
Disturbances	No	Yes a large proportion of the Study Area was previously cleared and supported broadscale agricultural crops.
Intensity	No	The survey satisfies a Level 1 Survey according to Guidance Statement 51 (EPA, 2004).
Resources	No	WA Herbarium specimens, taxonomic guides, DPaW database searches and the <i>Florabase</i> database were all used to prepare for the survey and used for the confirmation of any species where their identification was uncertain.
Remoteness / access problems	No	All parts of the Study Area were able to be accessed
Availability of contextual information	Yes (In Part)	Information was available for the Interim Biogeographic Regionalisation for Australia (IBRA) Lesueur subregion of the Geraldton Sandplains Bioregion, from FloraBase, DPaW and BoM. No FCT data (Vegetation status more detailed than Beard Veg Associations) is available at the regional/local level.

3. RESULTS

3.1. Flora

Flora recorded in the current field effort included 78 plant taxa from 52 different genera and 24 families. Of the 78 plant taxa recorded three specimens could not be completely identified due to inadequate material (sterile) for identification purposes (4% of specimens). The species list for the survey of the Waddi Solar Farm Study Area is found in **Appendix C**.

The most common genera in the Study Area were *Banksia* (6 taxa) and *Hakea* (5 taxa). This is a floristic composition typical of Proteaceous (Kwongan) heath of the Western Midlands (Western Australian Herbarium 2013).

3.2. Flora of Conservation Significance

No Threatened Flora species as listed under the *EPBC Act 1999*, or Threatened Flora species listed under the *WC Act 1950* (WA) were recorded within the Study Area.

Three Priority flora species were recorded from within the Study Area as shown in (**Figure 13**):

- *Lepidobolus quadratus* – Priority 3;
- *Stylidium aeonioides* – Priority 4; and
- *Tetralochea angulata* – Priority 3.

3.2.1. *Lepidobolus quadratus* – Priority 3

It was considered possible that *Lepidobolus quadratus* would occur in the Study Area given the information on habitat and proximity obtained during the desktop assessment (Section 2.6). One individual *L. quadratus* was recorded from the northern terminus of the Solar Farm Distribution Line Option 1, within the Volume 1780 Folio 891 (Solar Farm Distribution Line Option 1) landholding and within vegetation unit – Proteaceous Heath 1 (**Figure 13, Plate 1**).

There are 43 records of *Lepidobolus quadratus* housed at the WA Herbarium. Within the eight kilometre database search radius there is one record of this species (from the WA Herbarium database) along Mullering Road in 1992. There are another 16 locations of *Lepidobolus quadratus* in the region all centered on Brand Highway between Cataby and Eneabba (**Figure 10**).



Plate 1: *Lepidobolus quadratus*

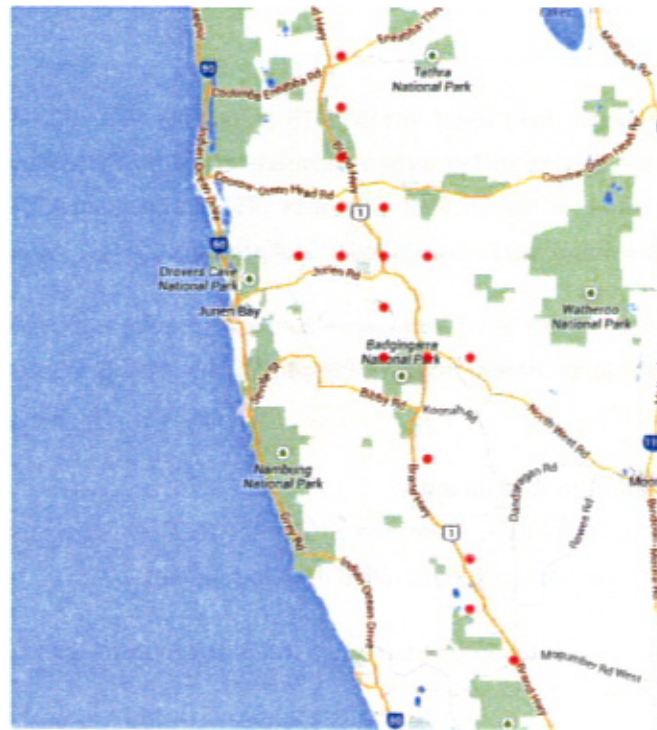


Figure 10: Locations of *Lepidobolus quadratus* recorded in the Atlas of Living Australia (2013)

3.2.2. *Stylidium aconioides* – Priority 4

It was considered possible that *Stylidium aconioides* would occur in the Study Area given the information on habitat and proximity obtained during the desktop assessment (Section 2.6). One *S. aconioides* was recorded from within the Study Area (Figure 13). It was recorded on the road verge where the Solar Farm Distribution Line Option 2 crosses Mullering Road. This location occurs within vegetation unit Proteaceous Heath 1 on rocky laterite slopes and hilltops. The flowers and habit of *Stylidium aconioides* is shown in Plate 2 and Plate 3.

