

Appendix A – Ecological Assessment Reports for the Albemarle Kemerton Plant 2017

GHD 2017



Memorandum

23 October 2017

To	Albemarle Lithium Pty Ltd		
Copy to	Amec Foster Wheeler Pty Ltd		
From	Glen Gaikhorst	Tel	+61 8 6222 8689
Subject	Additional Area Assessment	Job no.	6136286

1 Introduction

1.1 Background

GHD was commissioned by Amec Foster Wheeler Australia Pty Ltd (AMF) (on behalf of Albemarle Lithium Pty Ltd) to complete a biological assessment of several small areas within the Kemerton Strategic Industrial Area. The areas adjoin a broader proposal area that has been previously surveyed by Eco Logical Australia (ELA) (ELA 2017a, b, c).

The purpose of the assessment was to delineate key vegetation, flora and fauna constraints within the additional areas. The outcomes of the assessment will be used to inform the environmental assessment and approvals process.

1.2 Location and additional survey area

The broader proposal area is located approximately 17 km north-east of Bunbury, within Lot 510, Wellesley Road, Wellesley within the Shire of Harvey. The additional survey area was located on the northern and western side of the proposal area, and covers approximately 12.27 hectares (ha). The additional survey area is shown in Figure 1.

1.3 Scope of works

The scope of works was complete a reconnaissance assessment of areas not previously assessed (the additional survey area). Specifically the scope of works was to:

- Complete a reconnaissance vegetation survey to provide a description and mapping of vegetation units and vegetation condition within the additional survey area
- Complete a targeted flora survey for *Acacia semitrullata* to provide locations and counts
- Complete a Level 1 fauna survey to provide:
 - Presence and potential use of Black Cockatoo habitat trees and feeding evidence
 - Inventory of fauna recorded within the additional survey area
 - An indication of the presence of conservation significant fauna within the additional survey area
- Prepare a memorandum (this document) which outlines the methods and results of the assessment.



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1.4 Assumptions and limitations

This memorandum has been prepared by GHD for AMF and may only be used and relied on by AMF for the purpose agreed between GHD and AMF as set out in section 1.1 of this memorandum.

GHD otherwise disclaims responsibility to any person other than AMF arising in connection with this memorandum. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this memorandum were limited to those specifically detailed in the memorandum and are subject to the scope limitations set out in the memorandum.

The opinions, conclusions and any recommendations in this memorandum are based on conditions encountered and information reviewed at the date of preparation of the memorandum (including species listings). GHD has no responsibility or obligation to update this memorandum to account for events or changes occurring subsequent to the date that the memorandum was prepared.

The opinions, conclusions and any recommendations in this memorandum are based on assumptions made by GHD described in this memorandum. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this memorandum on the basis of information provided by AMF and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this memorandum are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this memorandum are constrained by the particular site conditions, such as the location of access tracks, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this memorandum.

Site conditions may change after the date of this memorandum. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this memorandum if the site conditions change.

2 Methodology

2.1 Flora and vegetation

GHD conducted a single season reconnaissance vegetation assessment of the additional survey area on 19 October 2017. The field survey was undertaken to identify and describe the dominant vegetation units, assess vegetation condition and complete targeted searches for *Acacia semitrullata*, previously recorded within the proposal area.



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The survey methodology employed for the survey was undertaken with reference to the Environmental Protection Authority (EPA) *Technical Guidance – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

2.1.1 Vegetation units

The classification of vegetation units within the additional survey area was based on structure, dominant taxa and cover characteristics as defined by field observations. Vegetation units were aligned with previously described communities (e.g. ELA 2017b, c) where possible.

2.1.2 Vegetation condition

The vegetation condition of the additional survey area was assessed and mapped in accordance with the condition rating scale for the South West and Interzone Botanical Provinces (EPA 2016a). The scale recognises the intactness of vegetation and consists of six rating levels.

2.1.3 Conservation significant flora

Previous surveys identified *Acacia semitrullata* (Priority 4) within the proposal area (ELA 2017b, c). The additional survey area was traversed on foot to record the presence of *A. semitrullata*. When individuals were located, a GPS location, and the number of plants and/or corresponding area of population was recorded.

2.1.4 Flora nomenclature

Nomenclature used in this memorandum follows that used by the WA Herbarium as reported on *FloraBase* (WA Herbarium 2017).

