TECHNICAL MEMORANDUM
Detailed Flora and Vegetation Assessment
Kangan Station Bore Field

PROJECT NUMBER	EP24-037(01)	**DOC. NUMBER**	EP24-037(01)--003 SCM
PROJECT NAME	Kangan Station Environmental Support	**CLIENT**	Kariyarra Aboriginal Corporation PBC
AUTHOR	SCM	**REVIEWER**	RAW
VERSION	1	**DATE**	18/11/2024

1. INTRODUCTION

1.1. Project background

Kariyarra Aboriginal Corporation PBC (KAC) are proposing to develop a water extraction scheme within Kangan Station, which comprises bores, monitoring wells and a pipeline for water conveyance. The locations for the infrastructure within and immediately adjacent to Kangan Station are herein referred to as the 'disturbance footprint'.

Emerge Associates were engaged by KAC to undertake a flora and vegetation assessment within the disturbance footprint and the broader area. The broader area encompassed Kangan Station and the entire pipeline footprint which extends approximately 69 kilometres (km) to the north and 15 km to the south of the disturbance footprint.

The disturbance footprint is located approximately 75 kilometres (km) south of Port Hedland, as shown in **Figure 1**. It extends over 37.92 hectares (ha) and is bounded by pastoral land to the north, west and south, and Great Northern Highway to the east.

1.2. Purpose and scope of work

This technical memorandum has been prepared to provide information on the flora and vegetation values within the disturbance footprint to support the lodgement of a clearing permit for the initial construction of the water extraction scheme infrastructure within and surrounding Kangan Station. A full report will be prepared in the future to detail the flora and vegetation values within the entire survey area. A detailed flora and vegetation survey was undertaken within the disturbance footprint with reference to EPA (2016).

As part of the scope of work, the following tasks were completed:

- Desktop review of relevant background information pertaining to the disturbance footprint and surrounds, including database searches for conservation significant flora and communities.
- A detailed flora and vegetation field survey (with reference to EPA (2016)) to record flora and vegetation values.
- Identification of potential habitat for conservation significant flora and vegetation.
- Documentation of the desktop assessment, methodology, field surveys and results into a report.

2. DESKTOP ASSESSMENT

A search was conducted for threatened and priority flora that may occur or have been recorded within a 50 km radius of the disturbance footprint using the Protected Matters Search Tool (DCCEEW 2024) and within a 100 km radius using the Department of Biodiversity, Conservation and Attraction's (DBCA) conservation significant flora database (reference no. 30-0424FL).

A search was also conducted for threatened ecological communities (TECs) and priority ecological communities (PEC) within a 50 km radius of the disturbance footprint using the Protected Matters Search Tool (DCCEEW 2024) and DBCA's conservation significant communities database (reference no. 23-0424EC).

2.1. Likelihood of occurrence method

The distribution and habitat preferences of threatened and priority flora species and ecological communities listed in **Section 0** were reviewed against site context information[1]. Likelihood of occurrence of threatened and priority flora species and ecological communities within the disturbance footprint was classified as 'high', 'moderate', 'low' or 'negligible' as outlined below in **Table 1**.

Table 1: Decision matrix for likelihood of occurrence of threatened and priority flora and ecological communities

		Distribution[1]	
		Reliable record within search area[2]	No reliable record within search area[2]
Habitat	Suitable	High	Negligible
	Potentially suitable	Moderate	
	Unsuitable	Low	

[1]Reliable record defined as validated, recent (within the last ~40 years) and spatially accurate (refer DBCA search meta data) in order to exclude unverified range or habitat projections. [2]Search area defined as 50 km for communities, 100 km for flora.

2.2. Likelihood of occurrence results

2.2.1. Threatened and priority flora

A total of one threatened and 37 priority flora species were identified from database searches as occurring or potentially occurring within 100 km of the disturbance footprint. A total of 21 priority flora were classified as having a 'high' or 'moderate' likelihood of occurrence within the disturbance footprint, as outlined in **Table 2**. The remaining species were classified as having a 'low' or 'negligible' likelihood of occurrence. The complete likelihood of occurrence assessment is provided as **Appendix A**.

[1] Including relevant Commonwealth documentation such as approved conservation advice, listing advice and other relevant literature.

Table 2: Threatened or priority flora species with a high or moderate likelihood of occurrence in the disturbance footprint

Species	Status		Life strategy	Flowering period	Likelihood of occurrence
	WA	EPBC Act			
Acacia fecunda	P1	-	P	May or Aug	Moderate
Cochlospermum macnamarae	P1	-	P	Apr-Jun	Moderate
Corchorus sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	P1	-	P	Jun	Moderate
Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	P1	-	P	May-Nov	Moderate
Euphorbia inappendiculata var. *inappendiculata*	P2	-	A	May/Aug	Moderate
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	P3	-	P	Apr-Nov	Moderate
Acacia levata	P3	-	P	May	Moderate
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	-	A	May-Sep	Moderate
Eragrostis crateriformis	P3	-	A	Jan-May or Jul	Moderate
Euphorbia clementii	P3	-	P	May-Jul	High
Euploca mutica	P3	-	P	May-Aug	Moderate
Gomphrena leptophylla	P3	-	A	Mar-Sep	Moderate
Goodenia obscurata	P3	-	A or short-lived perennial	Apr, May and Aug-Oct	Moderate
Gymnanthera cunninghamii	P3	-	P	Jan-Dec	Moderate
Heliotropium murinum	P3	-	P	May or Sep	Moderate
Rothia indica subsp. *australis*	P3	-	A	Apr-Aug	Moderate
Stylidium weeliwolli	P3	-	A	Aug-Sep	Moderate
Terminalia supranitifolia	P3	-	P	May or Jul or Dec	Moderate
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	-	P	Aug	Moderate
Triodia chichesterensis	P3	-	P	Feb-Apr and Aug	High
Ptilotus mollis	P4	-	P	May or Sep	Moderate