There are 29 records of *Stylidium aconioides* housed at the WA Herbarium. Within the eight kilometre database search radius there is one record of this species (from the WA Herbarium database) recorded along Mullering road in 1988. There another 15 locations of *Stylidium aconioides* in the region all centered on Brand Highway between Cataby and Eneabba (Figure 11).

Plate 2: *Stylidium aconioides* - habitatPlate 3: *Stylidium aconioides*Figure 11: Locations of *Stylidium aconioides* recorded in the Atlas of Living Australia (2013)

3.2.3. *Tetralthea angulata* – Priority 3

It was considered possible that *Tetralthea angulata* would occur in the Study Area given the information on habitat and proximity obtained during the desktop assessment (Section 2.6). Five individuals of *Tetralthea angulata* were recorded from within the Study Area (with one recorded just outside) on the road verge where the Solar Farm Distribution Line Option 2 crosses Mullering Road, within Proteaceous Heath (1) (Figure 13).

There are 12 records of *Tetralthea angulata* housed at the WA Herbarium. Within the eight kilometre search radius there is one record of this species (from the WA Herbarium database) recorded from the verge of Walyering Road in 2002 and only another five locations of *Tetralthea angulata* within the region (Figure 12).



Plate 4: *Tetratheca angulata*



Figure 12: Locations of *Tetratheca angulata* recorded in the Atlas of Living Australia (2013)



Figure 13: Priority Flora recorded in the Solar Farm Study Area October 2013

3.3. Weeds

Three common agricultural weeds were recorded within native vegetation in the Study Area. Weeds were recorded along the roadside and adjacent to cleared areas. No other weeds or infestations were recorded. No Declared Pests were recorded as listed under the *Biosecurity and Agriculture Management Act 2007*.

Table 6: Weed Species of the Study Area

Species	Common Name	Notes (<i>Florabase</i>)
<i>Wahlenbergia capensis</i>	Cape Bluebell	Slender annual herb, a weed of sandy soils, disturbed grounds and plains.
<i>Vulpia myuros</i> forma <i>myuros</i>	Rat's Tail Fescue	Tufted annual grass. Common on dry, disturbed sites - most common in early succession (disturbances that expose ground favour establishment.) Seeds have long awns which can easily attach to animals and disperse long distances.
<i>Ursinia anthemoides</i>	Ursinia	Slender annual herb, a weed of roadsides and waste places. Fruits have both pappus and hairs, so are easily dispersed by wind. Can be abundant immediately post-fire in <i>Banksia</i> woodland, and then declines over time.

3.4. Vegetation Units

The majority of the Study Area is cleared (248 ha / 99.3%) with intact native vegetation making up just 0.6% (1.67 ha) of the total area. One Vegetation Unit was sampled (Relevé GF-01 **Appendix E**) as shown in (**Figure 14**) within the Study Area and is described as follows:

Proteaceous Heath (1) (**Plate 5**):

- Scattered *Nuytsia floribunda* with Open Shrubland of *Xanthorrhoea ?drummondii* and *Allocasuarina humilis* over closed Proteaceous Heath including species such as *Petrophile shuttleworthiana*, *Banksia sphaerocarpa* var. *sphaerocarpa*, *Calothamnus hirsutus*, *Eremaea pauciflora* var. *ionchophylla*, *Banksia glaucifolia*, *Beaufortia bracteosa*, *Banksia shuttleworthiana*, *Hakea conchifolia*, *Hakea incrassata*, *Melaleuca clavifolia*, *Melaleuca*

trichophylla and *Lambertia multiflora* var. *multiflora* over Open Low Heath of *Hibbertia hypericoides*, *Gastrolobium oxylobioides*, *Daviesia nudiflora* over Sedgeland/Herbland of species including *Tetraria octandra*, *Conostylis teretifolia* subsp. *teretifolia*, *Chordifex sinuosus*, *Mesomelaena pseudostygia* and *Schoenus clandestinus* with *Austrostipa compressa/hemipogon* on lateritic sandy hilltops.

