ASSESSMENT OF FLORA AND VEGETATION VALUES

AND A RE-ASSESSMENT OF BLACK-COCKATOOS

USAGE ON THE

MIDLAND BRICK MUCHEA 6 SURVEY AREA

Prepared for

Midland Brick

Prepared by

Mattiske Consulting Pty Ltd

March 2022

Mattiske Consulting Pty Ltd

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LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BOM:	Bureau of Meteorology
DAWE:	Department of Agriculture, Water and the Environment
DBCA:	Department of Biodiversity, Conservation and Attractions
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
IBRA:	Interim Biogeographical Regionalisation for Australia
PEC:	Priority ecological community
TEC:	Threatened ecological community
TPFL:	Threatened and Priority Flora (WA Herbarium)
WAH:	Western Australian Herbarium (PERTH)

1. SUMMARY

Mattiske Consulting Pty Ltd was commissioned by Midland Brick in the spring months of 2021 to complete an assessment of flora and fauna values on the proposed expansion area of the Muchea 6 operations.

The Muchea 6 site has been operating for some time and currently is undergoing a potential expansion of its operations. The Muchea 6 site has been subject to previous agricultural activities and as such remnants of grazing pressures and clearing activities were carried out on the site prior to the development of the extractive industry.

Site visits were undertaken by Dr Libby Mattiske (Mattiske Consulting) and Caragh Sinclair (Midland Brick) in November 2021 and Tony Kirkby (Cockatoo specialist) in December 2021. These field trips supplement the earlier work by Jen Wilcox from Western Wildlife (2015).

The range of flora on the site is very limited due to the previous grazing activities and as such only 4 native and 9 introduced species were recorded in 2021. The latter low diversity reflects the degree of past disturbances from earlier agricultural activities.

The vegetation mapped as "E1" is dominated by open woodlands of Wandoo (*Eucalyptus wandoo*) with the occasional Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) over mainly introduced grasses and herbs.

No threatened or priority ecological communities listed at the State or Federal levels pursuant to the *Wildlife Conservation Act* 1950 or the *Environment Protection Biodiversity and Conservation Act* 1999 were recorded in the BGC Muchea project area (Department of Biodiversity, Conservation and Attraction 2022b 2022c; Department of Agriculture, Water and the Environment 2022c).

Vegetation condition across the survey area ranged from degraded to completely degraded in the majority of the Muchea 6 site. The area has been subject to previous extraction activities and also grazing, so the vegetation consists mainly of *Eucalyptus wandoo* (Wandoo) and occasional Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) with little understorey remaining over the majority of the area.

Two trees had suitable hollows for Black-Cockatoos. The two trees that had suitable hollows for Black-Cockatoos will not be cleared or impacted by the proposed expansion activities. A range of trees were highlighted by Western Wildlife (2015) and were re-assessed by Tony Kirkby in 2021. Although some had larger diameters at breast height only a few of these larger trees will be cleared and none have potential tree hollows suitable for the Black-Cockatoo nesting.

Of the proposed 89 trees to be cleared with diameters at breast height >30cm:

- a total of 8 trees have a DBH >80cm or more but none of these has suitable hollows for Black-Cockatoos;
- a total of 12 trees have small hollows which are not suitable for Black-Cockatoos;
- a total of 8 trees have large hollows that are not showing any sign of use by Black-Cockatoos or are not sufficiently suitable dimensions for Black-Cockatoos.
- neither of the two trees highlighted by Kirkby in 2021 will be cleared as part of the proposed expansion.

In summary, the main biological values of the area relate to the various stands of predominantly *Eucalyptus wandoo* (Wandoo) and some *Corymbia calophylla* (Marri) and the two trees with suitable hollows for Black-Cockatoos and also the trees which support Black-Cockatoo foraging activities.

In terms of the ten native vegetation clearing principles, only Principle (b) associated with the fauna species may be at variance with the clearing principles. However as the trees with suitable hollows will be avoided in the expansion, the remaining impact relates to the reduction in tree canopy for foraging.

2. INTRODUCTION

Mattiske Consulting Pty Ltd was commissioned by Midland Brick in the spring months of 2021 to complete an assessment of flora and fauna values on the proposed expansion area of the Muchea 6 operations. A such this work supplements the earlier work by Jen Wilcox of Western Wildlife (2015) on the Black-Cockatoos.

The Muchea 6 site has been operating for some time and currently is undergoing a potential expansion of its operations. The Muchea 6 site has been subject to previous agricultural activities and as such remnants of grazing pressures and clearing activities were carried out on the site prior to the development of the extractive industry.

2.1 Location

The Muchea 6 site operated by Midland Brock is located approximately 50km north of Perth. The survey area includes primarily agricultural areas with patches of remnant trees and a previous pit associated with extraction of clay and a pond area. The survey areas occur within the Drummond Botanical District, part of the greater South-West Botanical District (Beard 1990).

2.2 Climate

Beard (1990) describes the climate of the Drummond Botanical District as warm Mediterranean with 5-6 dry months per year. Figure 1 shows the average climate data of the Pearce RAAF Airbase (rainfall, minimum and maximum temperature), (BOM 2022). The seasonal wetter and cooler months in winter and the drier and hotter months in summer typify the regional conditions.

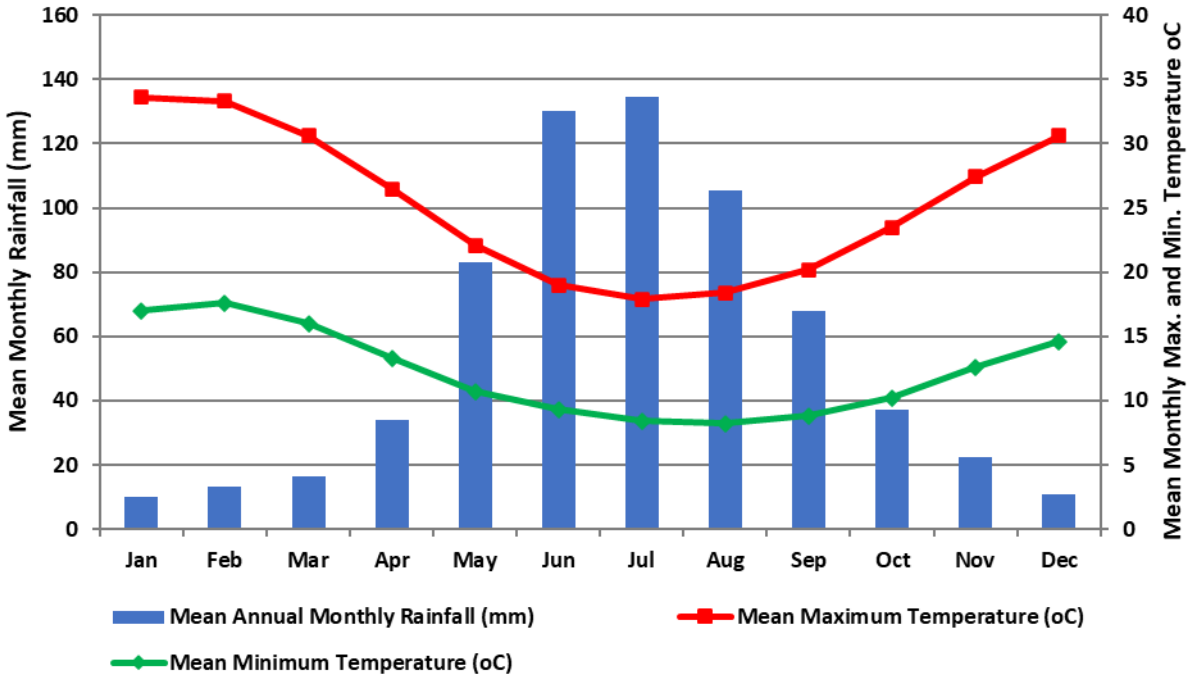

Figure 1: Summary of Climatic data from Bureau of Meteorology (BOM 2022) for the Pearce RAAF Airbase 009053 (Rainfall, Minimum and Maximum Temperatures °C)