2.2.2. Threatened and priority ecological communities

Two PECs were identified from database searches as occurring or potentially occurring within 50 km of the disturbance footprint. The 'Gregory land system' PEC (P3) was classified as having a 'moderate' likelihood of occurrence within the disturbance footprint. The 'Eighty Mile land system' was classified as having a 'negligible' likelihood of occurrence. The complete likelihood of occurrence assessment is provided as **Appendix B**.

3. METHODS

3.1. Field survey

Experienced botanists undertook the field survey on 13 - 14 May and 19 - 20 June 2024. The disturbance footprint was traversed on foot and the composition and condition of vegetation was recorded. Plant specimens were collected where the identity of flora required further confirmation. Photographic images and notes were recorded as required.

3.1.1. Targeted searches

Targeted searches were conducted for threatened and priority flora and ecological communities, with a particular focus on those with a high or moderate likelihood of occurrence (refer **Section 2.2.1**). Transects for flora were traversed approximately 20 m apart through areas of potentially suitable habitat. Transects and records were marked using a hand-held GPS receiver (±5 m accuracy). Where extensive priority flora individuals occurred within the survey area, the number of individuals was estimated based on sampling within a bounded area.

3.1.2. Sampling

Detailed sampling of the vegetation was undertaken using a combination of non-permanent 50 x 50 m quadrats and relevés. The quadrats were established using physical markers bounded by measuring tape. The relevés were completed over an equivalent 50 x 50 m area without the use of physical markers and were included to provide a more rapid sample of patches of vegetation. The position[2] of each sample was recorded with a hand-held GPS receiver (±5 m accuracy).

The data recorded within each sample included:

- site details (site name, site number, observers, date, location)
- environmental information (slope, aspect, bare-ground, rock outcropping, soil type and colour, litter layer, topographical position, time since last fire event)
- biological information (species, plant specimens, vegetation structure, vegetation condition, 'foliage projective cover', and disturbance).

3.1.3. Vegetation condition

The condition of the vegetation was assessed using the EPA (2016) scale as adapted from Trudgen (1988) (**Table 3**).

Table 3: Vegetation condition scale applied during the field survey

Category	Definition (EPA 2016)
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.

[2] For quadrats the north-west corner was recorded.

Table 3: Vegetation condition scale applied during the field survey (continued)

Category	Definition (EPA 2016)
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

3.2. Data analysis and preparation

3.2.1. Flora identification

Flora were identified through comparison with named material and through the use of taxonomic keys. Plant specimens collected during the field survey were dried, pressed and named in accordance with requirements of the Western Australian Herbarium (2024).

Flora was classified as native if indigenous to the IBRA region in which the disturbance footprint occurs. Non-native flora is denoted by '*' in text and raw data.

3.2.2. Threatened and priority flora confirmation

Threatened and priority flora were confirmed as absent from the disturbance footprint where no significant limitation was identified that could have affected their detection.

3.2.3. Vegetation unit identification and description

The vegetation units within the disturbance footprint were identified from the sample data collected during the field survey. The vegetation was described according to the dominant species present using the structural formation descriptions of the *National Vegetation Inventory System* (NVIS) (NVIS Technical Working Group 2017).

3.2.4. TEC and PEC confirmation

Vegetation units were assessed against TEC and PEC diagnostic characteristics and, if available, size and/or vegetation condition thresholds (DBCA 2023a). TECs and PECs were confirmed as absent from the disturbance footprint where no significant limitation was identified that could have affected their detection.

3.2.5. Mapping

Environmental features, vegetation units, vegetation condition, threatened or priority flora or ecological communities were mapped on aerial photography using notes and data collected in the field.

3.2.6. Limitations

The field survey was undertaken by experienced personnel within the optimal flowering period for assessment of flora in the Pilbara (EPA 2016). Climatic conditions prior to the survey were appropriate, with sufficient rainfall to promote growth and flowering.

4. RESULTS

4.1. Flora

4.1.1. Flora species inventory

A total of 38 native species were recorded in the disturbance footprint during the field surveys. This comprises a total of 13 families and 21 genera. The dominant families containing native taxa were Fabaceae (nine taxa) and Malvaceae (seven taxa). A complete species list is provided in **Appendix C**.

4.1.2. Threatened and priority flora

Two priority flora species were recorded, *Euploca mutica* (P3) and *Triodia chichesterensis* (P3). A total of 92 individuals of *E. mutica* were recorded, whilst an approximate total of between 80,000 and 300,000 individuals of *Triodia chichesterensis* are estimated to occur based on sampling (as discussed in **Section 5.1.1**).

The *E. mutica* individuals occurs as scattered individuals within the **AaAsTl** vegetation unit, whilst the *T. chichesterensis* individuals were restricted to the **AaAiTc** unit. The locations of the recorded priority flora individuals are shown in **Figure 2**.