This Vegetation Unit can be extrapolated and predicted to occur in the proposed alternative for the Solar Farm Distribution Line- Option 2. Additional flora species including those of potential conservation significance may be present in this unsurveyed remnant.

The location of the vegetated areas within the Solar Farm Study Area, are shown in (Figure 14). The areas that fall within the cleared paddocks are shown in (Figure 15). A photographic record and short vegetation description is provided. A species list is presented in Appendix D. Relevé data is provided in Appendix E.



Plate 5: Proteaceous Heath (1)

3.5. Vegetation Condition

In total 99.3% (248.88 ha) was cleared and does not contain native vegetation. Of the intact native vegetation within the Study Area the majority was considered to be in Excellent condition, with areas directly adjacent to cleared paddocks in Very Good and Very Good to Excellent condition as shown in (Figure 16).

The vegetation of the proposed alternative to Solar Farm Distribution Line - Option 2 is anticipated to be Very Good. But as the vegetation remnant is smaller, surrounded by paddock, it may be degraded with increased levels of weed invasion.



Figure 14: Vegetation Units of the Solar Farm Study Area



Figure 15: Targeted Flora Survey of the Solar Farm Study Area October 2013



Figure 16: Vegetation Condition of the Solar Farm Study Area October 2013

3.6. Vegetation of Conservation Significance

There are no known Threatened or Priority Ecological Community types known from within 15 km of the Study Area.

Further detail on Vegetation Types of the regional area is not readily available. The only regional survey, conducted by Griffin (1994) was based on sparse sampling, with only 70 quadrats across the subregions. Therefore Floristic Community Type and reservation status has not been adequately defined to be able to make meaningful comparisons.

Regionally, the Study Area contains Kwongan Proteaceous Heath and is recognised nationally and internationally as of biodiversity conservation significance with high levels of endemism and richness (Section 2.1). The vegetation of the Study Area is also part of an ecological linkage (Mullering roadside vegetation) between Minyulo Nature Reserve and Badgingarra National Park.

3.7. Black Cockatoo Targeted Habitat Assessment

3.7.1. Black Cockatoo Occurrence

The Study Area lies approximately 140 km north of the modelled distribution of Baudin's and Forest Red-tailed Black Cockatoo. It lies on the northern margin of the known breeding range and non-breeding range of Carnaby's Cockatoo. Carnaby's Cockatoos have been recorded within a 50 km radius of the Study Area (**Figure 17**), suggesting that they could potentially be present in the Study Area at appropriate times of year (between the months of January and June). As the survey took place in October and November, evidence of the species was unlikely to be found during the surveys. In accordance with the Commonwealth referral guidelines, the emphasis of the survey was on habitat assessment by qualified botanists. No observations of Carnaby's Cockatoo were made during the habitat assessment, and no signs of foraging or roosting activity were recorded.

3.7.2. Carnaby's Cockatoo Habitat

No trees bearing hollows suitable for nesting by Black Cockatoos were observed during the survey. Trees with the potential to develop such hollows were also absent from the Study Area, as the upper-storey was dominated by *Eucalyptus tottiana* and the middle storey comprised of Myrtaceous scrub and Proteaceous heath. Trees commonly used for nesting such as Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) were not present in the Study Area.

Trees and shrub species with potential to be used by Black Cockatoos as a source of food and/or for roost sites were present low numbers in the Study Area. These feed species included *Eucalyptus tottiana*, *Banksia* and *Hakea* species (**Figure 18**). This area of habitat is relatively small in extent and positioned toward the periphery of the Study Area (**Figure 18**), and is therefore likely to be avoidable by the Project footprint.