2.3 Western Australia's Flora – A Legislative Perspective

At the State level, the *Biodiversity Conservation Act 2016* provides for taxa of native flora (and fauna) to be specially protected because they are subject to identifiable threats. Protection of these taxa has been

identified as being warranted because they may become extinct, are threatened, or are otherwise in need of special protection. Ecological communities that are deemed to be threatened are afforded protection under the *Environmental Protection Act 1986*. Listings of threatened species and communities are reviewed annually by the Western Australian Threatened Species Scientific Committee (TSSC), which is a body appointed by the Minister for the Environment and supported by the DBCA. The TSSC reviews threatened and specially protected flora (and fauna) listings on an annual basis. Recommendation for additions or deletions to the listings of specially protected flora (and fauna) is made to the Minister for the Environment by the TSSC, via the Director General of the DBCA, and the WA Conservation Commission. Under Schedule 1 of the *Biodiversity Conservation Act 2006*, the Minister for the Environment may declare that a class or description of flora to be threatened flora throughout the State, by notice published in the *Government Gazette* (DBCA 2022a).

At the Commonwealth level, under the *Environment Protection and Biodiversity Conservation Act 1999*, a nomination process exists, to list a threatened species or ecological community. Additions or deletions to the lists of Threatened species and communities are made by the Minister for Agriculture, Water and the Environment, on advice from the Federal Threatened Species Scientific Committee. *Environment Protection and Biodiversity Conservation Act 1999* lists of Threatened flora and ecological communities are published on the Department of Agriculture, Water and the Environment website (2022b, 2022c).

2.4 Threatened and Priority Flora

Flora within Western Australia that is considered to be under threat may be classed as either threatened flora or priority flora. Where flora has been gazetted as threatened flora under the *Biodiversity Conservation Act* 2006, it is an offence "to take" such flora without the written consent of the Minister. The *Biodiversity Conservation Act* 2006 states that "to take" flora includes to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.

Priority flora constitute species which are considered to be under threat, but for which there is insufficient information available concerning their distribution and/or populations to make a proper evaluation of their conservation status. Such species are considered to potentially be under threat, but do not have legislative protection afforded under the *Biodiversity Conservation Act* 2016. The DBCA categorises priority flora according to their conservation priority, using five categories, P1 to P5, to denote the conservation priority status of such species, with P1 listed species being the most threatened, and P5 the least. Priority flora species are regularly reviewed, and may have their priority status changed when more information on the species becomes available. Appendix A1 sets out definitions of both threatened and priority flora (DBCA 2022a).

At the Commonwealth level, under the *Environment Protection and Biodiversity Conservation Act 1999*, threatened species can be listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable, or conservation dependent, by the Commonwealth Minister for Agriculture, Water and the Environment. Refer to Appendix A2 for a description of each of these categories of threatened species. Under the *Environment Protection and Biodiversity Conservation Act 1999*, a person must not take an action that has or will have a significant impact on a listed threatened species without approval from the Commonwealth Minister for Agriculture, Water and the Environment, unless those actions are not prohibited under the Act.

2.5 Threatened and Priority Ecological Communities

An ecological community is defined as a naturally occurring biological assemblage that occurs in a particular type of habitat composed of specific abiotic and biotic factors. At the State level, ecological communities may be considered as threatened once they have been identified as such by the Western Australian Threatened Ecological Communities Scientific Advisory Committee. A threatened ecological community is defined, under the *Environmental Protection Act 1986*, as an ecological community listed, designated or declared under a written law or a law of the Commonwealth as threatened, endangered or vulnerable. There are four State categories of threatened ecological communities, or TECs: presumed totally destroyed (PD); critically endangered (CR); endangered (EN); and vulnerable (VU) (DBCA 2019).

A description of each of these categories of TECs is presented in Appendix A3. Threatened ecological communities are gazetted as such (DBCA 2022b).

At the Commonwealth level, some Western Australian TECs are listed as threatened, under the *Environment Protection and Biodiversity Conservation Act 1999*. Under the *Environment Protection and Biodiversity Conservation Act 1999*, a person must not take an action that has or will have a significant impact on a listed threatened ecological community without approval from the Commonwealth Minister for the Agriculture, Water and the Environment, unless those actions are not prohibited under the Act. A description of each of these categories of TECs is presented in Appendix A4. The current *Environment Protection and Biodiversity Conservation Act 1999* list of threatened ecological communities can be located on the DAWE (2022c) website.

Ecological communities identified as threatened, but not listed as threatened ecological communities, can be classified as priority ecological communities (PECs). These communities are under threat, but there is insufficient information available concerning their distribution to make a proper evaluation of their conservation status. The DBCA categorises priority ecological communities according to their conservation priority, using five categories, P1 to P5, to denote the conservation priority status of such ecological communities, with P1 communities being the most threatened and P5 the least. Appendix A5 sets out definitions of priority ecological communities (DEC 2013). A list of current priority ecological communities can be viewed at the DBCA (2022c) website.

2.6 Clearing of Native Vegetation

Under the *Environmental Protection Act 1986*, the clearing of native vegetation requires a permit to do so, from the Department, Water and Environmental Regulations (DWER) or the Department of Mines, Industry Regulation and Safety (DMIRS), unless that clearing is exempted under specific provisions listed in Schedule 6 of the Act, or are prescribed in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Under the *Environmental Protection Act* (1986), "native vegetation" means indigenous aquatic or terrestrial vegetation, and includes dead vegetation unless that dead vegetation is of a class declared by regulation to be excluded from this definition but does not include vegetation in a plantation. Under the *Environmental Protection Act 1986*, Section 51A, "clearing" means the killing or destruction of, the removal of, the severing or ringbarking of trunks or stems of, or the doing of any other substantial damage to, some or all of the native vegetation in an area, and includes the draining or flooding of land, the burning of vegetation, the grazing of stock, or any other act or activity, that causes any of the aforementioned consequences or results.