4.1.3. Declared pests

No declared pests (pursuant to the *Biosecurity and Agriculture Management Act 2007*) or weeds of national significance (DAFF 2021) were recorded.

4.2. Vegetation

4.2.1. Vegetation units

Two vegetation units were recorded within the disturbance footprint, **AaAsTl** and **AaAiTc**. A description of the vegetation unit is provided in **Table 4** and representative photos of each are provided in **Plate 1** to **Plate 2**. The location of the vegetation units is shown in **Figure 3**.

Table 4: Extent of vegetation condition categories within the disturbance footprint

Vegetation unit	Description	Sample	Total area (ha)	Proportion of footprint (%)
AaAiTc	Sparse to open shrubland of *Acacia ancistrocarpa*, *Acacia inaequilatera*, *Codonocarpus cotinifolius* and *Grevillea wickhamii* over low open shrubland of *Acacia stellaticeps* and *Senna* sp. over closed hummock grassland of *Triodia chichesterensis* (P3) located on rocky low rises with surface quartzite.	Q1, R2, Q3, R4, R5, Q6, Q8, R10, R11	1.09	2.87
AaAsTl	Sparse to open shrubland of *Acacia ancistrocarpa*, *Acacia inaequilatera* and *Grevillea wickhamii* over low open shrubland of *Acacia stellaticeps*, *Dampiera candicans* and Ptilotus *astrolasius* over closed hummock grassland of *Triodia lanigera*.	Q12	36.83	97.13

*Plate 1: Vegetation unit **AaAsTl** in 'very good' condition*

*Plate 2: Vegetation unit **AaAiTc** in 'very good' condition*

4.2.2. Vegetation condition

The extent of vegetation by condition category is detailed in **Table 5** and shown in **Figure 4**.

Table 5: Extent of vegetation condition categories within the disturbance footprint

Condition category (Trudgen 1988)	Total area (ha)	Proportion of footprint (%)
Excellent	0	0
Very good	37.92	100
Good	0	0
Poor	0	0
Degraded	0	0
Completely degraded	0	0

4.2.3. Threatened and priority ecological communities

No threatened or priority ecological communities were recorded within the disturbance footprint.

5. DISCUSSION

5.1.1. Flora

Both priority flora species recorded within the disturbance footprint were also recorded within the broader vegetation within Kangan Station, and are known to occur within the broader area, based on the results of survey of the entire pipeline footprint. In particular, the **AaAsTl** unit, which provides habitat for *Euploca mutica* (P3) extends across broad areas to the north, south, east and west of the disturbance footprint. Whilst the **AaAiTc** unit, which provides habitat for *Triodia chichesterensis* (P3), was restricted to small patches within the disturbance footprint, these patches of vegetation were extend outside the footprint, and contained similar density of plants.

Due to the variable size of the *Triodia chichesterensis* individuals and inherent difficulties associated with counting individual hummock grasses, the number of *T. chichesterensis* individuals were recorded within a number of samples located in the disturbance footprint and wider survey area. The lower (8 individuals/m^2) and upper counts (30 individuals/m^2) were used to estimate the total number of individuals within the disturbance footprint. The relatively wide range of individuals per square metre was directly linked to disturbance history and maturity of plants; some areas appeared to have been subject to more recent fire and supported juvenile *T. chichesterensis* individuals at a higher density whereas areas with more mature plants supported approximately 8 plants/m^2.

T. chichesterensis is restricted to the Abydos Plain land system of the Pilbara and was only relatively recently described (Anderson *et al.* 2017). Limited records of the species exists (Western Australian Herbarium 2024) but this is likely due to its recent listing and similarity to other Triodia species with which it co-exists or occurs in close association with. Whilst a substantial number of individuals are estimated to occur in the disturbance footprint, areas of similar habitat and *T. chichesterensis* density occur in the surrounding area, which aligns with nearby surveys (Woodman Environmental 2020).

The remaining threatened and priority flora species identified in the likelihood of occurrence assessment (**Section 2.2.1**) are not considered to occur in the disturbance footprint as no significant limitation affecting their detection was identified.

5.1.2. Vegetation

The vegetation units recorded within the disturbance footprint were contiguous with the adjacent vegetation and that within the surrounding area. The **AaAiTc** vegetation unit was observed to be more localised, restricted to patches where soils were dominated by quartz, either as outcropping or localised quartzite expressions on the surface.

The Gregory land system PEC appears to be based on broad scale landform system mapping (DPIRD 2022). This land system is mapped as occurring approximately 1.4 km from the western boundary of the disturbance footprint (DPIRD 2022), and so was initially considered to have moderate potential to occur in the disturbance footprint.

This PEC occurs where there are 'linear dunes and restricted sandplains supporting shrubby hard spinifex (and occasionally soft spinifex) grasslands' (DBCA 2023b). The field survey confirmed that the disturbance footprint supports extensive pindan sandplains with occasional rocky outcrops. Therefore, as the key features of the PEC were not present within the disturbance footprint, it was not considered to occur.

6. REFERENCES

6.1. General references

Anderson, B. M., Thiele, K. R. and Barrett, M. D. 2017, A revision of the Triodia basedowii species complex and close relatives (Poaceae: Chloridoideae), Australian Systematic Botany, 30: 197-229.