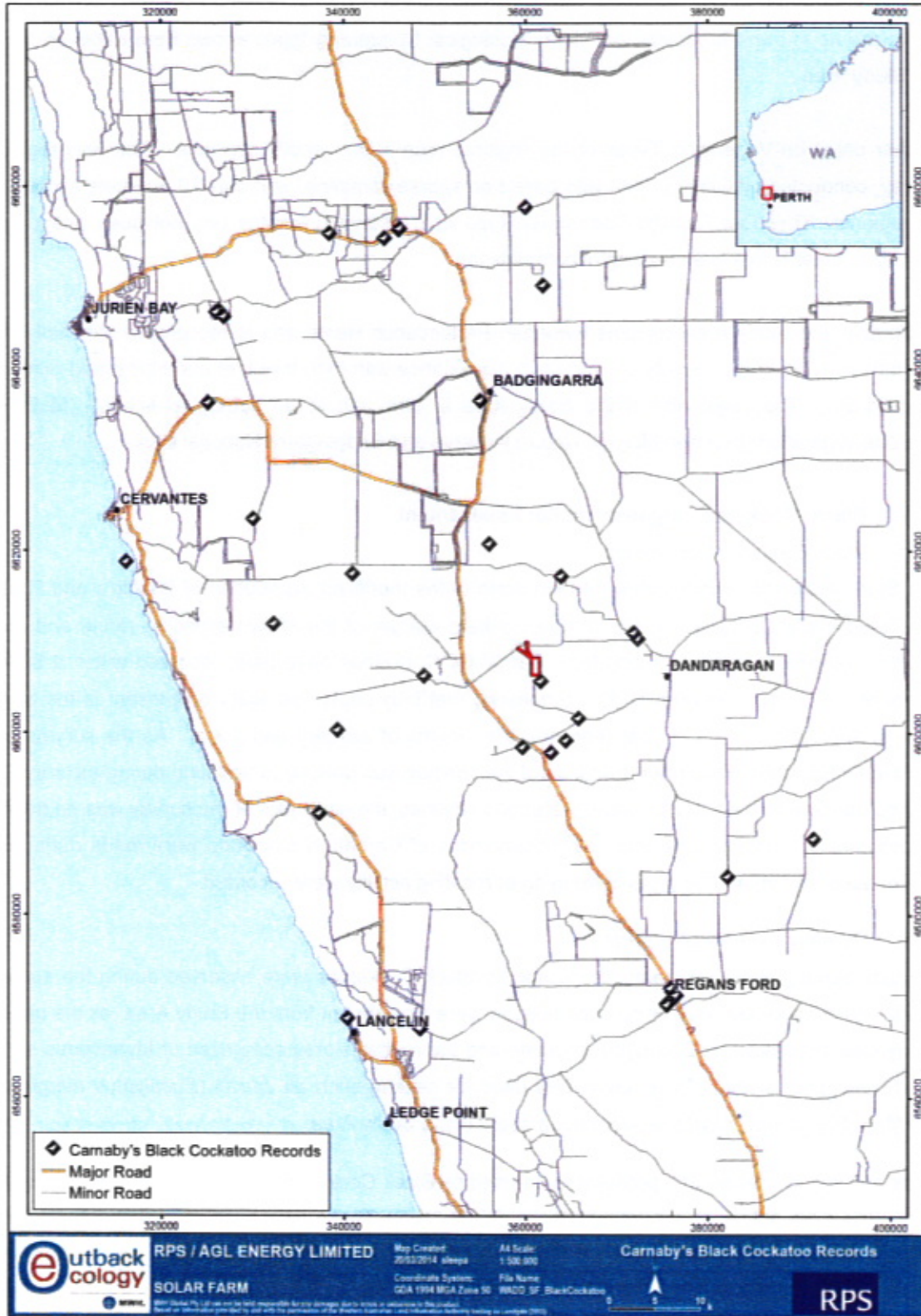


Figure 17: Previous records of Carnaby's Cockatoos surrounding the Study Area



Figure 18: Potential Black Cockatoo feeding and roosting habitat

4. DISCUSSION AND RECOMMENDATIONS

The proposed construction of the Solar Farm area has the potential to impact the entire footprint that was surveyed within the Study Area. Both the Solar Farm Options 1 and 2 of the Distribution Lines will require some disturbance to the corridor within the Study Area to accommodate either an underground cable or vehicle access to construct an overhead cable. If an overhead cable is constructed, it would also require disturbance to an area around the location of each pole. It is worth noting that the Study Area for the proposed Solar Farm (Options 1 and 2) lies wholly within that previously surveyed for the Waddi Wind Farm. If construction of the wind farm proceeds, the residual impact of the Solar Farm would therefore be largely limited to the Solar Farm area with the route of the Distribution Line shared with other wind farm infrastructure. The following discusses the key findings from a Level 1 flora and fauna assessment with any associated impacts.

4.1. Flora

The Priority Flora detected in this survey are known from only a *single* collection within eight kilometres of the Study Area (**Figure 13**), therefore the data of this survey represents new populations that may extend beyond the boundaries of the Study Area. To determine the impact on the populations of Priority Flora that cannot be avoided; further census of individuals immediately adjacent to the Study Area (to determine population extent and overall proportion to be taken from the local area and the region) would be required.

These Priority Flora should be avoided as a precautionary principle in any proposal until impacts on populations in the immediate vicinity and/or subregion is further determined. The standard exclusion buffer for significant flora that is used by DPaW is 30 metres. This avoidance zone is recommended as a precautionary principle with which to meet clearing regulations.