Under the *Environmental Protection Act 1986*, ten principles are set out, under which native vegetation should not be cleared. These principles state that native vegetation should not be cleared, if:

a. it comprises a high level of biological diversity;

b. it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia;

c. it includes, or is necessary for the continued existence of, threatened flora;

d. it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community;

e. it is significant as a remnant of native vegetation in an area that has been extensively cleared;

f. it is growing in, or in association with, an environment associated with a watercourse or wetland;

g. the clearing of the vegetation is likely to cause appreciable land degradation;

h. the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area;

i. the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water; or

j. the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

The *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, under Regulation 5, sets out prescribed clearing actions that do not require a clearing permit, as defined in Section 51C of the *Environmental Protection Act 1986*.

Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, under Regulation 6 –"Environmentally sensitive areas" are defined as "the area covered by vegetation within 50 m of threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the threatened flora is located".

Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* - Regulation 6 (Environmentally sensitive areas), the area covered by a threatened ecological community, is similarly considered an Environmental sensitive area and therefore non-permitted, unless Ministerial approval is granted.

2.7 Declared Plant (Pest) Species

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (section 12), or an organism for which a declaration under section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2022).

2.8 Local and Regional Significance

Flora or vegetation may be locally or regionally significant in addition to statutory listings by the State or Federal Government.

In regards to flora; species, subspecies, varieties, hybrids and ecotypes may be significant other than as threatened flora or priority flora, for a variety of reasons, including:

- a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status
- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- local endemism/a restricted distribution; and
- being poorly reserved (EPA 2004).

Vegetation may be significant because the extent is below a threshold level and a range of other reasons, including:

- scarcity;
- unusual species;
- novel combinations of species;

- a role as a refuge;
- a role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- being representative of the range of a unit (particularly, a good local and/or regional example of a unit in "prime" habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- a restricted distribution (EPA 2004).

Vegetation communities are locally significant if they contain Priority Flora species or contain a range extension of a particular taxon outside of the normal distribution. They may also be locally significant if they are very restricted to one or two locations or occur as small isolated communities. In addition, vegetation communities that exhibit unusually high structural and species diversity are also locally significant.

Vegetation communities are regionally significant where they are limited to specific landform types, are uncommon or restricted plant community types within the regional context, or support populations of threatened Flora.

Determining the significance of flora and vegetation may be applied at various scales, for example, a vegetation community may be nationally significant and governed by statutory protection as well as being locally and regionally significant.

3. OBJECTIVES

Mattiske Consulting Pty Ltd was commissioned by Midland Brick in the spring months of 2021 to complete an assessment of flora and fauna values on the proposed expansion area of the Muchea 6 operations. A such this work supplements the earlier work by Jen Wilcox of Western Wildlife (2015) on the Black-Cockatoos.

The reconnaissance survey was undertaken in accordance with the EPA (2016a and 2016b) and Commonwealth (2013) survey guidance statements. A detailed survey was not undertaken due to the extensive clearing in the past from historical grazing activities and previous extraction of clay materials in a section of Muchea 6.

- Record the flora, vegetation and fauna values in the area through sampling;
- Undertake searches for flora species using foot traverses;
- Collect and identify the vascular plant species present in the Survey Area;
- Collate and identify weeds within the survey areas;
- Review the conservation status of the vascular plant species recorded by reference to current literature and current listings by the DBCA (2022a) and plant collections held at the Western Australian State Herbarium (WAH 1998-), and listed by the DAWE (2022a) under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Identify any threatened or priority ecological communities recorded by reference to current literature and current listings by the DBCA (2022b, 2022c) and as listed by the DAWE (2022c) under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Undertake targeted work on the fauna habitat values and any potential usage of the area;
- Provide recommendations on the local and regional significance of the vegetation; and
- Prepare a report summarising the findings.

4. METHODS

This report provides a summary that incorporates key points from recent site inspections Dr Mattiske, Caragh Sinclair in November 2021 and Tony Kirkby in December 2021. Survey tracks are summarized in Figure 2 as attached. This aerial image also reflects the degree of previous clearing on the majority of the areas.

The trees on the survey area were re-assessed for the presence of suitable hollows for Black-Cockatoo species by Tony Kirkby and also for other key activities by the Black-Cockatoos. Hollows with a suitable entrances were further inspected using a pole camera and all hollows were checked for dimensions and also signs of activity such as evidence of physical chewing of the tree stems by the bird. GPS locations were taken handheld GPS (GDA 94). The assessments were undertaken in line with current guidelines.

An assessment of the impact of weed invasion or vegetation condition was undertaken on the basis of the vegetation condition scale from Keighery (1994) (Appendix A7).

All plant specimens collected during the field surveys were dried and processed in accordance with the requirements of the Western Australian Herbarium. The plant species were identified through comparisons with pressed specimens housed at the Western Australian Herbarium. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-).

The descriptions of plant communities within the survey area are based on the structural forms of Australian vegetation developed by Beard (1990).

4.1 Survey Limitations and Constraints

An assessment of the survey against a range of factors which may have had an impact on the outcomes of the present survey was made (Table 1). Based on this assessment, the present survey has not been subject to constraints which would affect the thoroughness of the survey, and the conclusions which have been formed.

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Scale: 1:5,000
MGA94 (Zone 50)

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Midland Brick
Muchea 6
Tracks on Aerial Imagery

Figure: **2**

Table 1: Potential Flora and Vegetation Survey Limitations for Survey Area

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	**Not a constraint:** The study has been undertaken in an area that has been well studied and documented with ample literature available (Beard 1976; 1990; Heddle et al. 1980; Mattiske and Havel 1998; Mitchell *et al.* 2002).
Scope (i.e. what life forms, etc., were sampled).	**Not a constraint:** Due to sufficient rainfall, all life forms were sampled adequately during the time of the survey. All site characteristics were adequately sampled during the time of the survey.
Proportion of flora collected and identified (based on sampling, timing and intensity).	**Not a constraint:** The proportion of flora surveyed was adequate; although due to the degraded nature of most areas the range of native flora was low.
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	**Not a constraint:** The information collected during the survey was sufficient to assess the vegetation that was present during the time of the survey.
Mapping reliability.	**Not a constraint:** Aerial photography of a suitable scale with previous mapping (Mattiske Consulting Pty Ltd 2012) shown was used. Sites were chosen from these aerials to plan quadrats in representative areas of plantations and remnants. Opportunistic sites were also used if differences were noticed during on ground reconnaissance. Vegetation communities were assigned to each quadrat based on previous mapping, topography, soil type, presence/absence and percent foliage cover of vegetation.
Timing, weather, season, cycle.	**Not a constraint:** It is generally accepted that flora and vegetation surveys are conducted in late spring (after late rains in the southwest in 2021) in the South-West Botanical Province (EPA 2004). Rainfall prior to the survey was deemed to be sufficient (Figure 2).
Disturbances (fire flood, accidental human intervention, etc.).	**Potential constraint:** Extensive grazing pressures have been experienced within the Muchea 6 area and this combined with previous extraction activities has led to degraded remnants in the survey area.
Intensity (in retrospect, was the intensity adequate).	**Not a constraint:** Sites were chosen from aerial maps to review the values in the degraded woodlands on the Muchea 6 area.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	**Not a constraint:** The available resources were adequate to complete the survey.
Access problems (i.e. ability to access survey area).	**Not a constraint:** Existing tracks enabled adequate access to survey the vegetation within the survey area. Where access was not available by car, it was easily traversed by foot.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	**Not a constraint:** All survey personnel have the appropriate training in sampling and identifying the flora of the region.