2.2 Fauna

GHD conducted a Level 1 fauna assessment (reconnaissance survey) concurrently with the vegetation assessment. The field survey was undertaken to identify and record fauna species, provide information on the potential presence of conservation significant fauna, and determine the presence and potential use of Black Cockatoo habitat trees and feeding within the additional survey area.

The survey methodology employed for the survey was undertaken with reference EPA *Technical Guidance: Sampling Methods for Terrestrial Vertebrate Fauna* (EPA 2016b), and was consistent with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPac – now the Department of the Environment and Energy, DEE) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo* (DSEWPac 2012).

Fauna field survey methods included opportunistic searches across the additional survey area to compile an inventory of fauna species identified at the time of survey. The opportunistic searches involved:

- Searching through microhabitats including turning over logs or rocks, turning over leaf litter and examining tree hollows and hollow logs
- Visual and aural surveys, this accounted for many bird species potentially utilising the additional survey area



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- Searching the additional survey area for tracks, scats, bones, diggings and feeding areas for both native and feral fauna.

An assessment for black cockatoo habitat within the additional survey area was completed. The assessment involved visual and aural assessment of the additional survey area to identify breeding habitat (presence/absence of actual and potential breeding trees), foraging habitat, current activity and any other signs of use by Black Cockatoos. For the purpose of this assessment, the DSEWPac (2012) Black Cockatoo referral guidelines were used to define breeding and foraging habitat.

Nomenclature used in this memorandum follows that used by the Western Australian Museum and the Department of Biodiversity, Conservation and Attractions (DBCA) *NatureMap* database, as it is deemed to contain the most up-to-date species information for Western Australia, with the exception of birds, where Christidis and Boles (2008) was used.

3 Results

3.1 Vegetation and flora

3.1.1 Vegetation associations

The additional survey area comprised five vegetation associations. Descriptions of the previously defined vegetation communities (see ELA 2013, 2017c) are provided in Table 1 with mapping provided in Figure 1.

No newly identified vegetation associations were described for the additional survey area.

Table 1 Vegetation communities present in the additional survey area

Code	Description (taken from ELA 2013, 2017c)	Extent in additional survey area (ha)
EmCcXb	<i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> woodland with <i>Allocasuarina fraseriana</i> , <i>Banksia attenuata</i> and <i>Xylomelum occidentale</i> isolated trees over <i>Xanthorrhoea brunonis</i> , <i>Acacia pulchella</i> and <i>Adenanthos meisneri</i> shrubland over * <i>Ehrharta calycina</i> open grassland over <i>Dasyopogon bromeliifolius</i> over open forbland uplands. Associated species include <i>Macrozamia riedlei</i> , <i>Jacksonia furcellata</i> and <i>Melaleuca preissiana</i> in low lying areas.	3.03
XbEc	<i>Xanthorrhoea brunonis</i> open shrubland with <i>Acacia pulchella</i> and <i>Jacksonia furcellata</i> isolated shrubs over * <i>Ehrharta calycina</i> open grassland in previously cleared farmland. Associated species include <i>Acacia semitrullata</i> (Priority 4)	3.64
PEr	<i>Pinus radiata</i> and <i>Eucalyptus rudis</i> low open woodland in low lying seasonal dampland.	1.24



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Code	Description (taken from ELA 2013, 2017c)	Extent in additional survey area (ha)
PJp	<i>Pinus</i> sp. open woodland over <i>Hypocalymma angustifolium</i> and <i>Astartea scoparia</i> isolated shrubs over * <i>Cynodon dactylon</i> sparse grassland over <i>Juncus kraussii</i> subsp. <i>australiensis</i> and <i>Juncus pallidus</i> closed rushland in low lying seasonal damp land.	4.17
EmCcBa	<i>Eucalyptus marginata</i> woodland with the occasional <i>Corymbia calophylla</i> over <i>Banksia attenuata</i> , <i>B. ilicifolia</i> and <i>B. grandis</i> with the occasional <i>Agonis flexuosa</i> and <i>Kunzea glabrescens</i> over <i>Melaleuca thymoides</i> , <i>Xanthorrhoea brunonis</i> , <i>Hibbertia hypericoides</i> and <i>Dasypogon bromeliifolius</i> with <i>Lyginia imberbis</i> and open forbland on uplands.	0.19

3.1.2 Vegetation condition

The vegetation condition within the additional survey area was rated from Excellent to Completed Degraded. Areas in western part were rated as Good, with the northern areas rated as Degraded or Completely Degraded. One small area on the northern boundary was rated as Excellent. The vegetation structure within the additional survey area was intact, or largely intact within limited disturbances observed.