A survey of the newly proposed alternative route to the Solar Farm distribution line – option 1, for species of conservation significance would be required to ascertain the presence and population extents of any potential conservation significant flora.

4.2. Vegetation

Conservation Significant Vegetation of the Study Area includes:

- Vegetation containing the Priority Flora as shown in **Figure 13**;
- Proteaceous Heath (Kwongan) recognised nationally and internationally as a 'hotspot' for biodiversity; and
- Roadside vegetation along Mullering Road that provides an ecological linkage between Minyulo Nature Reserve and Badgingarra National Park.

Avoidance and minimisation of disturbance in the Vegetation Types above is recommended. The project will need to address this strategy to meet the EPA Position Statement 2 (2000). Due to extensive clearing in agricultural areas, the EPA published Position Statement 2 *Environmental*

Protection of Native Vegetation in Western Australia which states that "...the EPA is of the view that it is unreasonable to expect to be able to continue to clear native vegetation from land within the agricultural area other than relatively small areas and where alternative mechanisms for protection biodiversity are addressed."

4.3. Black Cockatoo Habitat

No hollow-bearing trees were observed in the Study Area and it is therefore unlikely that Black Cockatoos nest within the Study Area. Trees with the potential to develop hollows that are suitable for nesting by Black Cockatoos were also absent from the Study Area, therefore no breeding or potential breeding habitat exists within the Study Area. Proteaceous Heath and *Eucalyptus tottiana* represent foraging habitat for the Carnaby's Cockatoo, which is present within the Study Area (**Figure 14**). There are nearby records of the species (**Figure 17**), and it should be assumed that the species is regionally present due to its mobility and the presence of suitable foraging habitat within the Study Area.

The proposed footprint for the project will not impinge on current or future breeding habitat, as none was recorded in the Study Area. As the Solar Farm Distribution Line - Option 1 proposes to avoid any significant vegetation from the proposed development; any impact to Black Cockatoo habitat will be negligible. Based on the survey assessments undertaken, the quantity of proposed vegetation clearing will be 0.6% (<0.1 ha) (for Option 1 only) and therefore a EPBC referral may not be warranted; however the Department of Environment (DoE) will be responsible for determining if a referral is recommended.

The permit holder should ensure that:

- No clearing of identified priority flora occurs (unless approval is granted);
- No clearing occurs within 30 metres of identified priority flora (unless approval is granted); and
- No clearing of more than 1 ha of suitable breeding habitat is removed as stated in the *Department of Sustainability Environment Water Population and Communities Environmental Protection and Biodiversity Conservation Act 1999 referral guidelines for three threatened Black Cockatoo species* (2012).

5. REFERENCES

- Atlas of Living Australia (2013). Website available at: <http://www.ala.org.au/australias-species/>
- Beard, J.S. (1975). Vegetation Survey of Western Australia. 1:100,000 Vegetation Series Map
- Beard, J.S. (1972). Vegetation Survey of Western Australia 1:250,000 series. Vegmap Publications, Applecross.
- Bureau of Meteorology (BOM) (2013) Climate statistics for Australian locations. Website: <http://www.bom.gov.au/climate/data/> Accessed: November 2013
- Department of Parks and Wildlife (DPaW) (2010) *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities*. Available from: <http://www.dec.wa.gov.au/management-and-protection/threatened-species/wa-s-threatened-ecological-communities.html>
- Department of Parks and Wildlife (DPaW) (2013a) *Conservation Codes for Western Australian Flora and Fauna*. Available from: <http://www.dec.wa.gov.au/management-and-protection/threatened-species/listing-of-species-and-ecological-communities.html?start=1>
- Department of Parks and Wildlife (DPaW) (2013b) Threatened (Declared Rare) and Priority Flora Database (TPFL) and the WA Herbarium Database (WAHerb). (The search was conducted for the Study Area plus a buffer of 15 km).
- Department of Parks and Wildlife (DPaW) (2013c) Threatened and Priority Ecological Communities Database. (The search was conducted for the Study Area plus a buffer of 15 km).
- Department of Environment (DoE) (2013a) *Australia's 15 National Biodiversity Hotspots*. Website: <http://www.environment.gov.au/node/13909>
- Department of Environment (DoE) (2013b) *Protected Matters Search Tool*. The search was conducted around a central point -31.13778 121.50694 with a 40 km buffer. Website: www.environment.gov.au/erin/ert/epbc/index.html
- Department of Environment (DoE) (2013c) *Matters of National Significance – Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*. Website http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf
- DSEWPaC: Department of Sustainability, Environment, Water, Population and Communities. (2013) *Species Profile and Threats Database*. Available online at <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>. Accessed on 15/11/2013.
- DSEWPaC: Department of Sustainability Environment Water Population and Communities (2012) *Environmental Protection and Biodiversity Conservation Act 1999 referral guidelines for three threatened Black Cockatoo species*. Available online at <http://www.environment.gov.au/system/files/resources/895d4094-af63-4dd3-8dff-ad2b9b943312/files/referral-guidelines-wa-black-cockatoo.pdf>.
- Desmond, A and A. Chant (2001). *Geraldton Sandplain 3 (GS3- Lesueur Sandplain subregion)*. In: *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*. Department of Conservation and Land Management, Perth, Western Australia.
- Environmental Protection Authority (2002) Position Statement No. 3 *Terrestrial Biological Surveys as an Element of Biodiversity Protection*, Government of Western Australia, Perth.