Department of Agriculture, Fisheries and Forestry (DAFF) 2021, Profiles for Weeds of National Significance, Centre for Invasive Species Solutions, <https://weeds.org.au/weeds-profiles/>.

Department of Biodiversity, Conservation and Attractions (DBCA) 2023a, Methods for survey and identification of Western Australian threatened ecological communities (draft), Perth, Western Australia.

Department of Biodiversity, Conservation and Attractions (DBCA) 2023b, Priority Ecological Communities for Western Australia Version 35, Perth.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024, Protected Matters Search Tool, <https://pmst.awe.gov.au/>.

Department of Primary Industries and Regional Development (DPIRD) 2022, Soil Landscape Mapping - Systems (DPIRD-064).

Environmental Protection Authority (EPA) 2016, Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment, Perth.

NVIS Technical Working Group 2017, Australian Vegetation Attribute Manual: National Vegetation Information System, Department of the Environment and Energy, Canberra.

Trudgen, M. E. 1988, A Report on the Flora and Vegetation of the Port Kennedy Area, unpublished report prepared for Bowman Bishaw and Associates.

Western Australian Herbarium 2024, Florabase, Department of Biodiveristy, Conservation and Attractions (DBCA), <https://florabase.dbca.wa.gov.au/>.

Woodman Environmental 2020, Wodgina Lithium Project: Detailed Flora and Vegetation Assessment, MRL19-19-04, Version 0.

6.2. Online references

The online resources that have been utilised in the preparation of this report are referenced in **Section 6.1**, with access date information provided in **Table R1**.

Table R1 Access dates for online references

Reference	Date accessed	Website or dataset name
DAFF (2021)	13 November 2024	Weeds of National Significance (WoNS)
DCCEEW (2024)	24 April 2024	Protected Matters Search Tool
Western Australian Herbarium (2024)	13 November 2024	Florabase

Figures

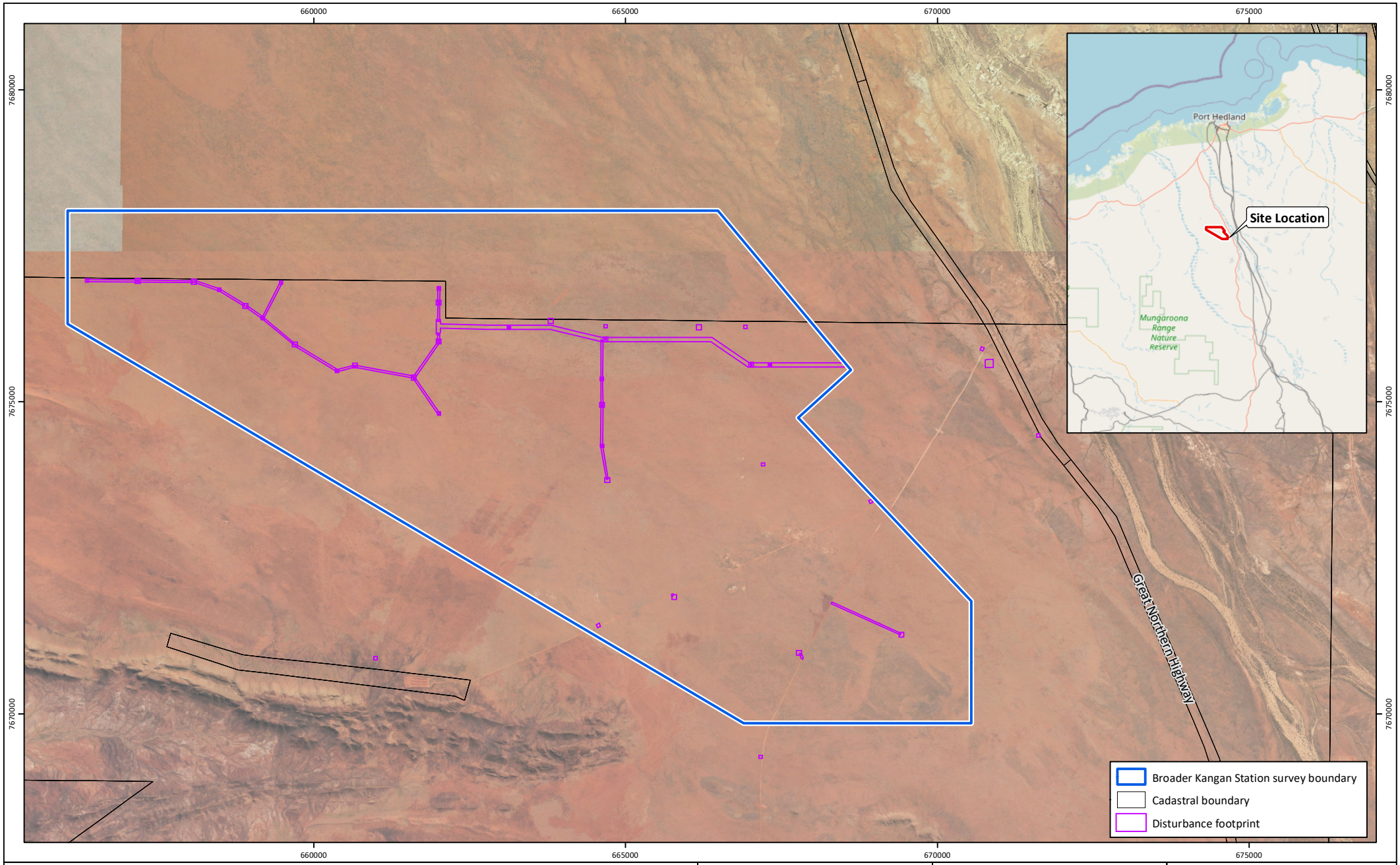

Figure 1: Survey Location

Project: Detailed Flora and Vegetation Assessment
Kangan Station Bore Field
Client: Kariyarra Aboriginal Corporation PBC