A summary of the extents of the vegetation condition ratings mapped within the additional survey area is provided in Table 2 with updated mapping provided in Figure 2.

Table 2 Extent of vegetation condition ratings within the additional survey area

Vegetation condition rating	Extent in additional survey area (ha)
Excellent	0.19
Good	3.03
Degraded	3.64
Completely Degraded	5.41

3.1.3 Conservation significant flora

Fifty-nine individuals of *Acacia semitrullata* were recorded in the additional survey area (Table 3, Plate 1 and Figure 1). The species was primarily recorded in vegetation community EmCcXb, however a small number of individuals were also recorded in vegetation community EmCcBa.



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Table 3 *Acacia semitrullata* locations and counts

Species	Status	Easting	Northing	No. of plants
<i>Acacia semitrullata</i>	P4	384204	6325599	3
<i>Acacia semitrullata</i>	P4	384011	6325591	3
<i>Acacia semitrullata</i>	P4	384083	6325589	2
<i>Acacia semitrullata</i>	P4	383915	6325483	3
<i>Acacia semitrullata</i>	P4	383890	6325478	2
<i>Acacia semitrullata</i>	P4	383888	6325524	4
<i>Acacia semitrullata</i>	P4	383889	6325440	2
<i>Acacia semitrullata</i>	P4	383906	6325397	7
<i>Acacia semitrullata</i>	P4	383845	6325485	5
<i>Acacia semitrullata</i>	P4	383895	6325374	23
<i>Acacia semitrullata</i>	P4	383838	6325527	5



Plate 1 *Acacia semitrullata* in-situ



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3.2 Fauna

3.2.1 Fauna diversity

Forty-four fauna species comprising 35 birds, four reptiles and five mammals were recorded within the additional survey area (Table 4). Of these, four are introduced (feral) species, Red Fox, European Rabbit, Pig and Laughing Kookaburra.

One species of conservation significance was recorded in the additional survey area, the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*). This species is listed as Vulnerable under the Commonwealth EPBC Act and the State *Wildlife Conservation Act 1950* (WC Act). In addition, based on chewed Banksia nuts and Pine Tree cones observed within the additional survey area, it is likely that Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) utilises the additional survey area.

Carnaby's Black Cockatoo is listed as Endangered under both the EPBC and WC Acts.

Table 4 Fauna species recorded during the survey

Family	Scientific Name	Common Name	Listing	Numbers
Birds				
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill		4
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone		1
Acanthizidae	<i>Smicromnis brevirostris</i>	Weebill		4
Acanthizidae	<i>Sericornis frontalis</i>	White-browed Scrubwren		4
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite		1
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow		2
Artamidae	<i>Cracticus tibicen</i>	Australian Magpie		4
Artamidae	<i>Cracticus torquatus</i>	Grey Butcherbird		1
Cacatuidae	<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo	Vu, Vu	6
Cacatuidae	<i>Eolophus roseicapillus</i>	Galah		6
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		1
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon		1
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing		1
Corvidae	<i>Corvus coronoides</i>	Australian Raven		2
Cuculidae	<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo		1
Halcyonidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra		2
Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow		4
Hirundinidae	<i>Petrochelidon nigricans</i>	Tree Martin		2



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Family	Scientific Name	Common Name	Listing	Numbers
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote		2
Pachycephalidae	<i>Pachycephala pectoralis</i>	Golden Whistler		2
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler		1
Maluridae	<i>Malurus splendens</i>	Splendid Fairy-wren		4
Meliphagidae	<i>Acanthorhynchus superciliosus</i>	Western Spinebill		1
Meliphagidae	<i>Anthochaera carunculata</i>	Red Wattlebird		2
Meliphagidae	<i>Anthochaera lunulata</i>	Western Wattlebird		2
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater		1
Meliphagidae	<i>Lichmera indistincta</i>	Brown Honeyeater		20
Meliphagidae	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater		20
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater		2
Petroicidae	<i>Petroica boodang</i>	Scarlet Robin		1
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck		4
Psittacidae	<i>Purpureicephalus spurius</i>	Red-capped Parrot		2
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail		1
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail		1
Zosteropidae	<i>Zosterops lateralis</i>	Silvereye		6
Mammals				
Canidae	<i>Vulpes vulpes</i>	Fox	Int	1
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit	Int	2
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo		6
Phalangeridae	<i>Trichosurus vulpecula</i>	Common Brushtail Possum		1
Suidae	<i>Sus Scofa</i>	Pig	Int	0
Reptiles				
Egerniidae	<i>Tiliqua rugosa</i>	Bobtail		1
Eugongylidae	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink		1
Eugongylidae	<i>Menetia greyii</i>	Common Dwarf Skink		1
Sphenomorphidae	<i>Hemiergis quadrilineata</i>	Two-toed Earless Skink		1