- Environmental Protection Authority (2004) Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*. Government of Western Australia, Perth.
- Environmental Protection Authority (2008), *Guidance Statement No. 33 - Environmental Guidance for Planning and Development*, Environmental Protection Authority, Western Australia.
- Gibson, N., Keighery, B., Keighery G., Burbidge A. and M. Lyons (1994). *A Floristic Survey of the southern Swan Coastal Plain*. A report prepared by the Western Australian Department of Conservation and Land Management and the Western Australian Conservation Council for the Australian Heritage Commission.
- Government of Western Australia. (2013). *CAR Analysis Report 2013*. WA Department of Parks and Wildlife, Perth,
<https://www2.landgate.wa.gov.au/slip/portal/services/files/carreserveanalysis2013.xls>
- Griffin, E.A. (1994). *Floristic Survey of the Northern Sandplains between Perth and Geraldton* Resource Management Technical Report 144. Department of Agriculture, Western Australia.
- Keighery, B. J. (1994) *Bushland Plant Survey. A Guide to Plant Community Survey for the Community*. Wildflower Society of Western Australia (Incorporated), Nedlands, Western Australia.
- Outback Ecology (2010). *Waddi Wind Farm. Targeted Level 1 Vegetation and Flora Assessment*. An unpublished report for RPS and Wind Prospect.
- Thackway, R and Cresswell, I.D. (eds) (1995). *An Interim Biogeographical Regionalisation of Australia*. Australian Nature Conservation Agency (now DEWH), Canberra.
- Western Australian Herbarium (1998–2013). *FloraBase—the Western Australian Flora*. Department of Parks and Wildlife. <http://florabase.dpaw.wa.gov.au/>

APPENDIX A
Definitions Of Codes And Terms Used To Describe Conservation Significance Of
Flora And Vegetation

Definitions of Codes and Terms used to Describe Conservation Significance of Flora

Status	Code	Description
Schedule 1 of the Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950		
Threatened	T	Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such
Schedule 2 of the Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950		
Presumed Extinct Flora	X	Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such
Threatened Flora (Schedule 1) are further ranked by DPaW according to their level of threat using IUCN Red List criteria:		
Critically Endangered	CR	considered to be facing an extremely high risk of extinction in the wild
Endangered	EN	considered to be facing a very high risk of extinction in the wild
Vulnerable	VU	considered to be facing a high risk of extinction in the wild.
DPAW Priority List		
Priority One (Poorly known taxa)	P1	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
Priority Two (Poorly known taxa)	P2	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
Priority Three (Poorly known taxa)	P3	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

Status	Code	Description
Priority Four (Near threatened or other taxa in need of monitoring)	P4	<ol style="list-style-type: none"> 1. Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. 2. Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. 3. Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Priority Five (Conservation dependent taxa)	P5	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

Definitions for Threatened Ecological Communities (TEC)

TECs are indirectly protected under the Western Australian *Environmental Protection Act 1986* and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for; but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B):

- A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or
- B) All occurrences recorded within the last 50 years have since been destroyed

Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

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

- i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);
 - ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
- i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);
 - ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;
 - iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.
- C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

- A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):
- i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);
 - ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.
- B) Current distribution is limited, and one or more of the following apply (i, ii or iii):
- i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

- ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;
- iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

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

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

- A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.
- B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.
- C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

Definitions for Priority Ecological Communities (PEC)

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

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally =5 occurrences or a total area of = 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include

communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally =10 occurrences or a total area of =200ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four:

- i. **Rare.** Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.
- (ii) **Near Threatened.** Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- (iii) **Ecological communities that have been removed from the list of threatened communities during the past five years.**

These communities require regular monitoring.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX B
Vegetation Condition Scale