Plan Number:
EP24-037(01)--F03
Drawn: GAR
Date: 18/11/2024
Checked: SCM
Approved: RAW
Date: 18/11/2024

N

0 1 2 3
Kilometers
Scale: 1:80,000@A4
GDA2020 MGA Zone 50

emerge ASSOCIATES

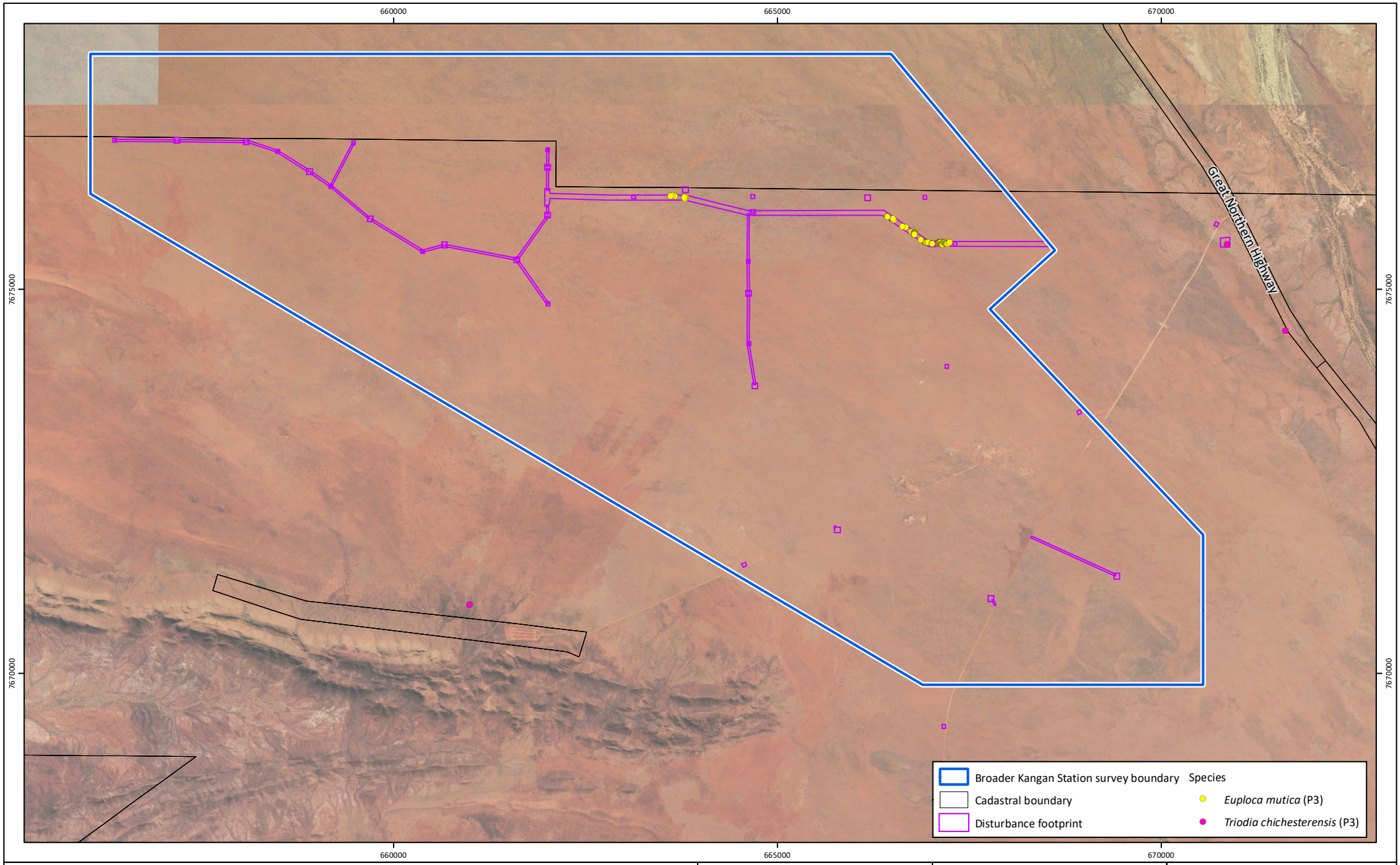

Figure 2: Priority Flora

Project: Detailed Flora and Vegetation Assessment
Kangan Station Bore Field
Client: Kariyarra Aboriginal Corporation PBC

Plan Number:
EP24-037(01)--F04
Drawn: GAR
Date: 18/11/2024
Checked: SCM
Approved: RAW
Date: 18/11/2024

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Kilometers
Scale: 1:65,000@A4
GDA2020 MGA Zone 50