5. RESULTS

5.1 Landform and Soils

The underlying land system as illustrated on Figure 3 is the Reagan system, namely:

. **Reagan System** - Gentle Slopes from the Dandaragan plateau to the Pinjarra plain. Brown, yellow and pale sands that may be shallow to very deep with clay or duricrust underlying. Variable low woodland and shrubland of *Eucalyptus, Banksia* and *Acacia* species.

The Muchea 6 area covers some 49.98ha which occurs as 0.94% of the total extent of this land system.

The Regan System has also been subdivided into 4 soil landscape mapping units consisting of subsystems and phases on the Muchea 6 site, namely:

. **Reagan 222Re-1g Phase** – covering 21.26ha of the 22.05ha in the wider area; with gentle slopes of gravelly deep pale sands often over clay or duricrust. Very low woodland and shrubland with scattered low trees. *Banksia prionotes, Nuytsia floribunda, Adenanthos* species and a few stunted *Eucalyptus marginata*.

. **Reagan 222Re-1x Phase** – covering 28.17ha of the 576.36ha in the wider area; with gentle slopes of loose brown or pale sands with a sandy fabric. Low woodland and shrubland with scattered low trees Banksia *prionotes, Nuytsia floribunda, Adenanthos* species and stunted *Eucalyptus marginata*.

. **Reagan 222Re10 Subsystem** – covering 0.10ha of the 674.01ha in the wider area; with drainage depressions on the Dandaragan Plateau. Generally duplex, some uniform fine, yellow to yellowish brown alluvial soils. *Corymbia calophylla* and *Eucalyptus wandoo* with occasional *Eucalyptus marginata. Melaleuca* species., reeds and *Eucalyptus rudis* in wet areas.

. **Reagan 222Re5 Subsystem** – covering 0.45ha of the 51.87ha in the wider area; with level to very gently inclined swampy drainage lines with poorly drained grey siliceous and pale yellow-brown sands. Low woodland of *Corymbia calophylla, Eucalyptus wandoo*, some *Eucalyptus marginata. Melaleuca* species, *Eucalyptus rudis* and reeds in wet areas.

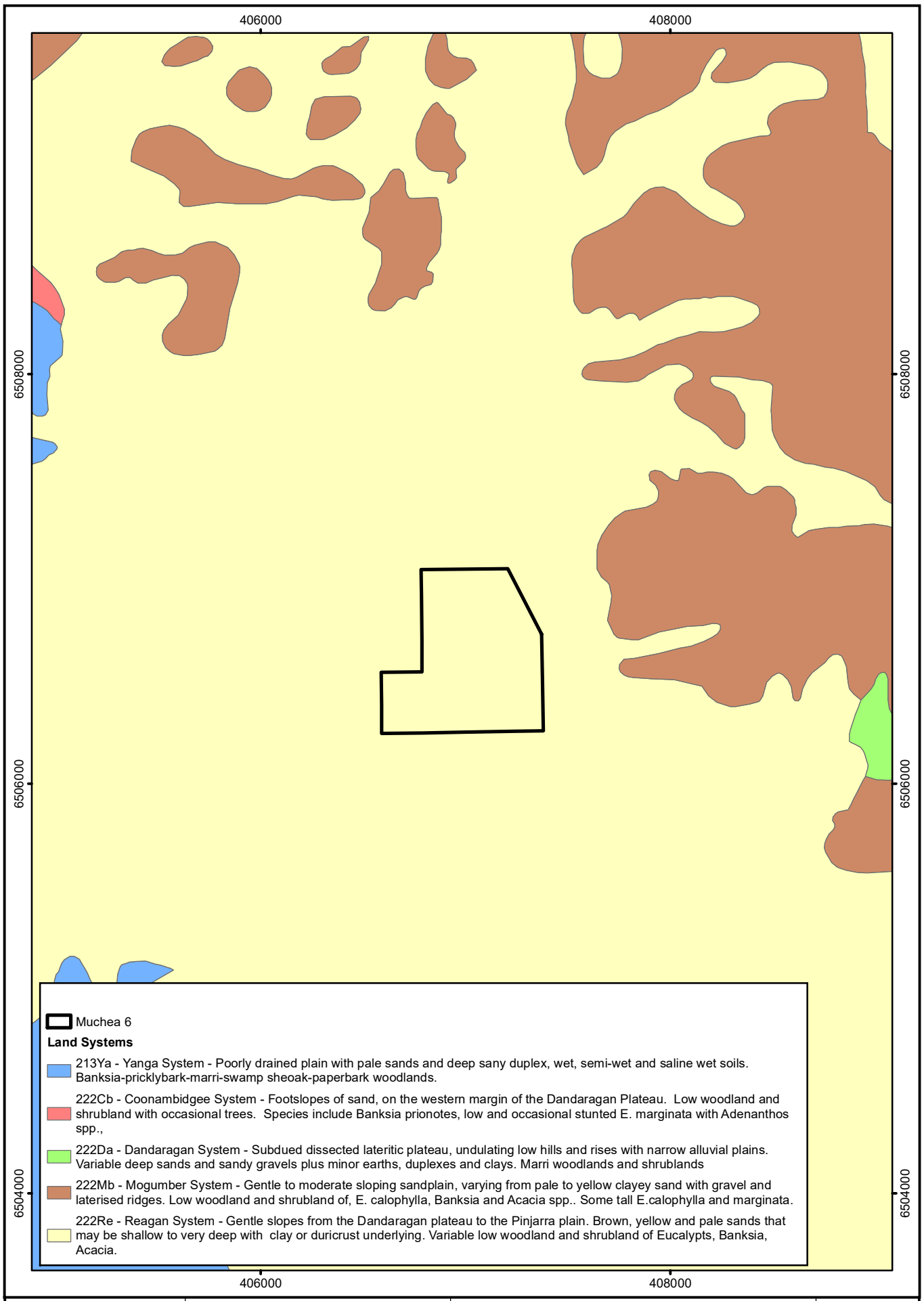
5.2 Pre-European Vegetation

The survey area lies in the Drummond Botanical Sub-districts within the Darling Botanical District of the South-west Botanical Province (Beard 1979, 1980 and 1990).

The underlying Pre-European vegetation as illustrated on Figure 5 is the Gingin system, namely:

. **Gingin System** – Mainly *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri)

The Muchea 6 area covers some 49.98ha which occurs as 0.89% of the total extent of this Pre-European vegetation mapping unit.