Vegetation Condition Scale (Keighery 1994)

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

APPENDIX C
Vegetation Structural Scale

Vegetation Structure Classification (Keighery 1994)

Life Form/ Height Class	Canopy Cover (percentage)			
	100% - 70%	70% - 30%	30% - 10%	10% - 2%
Trees over 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland
Trees 10-30m	Closed Forest	Open Forest	Woodland	Open Woodland
Trees < 10m	Low Closed Forest	Low Open Forest	Low Woodland	Low Open Woodland
Tree Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs > 2m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1-2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs < 1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

APPENDIX D
Flora Species List By Family

Family	I	Name	Common Name
Asteraceae	*	<i>Ursinia anthemoides</i>	Ursinia
Campanulaceae	*	<i>Wahlenbergia capensis</i>	Cape Bluebell
Casuarinaceae		<i>Allocasuarina humilis</i>	Dwarf Sheoak
Cyperaceae		<i>Caustis dioica</i>	
		<i>Lepidosperma tenue</i>	
		<i>Mesomelaena pseudostygia</i>	
		<i>Schoenus clandestinus</i>	
		<i>Tetragia octandra</i>	
Dilleniaceae		<i>Hibbertia huegelii</i>	
		<i>Hibbertia hypericoides</i>	Yellow Buttercups
		<i>Hibbertia</i> sp.	
Elaeocarpaceae		<i>Tetragia angulata</i>	
		<i>Tetragia confertifolia</i>	
Ericaceae		<i>Leucopogon</i> sp. Cataby (F. Hort 1638)	
Fabaceae		<i>Bossiaea eriocarpa</i>	Common Brown Pea
		<i>Daviesia decurrens</i>	Prickly Bitter Pea
		<i>Daviesia epiphyllum</i>	
		<i>Daviesia nudiflora</i>	
		<i>Gastrolobium oxylobioides</i>	Champion Bay Poison
		<i>Gastrolobium spinosum</i>	Prickly Poison
		<i>Sphaerolobium macranthum</i>	
Goodeniaceae		<i>Goodenia coerulea</i>	
		<i>Lechenaultia floribunda</i>	Free-flowering Leschenaultia
		<i>Scaevola glandulifera</i>	Viscid Hand-flower
		<i>Verreauxia reinwardtii</i>	Common Verreauxia
Haemodoraceae		<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>	
		<i>Haemodorum</i> sp.	
		<i>Haemodorum venosum</i>	
Haloragaceae		<i>Glischrocaryon aureum</i>	Common Popflower
Hemerocallidaceae		<i>Johnsonia pubescens</i>	Pipe Lily
Iridaceae		<i>Patersonia juncea</i>	Rush Leaved Patersonia
		<i>Patersonia occidentalis</i>	Purple Flag
Lamiaceae		<i>Hemiandra linearis</i>	Speckled Snakebush
		<i>Hemigenia barbata</i>	
		<i>Microcorys</i> sp. Coomallo (L. Haegi 2677)	
Loganiaceae		<i>Logania campanulata</i>	Bell Flowered Logania
Malvaceae		<i>Thomasia triphylla</i>	
Myrtaceae		<i>Baeckea grandiflora</i>	Large-flowered Baeckea
		<i>Beaufortia bracteosa</i>	
		<i>Calothamnus hirsutus</i>	Blowfly Grass
		<i>Darwinia neildiana</i>	Fringed Bell
		<i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>	
		<i>Eremaea pauciflora</i> var. <i>lonchophylla</i>	
		<i>Melaleuca ciliosa</i>	
		<i>Melaleuca trichophylla</i>	
		<i>Verticordia pennigera</i>	
Poaceae		<i>Austrostipa compressa</i>	
		<i>Austrostipa elegantissima</i>	
		<i>Austrostipa hemipogon</i>	