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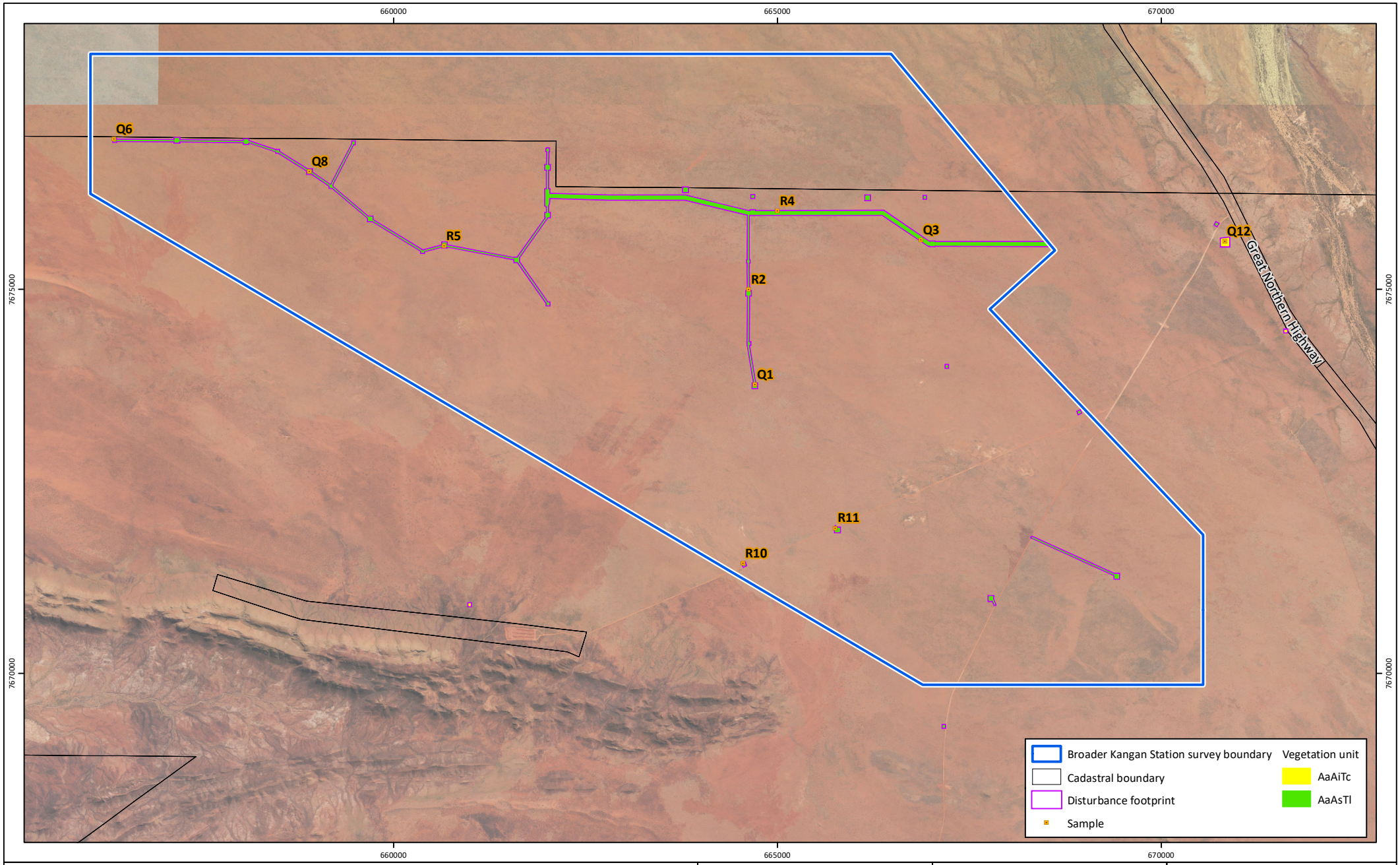

Figure 3: Vegetation Units

Project: Detailed Flora and Vegetation Assessment
Kangan Station Bore Field
Client: Kariyarra Aboriginal Corporation PBC

Plan Number:
EP24-037(01)--F05
Drawn: GAR
Date: 18/11/2024
Checked: SCM
Approved: RAW
Date: 18/11/2024

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Kilometers
Scale: 1:65,000@A4
GDA2020 MGA Zone 50