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MGA94 (Zone 50)

CAD Ref: a2866F006

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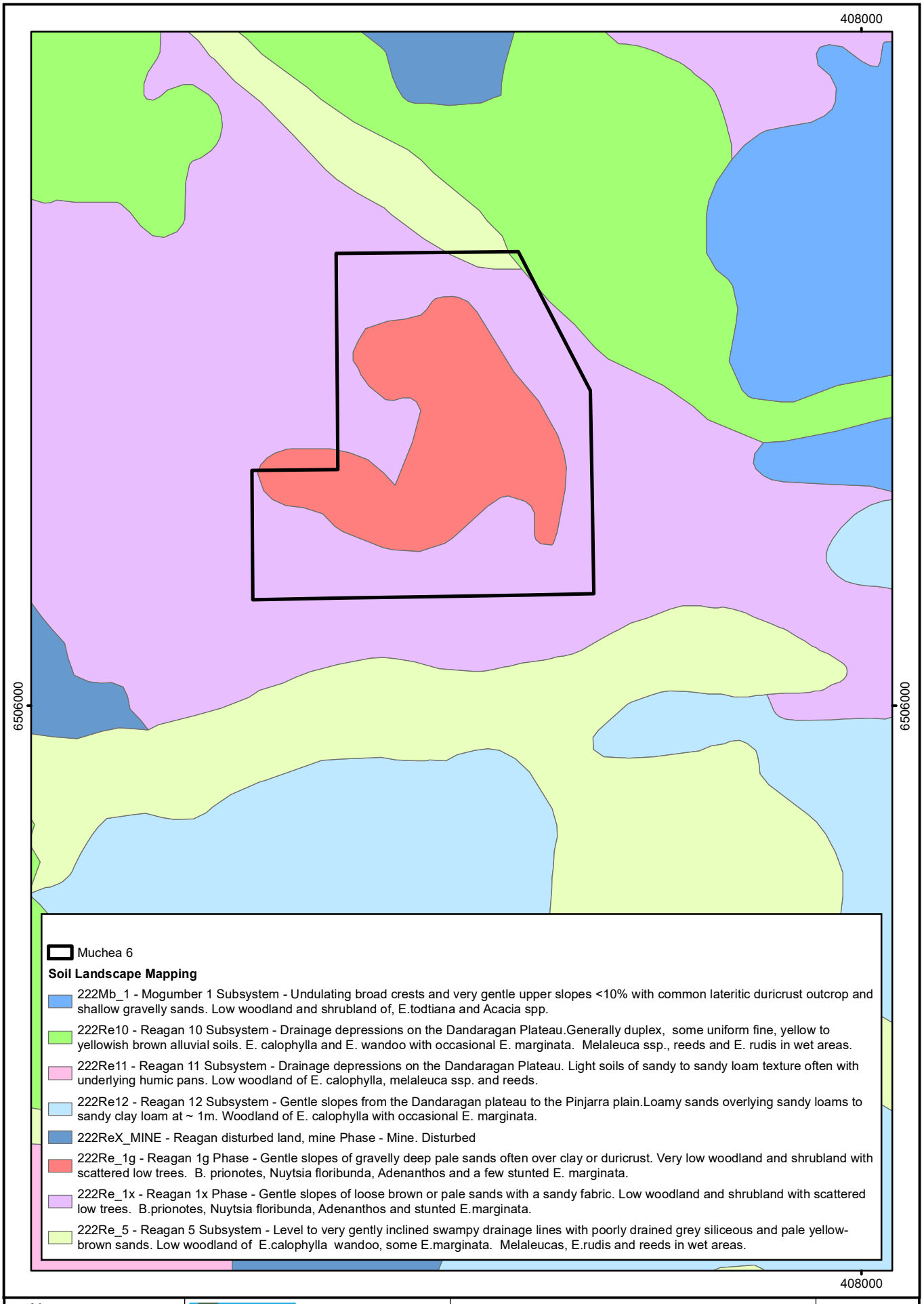
Midland Brick
Muchea 6
Land Systems

Figure: **3**



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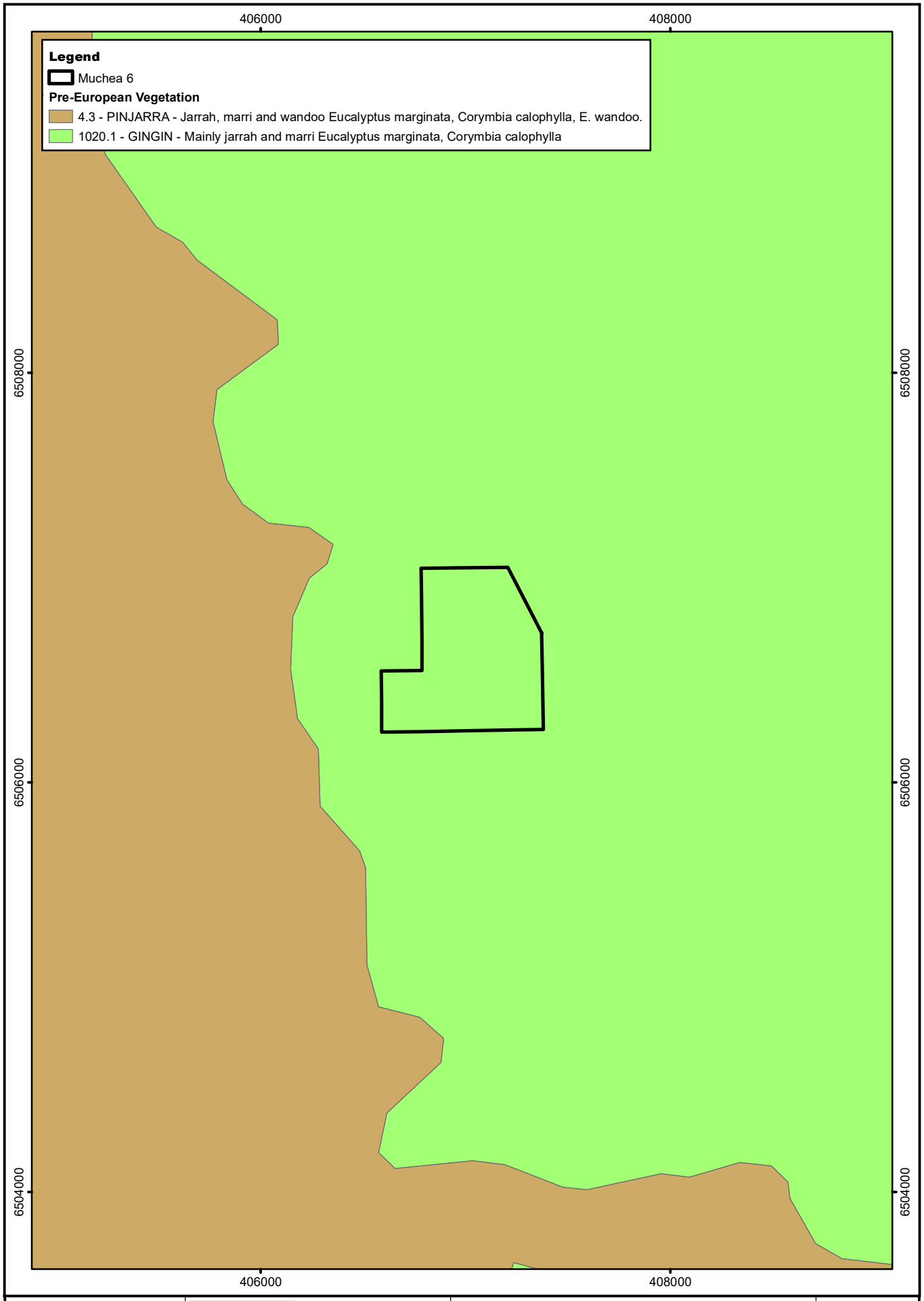
Midland Brick
Muchea 6
Soil Landscape Mapping