3.2.2 Black Cockatoos

The additional survey area occurs within the known range of three species of black cockatoo, Carnaby's Black Cockatoo, Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) and Forest Red-tailed Black Cockatoo (DSEWPaC 2012). In the south-west of Western Australia, these species mostly occurs in the Jarrah Forest, where they breed between July/August to January/February.

The field survey was carried out during the breeding season of black cockatoos, however no evidence of breeding (at this time) or roosting were recorded within the survey area. A description of the extent of the foraging, potential breeding and roosting habitat for black cockatoos within the additional survey area is summarised in Table 5. Black cockatoo habitat trees and feeding evidence within the additional survey area are provided in Tables 6 and 7 respectively. Black cockatoo mapping is provided in Figure 3.

Table 5 Summary and extent of black cockatoo habitat within the additional survey area

Habitat type	Presence within the project area / Evidence
Foraging habitat	Habitat types (remnant areas) within the additional survey area contain suitable foraging species, of which are considered to provide high quality foraging habitat for black cockatoos (i.e. do contain a high density of foraging species). Foraging evidence by black cockatoos was recorded on four separate occasions on Jarrah and Banksia within the additional survey area. Numerous observations of feeding on Pine cones was also recorded within the additional survey area.
Actual breeding habitat	No breeding events were recorded by black cockatoos at the time of the survey. Two large Jarrah trees were recorded within the additional survey area. Both trees had DBH greater than 500 mm, had large hollows with potential chews and had been marked previously as habitat trees.
Potential breeding habitat	A further nine potential breeding habitat trees were recorded within the additional survey area; all Jarrah with no visible hollows present.
Roosting habitat	No roosting sites were recorded as being used by black cockatoos.

Table 6 Black Cockatoo habitat trees identified within the additional survey area

Type	DBH (mm)	Easting	Northing	Potential breeding in future	Actual breeding	Comment
Jarrah	500	383892	6325476	yes	no	
Jarrah	500	383821	6325491	yes	no	
Jarrah	500	384165	6325591	yes	no	



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Type	DBH (mm)	Easting	Northing	Potential breeding in future	Actual breeding	Comment
Jarrah	500	384190	6325594	yes	no	
Jarrah	500	384205	6325598	yes	no	
Jarrah	500	384064	6325594	yes	no	
Jarrah	500	384068	6325594	yes	no	
Jarrah	550	384068	6325596	yes	no	
Jarrah	500	384133	6325536	yes	no	
Jarrah	1200	384134	6325598	yes	yes	Tree has large hollows with potential chews. Also has a large white "H" on tree identifying it as a habitat or breeding tree.
Jarrah	850	383988	6325598	yes	yes	Tree has large hollows with potential chews. Also has a large white "H" on tree identifying it as a habitat or breeding tree.

Table 7 Black Cockatoo feeding evidence within additional survey area

Feeding evidence	Observation	Easting	Northing	Comment
Jarrah	feeding	384068	6325594	Forest Red-tailed Black Cockatoo chews on Jarrah nuts
Jarrah	feeding	384068	6325596	Forest Red-tailed Black Cockatoo chews on Jarrah nuts
Banksia	feeding	383977	6325584	Distinct Carnaby's Black Cockatoo feeding evidence
Jarrah	feeding	383853	6325485	Forest Red-tailed Black Cockatoo chews on Jarrah nuts
Pine	feeding	Throughout pine plantation		Distinct Carnaby's Black Cockatoo feeding evidence (not mapped)



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Regards

A handwritten signature in black ink, appearing to read 'Glen Gaikhorst', written on a light-colored background.

Glen Gaikhorst
Senior Zoologist



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References

Christidis, L and Boles, WE 2008, *Systematics and Taxonomy of Australian Birds*, Melbourne, CSIRO Publishing.