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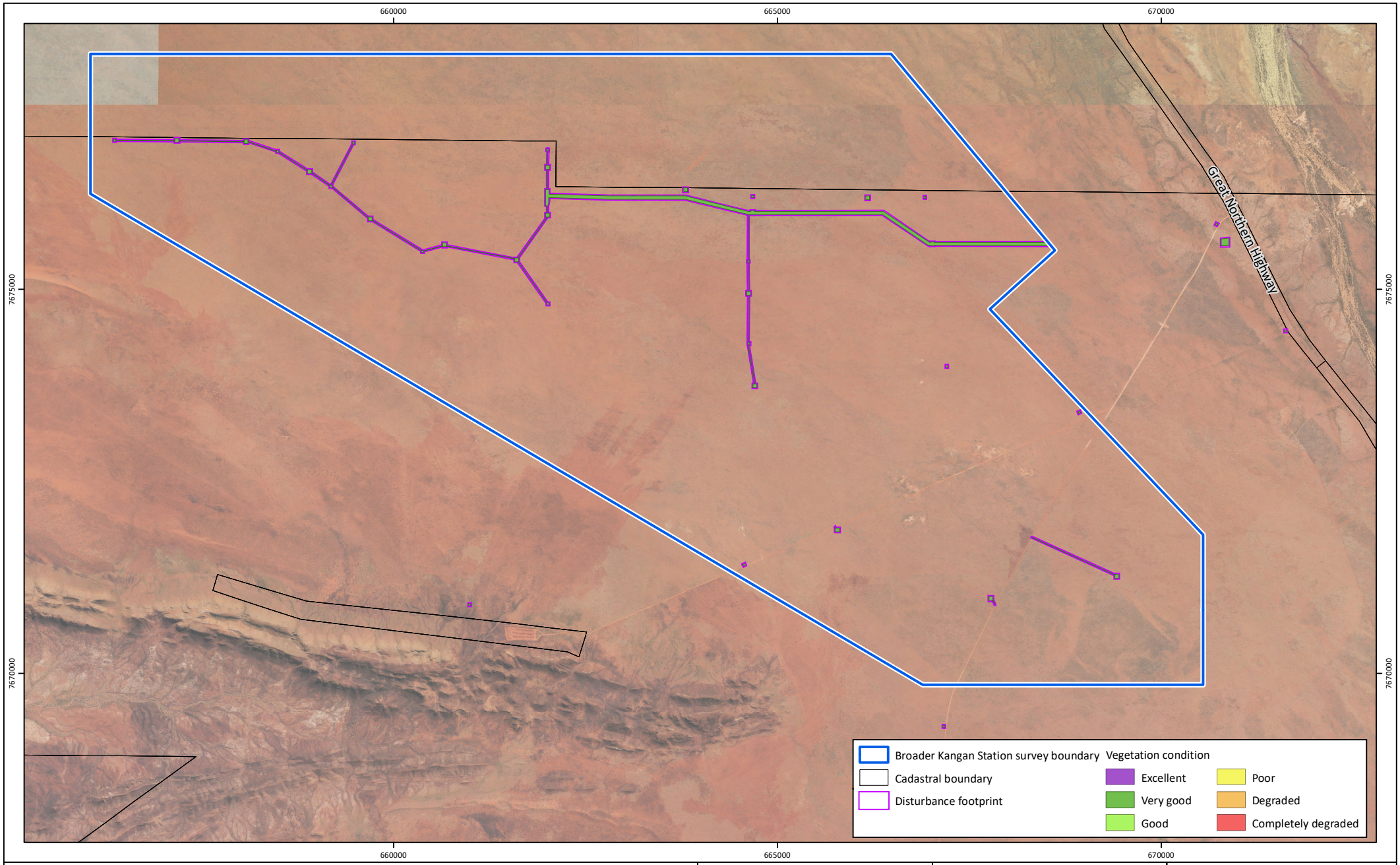

Figure 4: Vegetation Condition

Project: Detailed Flora and Vegetation Assessment
Kangan Station Bore Field
Client: Kariyarra Aboriginal Corporation PBC

Plan Number:
EP24-037(01)--F06
Drawn: GAR
Date: 18/11/2024
Checked: SCM
Approved: RAW
Date: 18/11/2024

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Kilometers
Scale: 1:65,000@A4
GDA2020 MGA Zone 50

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Appendix A

Conservation Significant Flora Species and Likelihood of Occurrence Assessment

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Quoya zonalis	EN	EN	P	Steep, rocky sandstone conglomerate and granite slopes in skeletal, brown sandy loams soils of the Capricorn Land System. Subpopulations often distirbuted in a linear arranegemnt on slopes with a southerly or easterly aspect.	Jul-Sep	Low
Acacia cyperophylla var. *omearana*	P1	-	P	Stony & gritty alluvium. Along drainage lines.	Mar-Apr	Negligible
Acacia fecunda	P1	-	P	Quartzite gibbers over grey-red skeletal soil. Along shallow creeks and drainage lines, hills, road verges.	May or Aug	Moderate
Acacia leeuweniana	P1	-	P	Gritty, skeletal red-grey sandy loam, light orange-btrown gravelly sand, granite. In rock fissures in outcrops, among boulders.	Apr-May or late Oct	Low
Cochlospermum macnamarae	P1	-	P	Upper slopes of a low hill in shallow, stony soil closely underlain by granitic bedrock.	Apr-Jun	Moderate
Corchorus sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	P1	-	P	Slopes, gullies and drainage lines, brown loam or clay/loam.	Jun	Moderate
Euploca argyrea	P1	-	?P	Loose rubble on limestone ridge	?Sep	Negligible
Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	P1	-	P	Red-brown clay-loam, often near granitic rises.	May-Nov	Moderate
Tephrosia rosea var. Port Hedland (A.S. George 1114)	P1	-	P	Sand. Coastal dunes.	Mar-Oct	Low
Themeda sp. Panorama (J. Nelson et al. NS 102)	P1	-	P	Shallow loamy soils on rocky slopes, gorges or gullies.	Unknown	Low
Triodia degreyensis	P1	-	P	Gravelly hills, including steep hill crests of ironstone. Skeletal soils. Only known from four collections on a single small range.	Recorded in Feb and Mar	Low
Cladium procerum	P2	-	P	Perennial pools.	Nov	Negligible
Euphorbia inappendiculata var. *inappendiculata*	P2	-	A	Creek bed, flood plains and clay pans in sand, sandy clay or loam.	May/Aug	Moderate
Gomphrena pusilla	P2	-	A	Fine beach sand. Behind foredune, on limestone.	Mar-Apr/Jun	Low