Figure: **4**



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MGA94 (Zone 50)

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Midland Brick
Muchea 6
Pre-European Vegetation

Figure: **5**

5.3 Vegetation Complexes

The two vegetation complexes defined by Heddle *et al.* 1980) and later updated by Mattiske and Havel (1998) included Mogumber and Reagan complexes (Figure 6), namely:

- Mogumber South – Open Woodland of *Corymbia calophylla* with some mixtures of *Eucalyptus marginata* subsp. *thalassica* and a second storey of *Eucalyptus todtiana-Banksia attenuata-Banksia menziesii-Banksia ilicifolia* on sandy-gravels on the uplands in arid and per-arid zones.
- Reagan – Mixture of low open woodland of *Banksia* species – *Eucalyptus todtiana* to closed heath of Myrtaceae – Proteaceae species depending on depth of soils on escarpment in arid and per-arid zones.

The vegetation as defined in Mogumber and Reagan do not reflect the local dominance of the *Eucalyptus wandoo* which reflects the dominance of clays in the local soils. The latter is not surprising as the vegetation complex mapping was based on regional datasets rather than local data sets specific to the Muchea 6 site. Both these vegetation complexes (Mogumber – South and Reagan) are poorly represented in the conservation estates and less than 7% remains for both complexes within the land areas managed by the Government of Western Australia (2019). Only 1.19% and 3.72% of the Mogumber South and Reagan area respectively in lands protected (IUCN-I-IV) for Conservation (%).

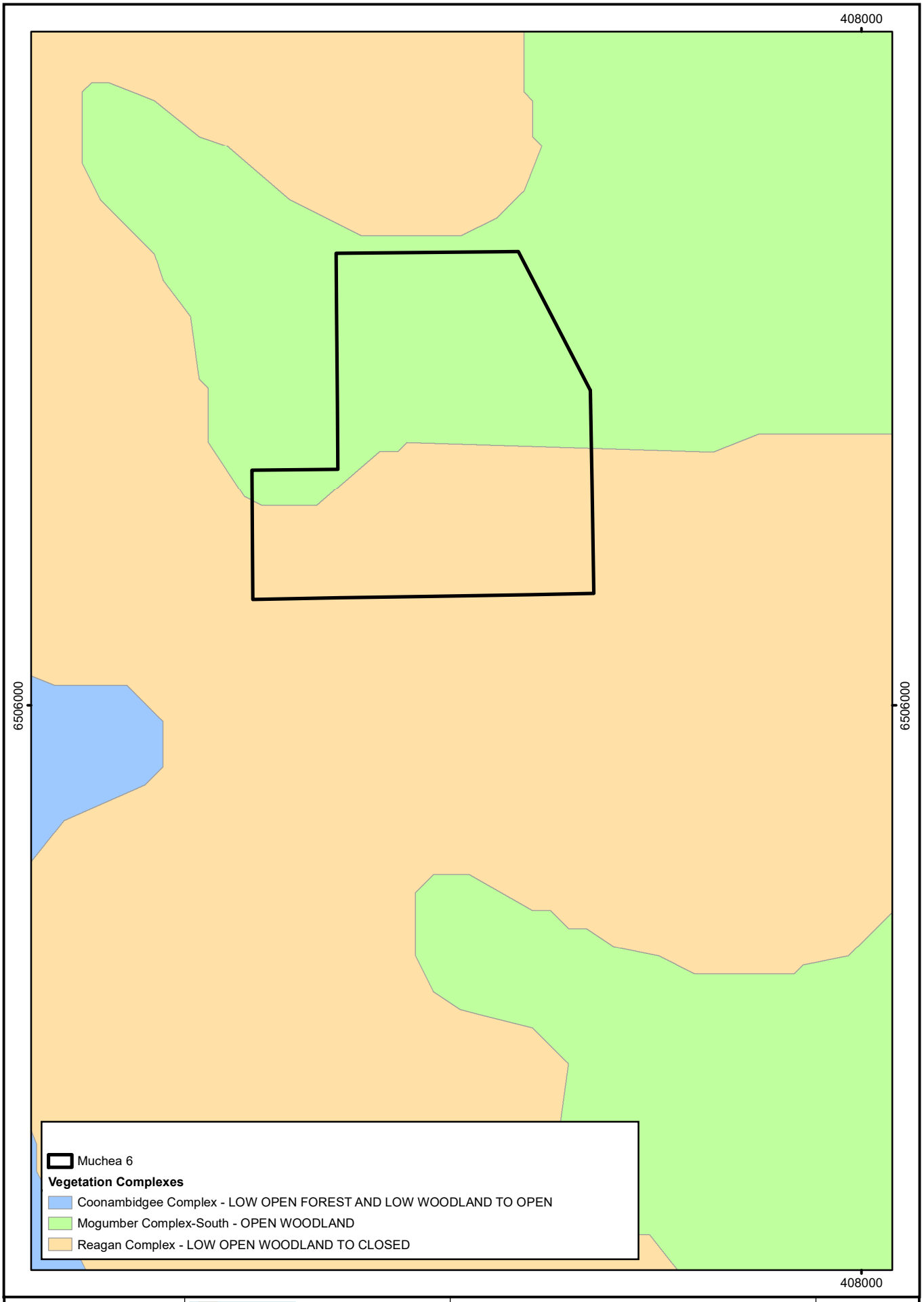
5.4 Recorded Flora and Vegetation

The range of flora on the site is very limited due to the previous grazing activities and as such only 4 native and 9 introduced species were recorded, Table 2. The latter low diversity reflects the degree of past disturbances from earlier agricultural activities, Figures 1 and 2. None of the introduced species are listed as Weeds of National Significance (DAWE 2022a). **Echium plantagineum* is a listed as a declared weed under section 22(2) of the State Biosecurity and Agriculture Management Act 2007l (DPIRD 2022).

The vegetation mapped as "E1" on Figure 7 is dominated by open woodlands of Wandoo (*Eucalyptus wandoo*) with the occasional Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) over mainly introduced grasses and herbs, see Photographs 1 to 3 below. The lower lying areas on the north-eastern corner of the survey area support more Marri trees but due to the degree of disturbance have not been highlighted on the vegetation mapping.

No threatened or priority ecological communities listed at the State or Federal levels pursuant to the *Wildlife Conservation Act* 1950 or the *Environment Protection Biodiversity and Conservation Act* 1999 were recorded in the BGC Muchea 6 survey area (Department of Biodiversity, Conservation and Attraction 2022b, 2022c; Department of Agriculture, Water and the Environment 2022c).