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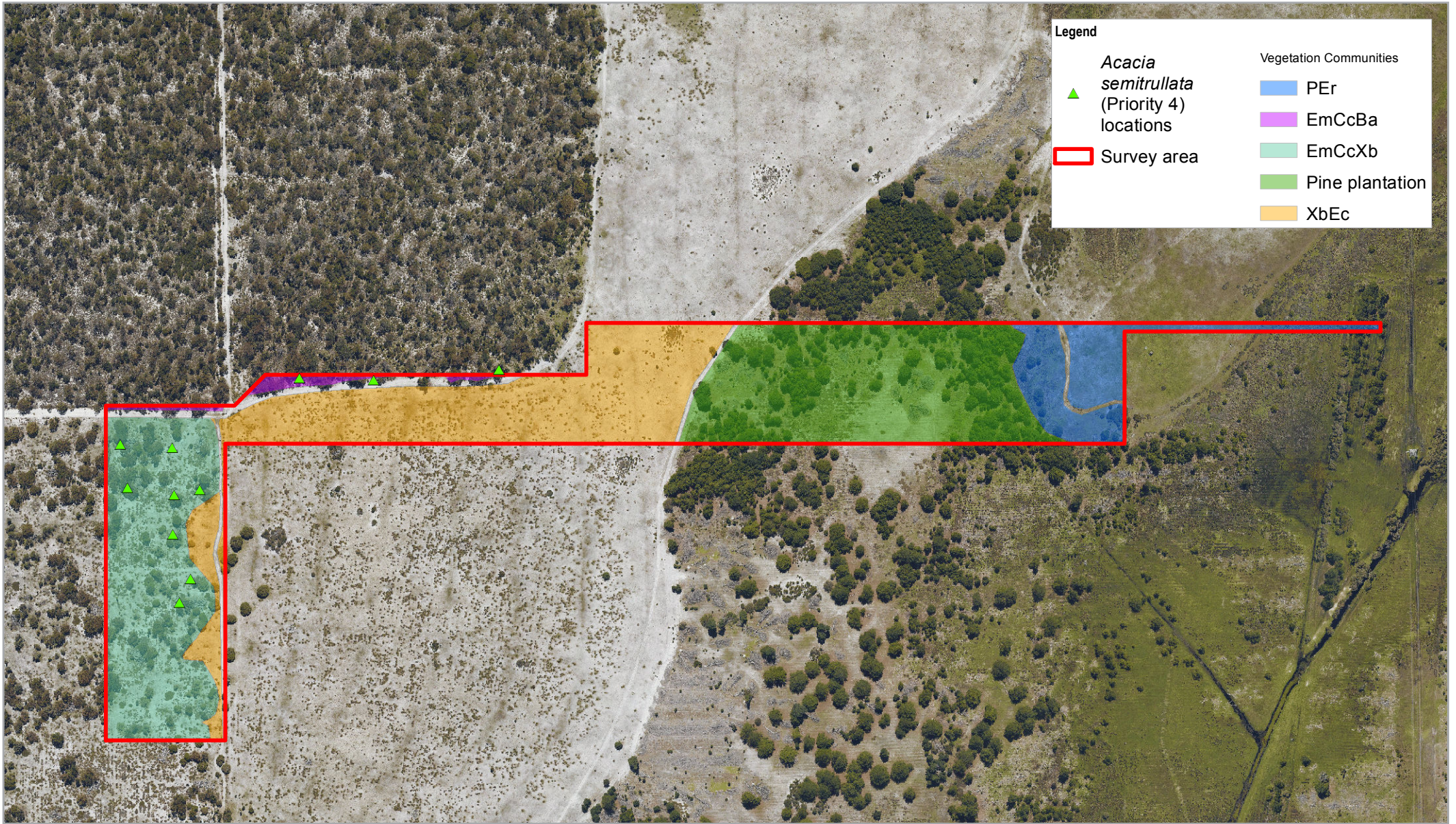
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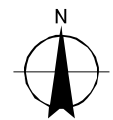
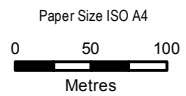
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Attachment 1, Figures



Legend

▲ <i>Acacia semitrullata</i> (Priority 4) locations	Vegetation Communities
▭ Survey area	▭ PEr
	▭ EmCcBa
	▭ EmCcXb
	▭ Pine plantation
	▭ XbEc