Family	I	Name	Common Name
Poaceae		<i>Neurachne alopecuroidea</i>	Foxtail Mulga Grass
	*	<i>Vulpia myuros</i> forma <i>myuros</i>	Rat's Tail Fescue
Polygalaceae		<i>Comesperma acerosum</i>	
Proteaceae		<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	Common Woollybush
		<i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i>	
		<i>Banksia carlinoides</i>	Pink Dryandra
		<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>	Couch Honeypot
		<i>Banksia glaucifolia</i>	
		<i>Banksia shuttleworthiana</i>	Bearded Dryandra
		<i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i>	Fox Banksia
		<i>Conospermum nervosum</i>	One-sided Bottlebrush
		<i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>	Common Smokebush
		<i>Hakea auriculata</i> var. <i>spathulata</i>	
		<i>Hakea conchifolia</i>	Shell-leaved Hakea
		<i>Hakea incrassata</i>	Marble Hakea
		<i>Hakea spathulata</i>	
		<i>Hakea stenocarpa</i>	Narrow-fruited Hakea
		<i>Lambertia multiflora</i> var. <i>multiflora</i>	Many-flowered Honeysuckle
		<i>Petrophile linearis</i>	Pixie Mops
		<i>Petrophile shuttleworthiana</i>	
		<i>Petrophile striata</i>	
		<i>Stirlingia latifolia</i>	Blueboy
		<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>	
Restionaceae		<i>Chordifex sinuosus</i>	
Rhamnaceae		<i>Stenanthemum notiale</i> subsp. <i>chamelum</i>	
		<i>Stenanthemum reissekii</i>	
Stylidiaceae		<i>Stylidium cygnorum</i>	
Thymelaeaceae		<i>Pimelea</i> sp.	
Xanthorrhoeaceae		<i>Xanthorrhoea ?drummondii</i>	

APPENDIX E
Relevé Data

WADDI Wind Farm Level 1

Site GF-01

Described by

VY/AS

Date 30/10/2013 Type

Relevé

Season Good

Uniformity

Location Glasferd Property – Mullering Road Reserve

MGA Zone 50 359083 mE 6609308 mN 115.529471 E -30.640474 S

Habitat Undulating slopes

Soil Pale Brown Sandy Loam

Rock Type Laterite Outcropping

Unit **Proteaceous Heath (1)**

Vegetation Closed Heath of *Petrophile shuttleworthiana*, *Petrophile striata*, *Melaleuca trichophylla*, *Lambertia multiflora* var. *multiflora*, *Xanthorrhoea ?drummondii*, *Calothamnus hirsutus*, *Hakea conchifolia* and *Hakea incrassata* over Low Shrubland of *Banksia sphaerocarpa* var. *sphaerocarpa*, *Hibbertia hypericoides*, *Gastrolobium oxylobioides* and *Daviesia nudiflora* over *Mesomelaena pseudostygia* and *Schoenus clandestinus* with *Austrostipa compressa*/hemipogon.

Veg Condition Excellent

**SPECIES LIST:**

<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>	<i>Comesperma acerosum</i>	<i>Haemodorum</i> sp.
<i>Allocasuarina humilis</i>	<i>Conospermum nervosum</i>	<i>Hakea conchifolia</i>
<i>Austrostipa compressa</i>	<i>Conostylis teretifolia</i> subsp. <i>teretifolia</i>	<i>Hakea incrassata</i>
<i>Austrostipa elegantissima</i>	<i>Daviesia decurrens</i>	<i>Hakea spathulata</i>
<i>Austrostipa hemipogon</i>	<i>Daviesia epiphyllum</i>	<i>Hakea stenocarpa</i>
<i>Baeckea grandiflora</i>	<i>Daviesia nudiflora</i>	<i>Hemiandra linearis</i>
<i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i>	<i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>	<i>Hibbertia huegelii</i>
<i>Banksia carlinoides</i>	<i>Gastrolobium oxylobioides</i>	<i>Hibbertia hypericoides</i>
<i>Banksia glaucifolia</i>	<i>Gastrolobium spinosum</i>	<i>Hibbertia</i> sp.
<i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i>	<i>Glischrocaryon aureum</i>	<i>Lambertia multiflora</i> var. <i>multiflora</i>
<i>Calothamnus hirsutus</i>	<i>Goodenia coerulea</i>	<i>Lepidosperma tenue</i>

<i>Leucopogon</i> sp. Cataby (F. Hort 1638)
<i>Melaleuca trichophylla</i>
<i>Mesomelaena pseudostygia</i>
<i>Microcorys</i> sp. Coomallo (L. Haegi 2677)
<i>Neurachne alopecuroidea</i>
<i>Petrophile shuttleworthiana</i>
<i>Petrophile striata</i>
<i>Scaevola glandulifera</i>
<i>Schoenus clandestinus</i>
<i>Sphaerolobium macranthum</i>
<i>Stenanthemum reissekii</i>
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>
<i>Tetrania octandra</i>
<i>Tetratheca angulata</i>
<i>Tetratheca confertifolia</i>
<i>Thomasia triphylla</i>
<i>Ursinia anthemoides</i>
<i>Vulpia myuros</i> var. <i>myuros</i>
<i>Wahlenbergia capensis</i>
<i>Xanthorrhoea drummondii</i>