The native understorey is virtually absent, and the entire area is currently accessible to livestock.



N

0 90 180 m

Scale: 1:11,866
MGA94 (Zone 50)

CAD Ref: a2866F008

Date: March 2022 | Rev: A | A4

Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

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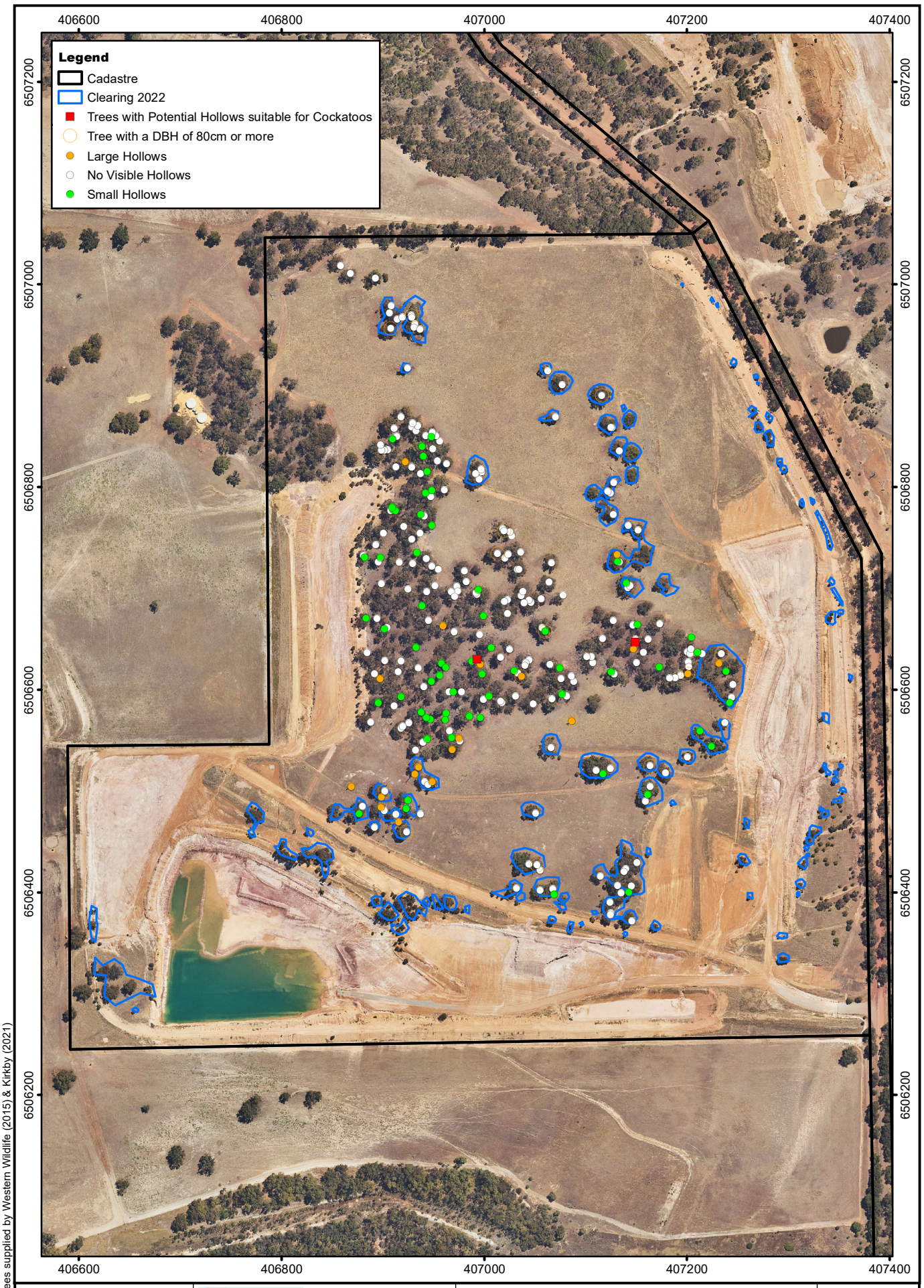
Midland Brick
Muchea 6
Vegetation Complexes

Figure:

6



Potential Habitat Trees supplied by Western Wildlife (2015) & Kirkby (2021)

N

0 40 80 m

Scale: 1:5,000
MGA94 (Zone 50)

CAD Ref: a2866F009

Date: March 2022 | Rev: A | A4

Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

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Midland Brick - Muchea 6

Key Tree Values and Proposed Clearing Areas

Figure: **7**

Table 2: Vascular Plant Species recorded on Muchea 6, 2021
Note: * denotes introduced species

Family	Species
Amaranthaceae	*Ptilotus polystachyus*
Asteraceae	**Hypochaeris glabra* **Ursinia anthemoides*
Boraginaceae	**Echium plantagineum*
Myrtaceae	*Corymbia calophylla* *Eucalyptus wandoo*
Poaceae	**Avena fatua* **Briza maxima* **Bromus diandrus* **Ehrharta calycina* **Ehrharta longiflora* **Lolium rigidum*
Xanthorrhoeaceae	*Xanthorrhoea preissii*

Photograph 1: Woodland of *Eucalyptus wandoo – Corymbia calophylla* in small gully on southern section of the Muchea 6 area. Note lack of understorey and dominance of introduced grasses and herbs

Photograph 2: Woodland of *Eucalyptus wandoo – Corymbia calophylla* in central section of remnant trees on the Muchea 6 area. Note lack of understorey and dominance of introduced grasses and herbs

Photograph 3: Woodland of *Eucalyptus wandoo* in northern section of remnant trees on the Muchea 6 area. Note lack of understorey and dominance of introduced grasses and herbs

5.5 Black-Cockatoo Re-assessment

Tony Kirkby (Black-Cockatoo specialist) undertook a re-assessment of the trees in December 2021. This wok entailed comprehensive foot traverses, camera observations of any potential hollows suitable for Black-Cockatoo nesting. These field trips supplement the earlier work by Jen Wilcox from Western Wildlife (2015).

Two trees with suitable hollows showing signs of use such as chewing at the entrance were located within the survey area, see Figure 7. These trees are shown as an overlay over the vegetation as defined by Mattiske and also the previous highlighted trees by Jen Wilcox. The trees as highlighted by Jen Wilcox in 2015 were re-assessed by Tony Kirkby in 2021. Although some had larger diameters at breast height only a few of these larger trees will be cleared and none have potential tree hollows suitable for the Black-Cockatoo nesting.

Tree 1141- 407149E: 6506647N. Hollow with suitably sized entrance and chewing both at rim and internally. Highly Likely a Black-Cockatoo breeding hollow. This tree also contains another suitable hollow with external chewing at entrance but which is now occupied by feral European Honey Bees *Apis mellifera.*

In summary, these locations in the expansion area should be avoided, if possible, to minimize impacts to these trees Therefore, the main value of these Wandoo woodlands is for potential usage by the Black-Cockatoos.