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	P3	-	P	Orange/brown sand. Sandy clay. Plains.	Apr-Nov	Moderate
Acacia levata	P3	-	P	Sand or sandy loam over granite. Hillslopes.	May	Moderate
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	-	A	Claypans and drainage lines on clay and sandy clay, often cracking.	May-Sep	Moderate
Eragrostis crateriformis	P3	-	A	Clayey loam or clay. Creek banks, depressions.	Jan-May or Jul	Moderate
Euphorbia clementii	P3	-	P	Gravelly hillsides, stony grounds.	May-Jul	High
Euploca mutica	P3	-	P?	Red/orange/brown sand, loam. Plains	May-Aug	Moderate
Gomphrena cucullata	P3	-	A	Red sandy loam, clayey sand. Open floodplains.	Feb or May	Negligible
Gomphrena leptophylla	P3	-	A	Sand, sandy to clayey loam, granite, quartzite. Open flats, sandy creek beds, edges salt pans & marshes, stony hillsides.	Mar-Sep	Moderate
Goodenia obscurata	P3	-	A or short-lived perennial	Floodplains or low rocky ridges, growing in red-brown sandy clay or lateritic loam over banded ironstone.	Apr, May and Aug-Oct	Moderate
Gymnanthera cunninghamii	P3	-	P	Sandy soils.	Jan-Dec	Moderate
Heliotropium murinum	P3	-	P	Sandy loam on plains, sometimes with quartz. Ironstone or sandstone pebbles.	May or Sep	Moderate
Nicotiana umbratica	P3	-	A or short-lived perennial	Shallow soils. Rocky outcrops.	Apr-Jun	Low
Phyllanthus hebecarpus	P3	-	P	Loamy soils among outcropping granite.	Unknown	Low
Rothia indica subsp. australis	P3	-	A	Sandy soils. Sandhills and sandy flats.	Apr-Aug	Moderate
Stylidium weeliwolli	P3	-	A	Gritty sand soil, sandy clay on edge of watercourses.	Aug-Sep	Moderate
Terminalia supranitifolia	P3	-	P	Sand among basalt rocks.	May or Jul or Dec	Moderate
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	-	P	Red clay on clay pan, grass plain.	Aug	Moderate

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
Triodia basitricha	P3	-	P	Sopes or crests of rocky hills.	Jan-Mar	Low
Triodia chichesterensis	P3	-	P	Occurs in rocky to gravelly substrates of loam or sand, often with quartzite pieces evident on the surface.	Feb-Apr and Aug	High
Vigna triodiophila	P3	-	P	Rockpiles among cobbles and boulders in shallow, red-brown or brown, clayey sand or loam.	May-?Sep	Low
Bulbostylis burbidgeae	P4	-	A	Granitic soils. Granite outcrops, cliff bases	Mar or Jun-Aug	Low
Ptilotus mollis	P4	-	P	Stony hills and screes.	May or Sep	Moderate

Note: CR=critically endangered, EN=endangered, VU=vulnerable, P1=Priority 1, P2=Priority 2, P3=Priority 3, P4=Priority 4, P=perennial, PG=perennial geophyte, A=annual. Species considered to potentially occur within the site are shaded green.

Appendix B

Conservation Significant Communities and Likelihood of Occurrence Assessment

Code	Community name	TEC/ PEC	Level of significance		Likelihood of occurrence
			State	EPBC Act	
Eighty Mile LS	Eighty Mile Land System	PEC	P3	-	Negligible
Gregory LS	Gregory Land System	PEC	P3	-	Moderate

Note: TEC=threatened ecological community, PEC=priority ecological community, P3=priority 3

Appendix C

Species List

Family	Status	Species
Amaranthaceae		
		Ptilotus calostachyus
		Ptilotus astrolasius
Boraginaceae		
	P3	*Euploca mutica*
Cleomaceae		
		Arivela uncifera
Convolvulaceae		
		Bonamia alatisemina
Fabaceae		
		Acacia acradenia
		Acacia ancistrocarpa
		Acacia bivenosa
		Acacia inaequilatera
		Acacia sphaerostachya
		Acacia stellaticeps
		Fabaceae sp.
		Indigofera monophylla
		Senna sp.
Goodeniaceae		
		Dampiera candicans
Gyrostemonaceae		
		Codonocarpus cotinifolius
Lauraceae		
		Cassytha sp.
Malvaceae		
		Corchorus ?lasiocarpus
		Corchorus ?parviflorus
		Corchorus sp.
		Malvaceae sp. 1
		Malvaceae sp. 2
		Sida sp. 1
		Sida sp. 2
Myrtaceae		
		Corymbia hamersleyana
		Corymbia zygophylla
		Melaleuca linophylla
Poaceae		
		Eriachne sp.
		Triodia ?angusta
	P3	*Triodia chichesterensis*
		Triodia epactia
		Triodia lanigera
		Triodia schinzii
Proteaceae		
		Grevillea wickhamii
		Hakea lorea subsp. *lorea*
		Hakea sp.