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

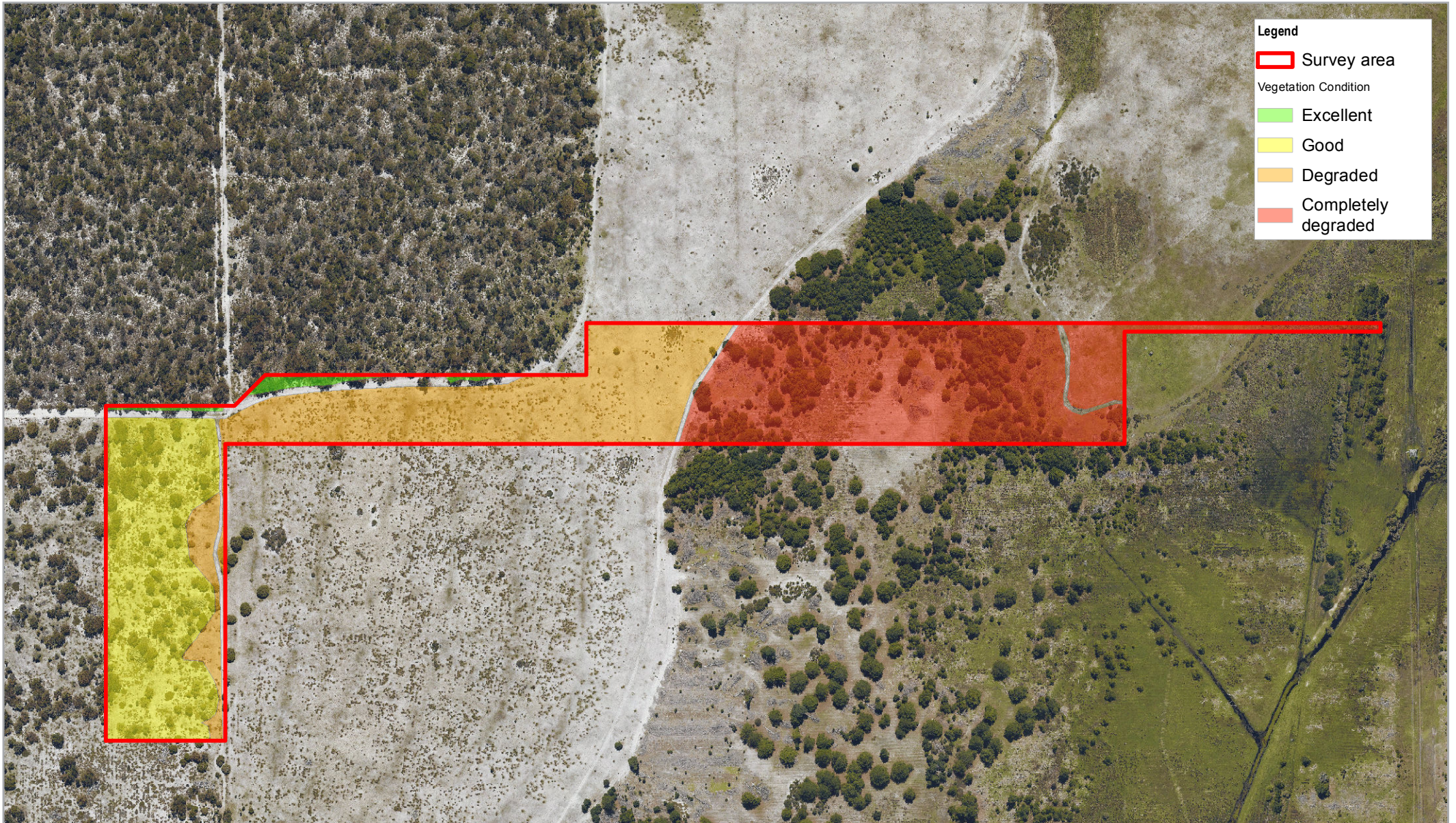
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Albemarle Kemerton Plant

Project No. 61-36286
Revision No. 0
Date 24/10/2017

**Vegetation associations and
*Acacia semitrullata***

FIGURE 1

Data source: GHD: Survey area, Vegetation associations, A. semitrullata - 2017/1024; Landgate: Aerial photography - Bunbury townsite Oct. 2016. Created by: mmikkonen

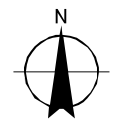
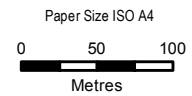


Legend

Survey area

Vegetation Condition

- Excellent
- Good
- Degraded
- Completely degraded



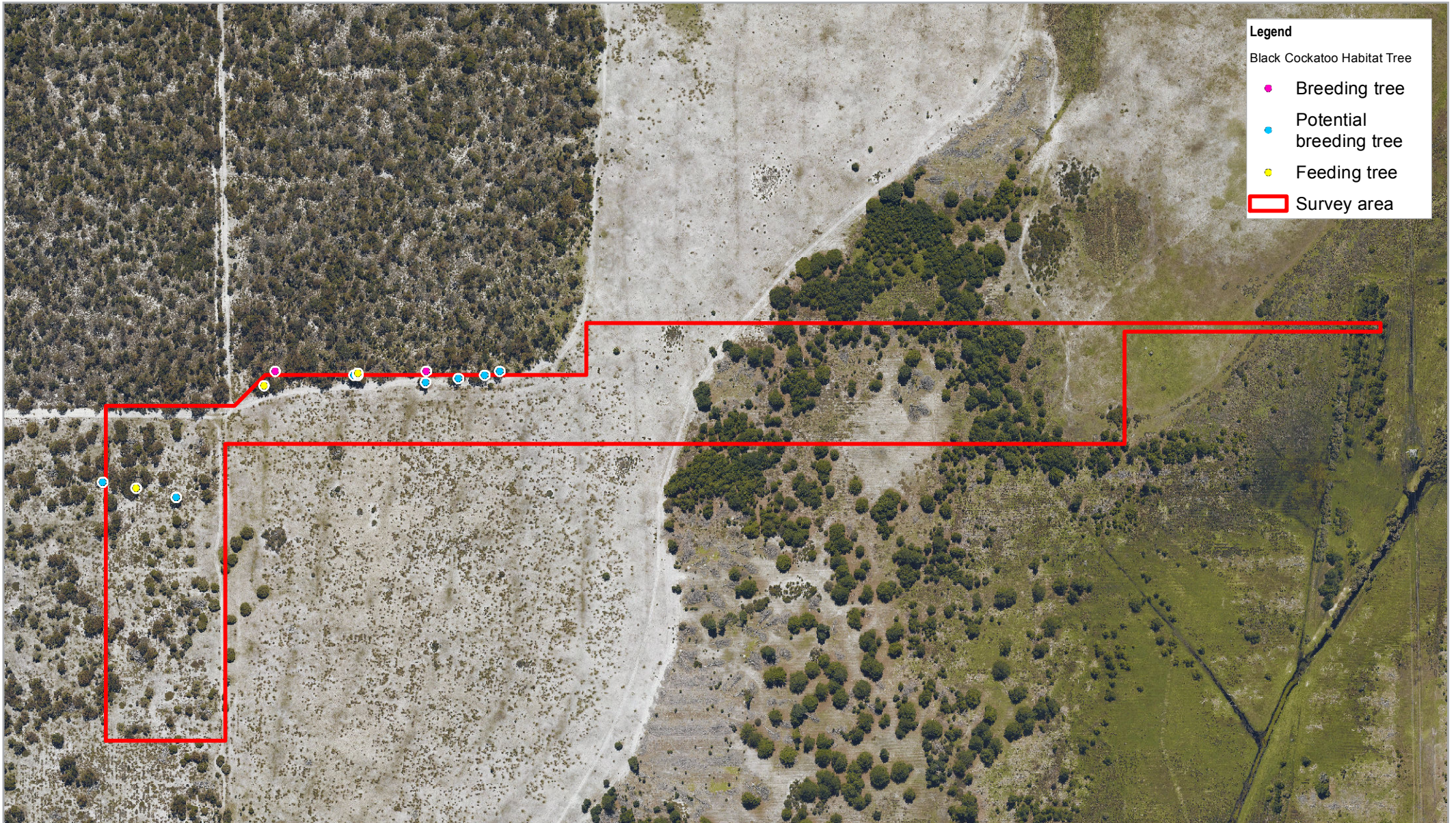
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Vegetation condition

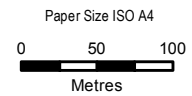
FIGURE 2



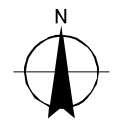
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Black Cockatoo Habitat Tree

- Breeding tree
- Potential breeding tree
- Feeding tree
- Survey area



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



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Black cockatoo habitat

FIGURE 3