Tree 1141 showing extensive chewing.

Tree 1148 - 406993E: 6506630N. Hollow with suitably sized entrance and chewing both at rim and internally. Highly Likely a Black-Cockatoo breeding hollow.

Tree 1148 showing internal chewing.

Of the proposed 89 trees to be cleared with diameters at breast height >30cm:

- a total of 8 trees have a DBH >80cm or more but none of these has suitable hollows for Black-Cockatoos;
- a total of 12 trees have small hollows which are not suitable for Black-Cockatoos;
- a total of 8 trees have large hollows that are not showing any sign of use by Black-Cockatoos or are not sufficiently suitable dimensions for Black-Cockatoos.
- neither of the two trees highlighted by Kirkby in 2021 will be cleared as part of the proposed expansion.

All the native vegetation in the study area is likely to be Black-Cockatoo foraging habitat, as the canopy of primarily Wandoo and the occasional Marri and Jarrah trees provides seeds for foraging by Black-Cockatoos. Evidence of Black-Cockatoo foraging (chewed eucalypt fruits or flowers) was not observed during the site visit in 2015, however Western Wildlife indicated that Carnaby's Black-Cockatoo may be a seasonal visitor to the area. The Forest Red-tailed Black-Cockatoo potentially forages in the area throughout the year, whenever Marri and Jarrah fruits are available. However, the habitat is less suitable for this species, as they prefer Marri dominated forests and woodlands and Wandoo dominates the Muchea 6 area.

The areas of pasture have negligible value as Black-Cockatoo foraging habitat, though even scattered trees within the pasture have foraging value.

Whilst main of the trees had smaller hollows and a few logs occurred in the areas of remnant vegetation, there was a lack of fauna utilising the area.

6. REVIEW OF 10 NATIVE VEGETATION CLEARING PRINCIPLES

The observations were reviewed against the 10 clearing principles as defined under the EPA Regulations (2004) on the Native Vegetation Clearing.

Principle (a): Native vegetation should not be cleared if it comprises a high level of biodiversity.

As indicated by the lack of understorey plant species and the high ratio of introduced plant species to native plant species. This area is not considered to contain levels of high biodiversity due to the restricted size of the proposed clearing area and also the historical raw material extraction activities and past agricultural activities.

Clearing of the vegetation is not at variance with this Principle.

Principle (b): Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia.

The assessment area supporting remnant vegetation is relatively restricted in area (6.789ha), however only the eastern, southern and northern fringes of the main woodland area will be cleared during the expansion totally some 2.09 ha. In addition, this 2.09ha is an over-estimation of the impacts as some of the expansion areas within the blue polygons on Figure 7 area very disturbed. Neither of the trees that were highlighted as potential suitable hollows for Black-Cockatoos by Kirkby 2021 occur in the proposed expansion area. The other trees with larger hollows were also checked for suitable dimensions and also any activity and none were located. The trees were checked with a camera on a pole. As indicated in the Western Wildlife (2015) report, foraging activities are likely to be occasional and seasonal and mainly by the Carnaby's Black-Cockatoos. The usage by the Red-tailed Black-Cockatoos is even more unlikely as this area occurs on the fringes of this species main occurrence and also their preference for Marri and Jarrah rather than Wandoo. The lack of understorey species also reduced the usage of the area for foraging activities by the Black-Cockatoos.

Clearing of the vegetation may be at variance with this Principle if occasional foraging activities are undertaken.

Principle (c): Native Vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.

No naturally occurring threatened or priority flora species were present in the assessment area.

Clearing of the vegetation is not at variance with this Principle.

Principle (d): Native vegetation should not be cleared if it compromises the whole or part of, or is necessary for the maintenance of a threatened ecological community.

No threatened ecological communities were present in the assessment area.

Clearing of the vegetation is not at variance with this Principle.

Principle (e): Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

The assessment area occurs within mainly historical agricultural areas so the values from a flora and vegetation perspective are limited. There has been some rehabilitation on the adjacent property to the

north, however the main value of the remaining vegetation is the Wandoo trees and the value of these trees to the Black-Cockatoos. As such the remnant vegetation is degraded due to previous activities and as such provides only some values in the overstorey species.

Clearing of the vegetation is not at variance with this Principle.

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, and environment associated with a watercourse or wetland.

There is a small valley in the southern section (see Photograph 1) and the area in the northern sections tends to slope to the north. No watercourse of wetland (other than the artificial water body in the south resulting from extraction activities) persist on the Muchea 6 area.

Clearing of the vegetation is not at variance with this Principle.

Principle (g): Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

The assessment area does not occur near any adjacent or nearby conservation areas as the area is surrounded by agricultural properties.

Clearing of the vegetation is not at variance with this Principle.

Principle (h): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Clearing is unlikely to cause further degradation due to the highly modified nature of the Muchea 6 site.

Clearing of the vegetation is not at variance with this Principle.

Principle (i): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water

Clearing is unlikely to cause deterioration in the quality of surface or underground water.

Clearing of the vegetation is not at variance with this Principle.

Principle (j): Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

In view of the size of the proposed clearing and the location on mid and upper slopes, clearing activities are not likely to cause, or exacerbate, the incidence of flooding.

Clearing of the vegetation is not at variance with this Principle.

7. DISCUSSION

Mattiske Consulting Pty Ltd was commissioned by Midland Brick in the spring months of 2021 to complete an assessment of flora and fauna values on the proposed expansion area of the Muchea 6 operations. The work in 2021 supplements the earlier Black-Cockatoo work by Jen Wilcox from Western Wildlife (2015).

se field trips supplement the earlier work by Jen Wilcox from Western Wildlife (2015).

The range of flora on the site is very limited due to the previous grazing activities and as such only 4 native and 9 introduced species were recorded. The latter low diversity reflects the degree of past disturbances from earlier agricultural activities.

The vegetation mapped as "E1" is dominated by open woodlands of Wandoo (*Eucalyptus wandoo*) with the occasional Marri (*Corymbia calophylla*) over mainly introduced grasses and herbs.

No threatened or priority ecological communities listed at the State or Federal levels pursuant to the *Wildlife Conservation Act* 1950 or the *Environment Protection Biodiversity and Conservation Act* 1999 were recorded in the BGC Muchea project area (Department of Biodiversity, Conservation and Attraction 2022b, 2022c; Department of Agriculture, Water and the Environment 2022c).

Vegetation condition across the survey area ranged from degraded to completely degraded in the majority of the Muchea 6 site. The area has been subject to previous extraction activities and also grazing, so the vegetation consists mainly of *Eucalyptus wandoo* (Wandoo) and *Corymbia calophylla* (Marri) with little understorey remaining over the majority of the area.

Two trees had suitable hollows for Black-Cockatoos and the tree species and the trees would be foraged by the Black-Cockatoos. The two trees that had suitable hollows for Black-Cockatoos will not be cleared or impacted by the proposed expansion activities. Very few smaller hollows were present in the trees and there were a few logs on the ground that could be used for fauna.

In summary, the main biological values of the area relate to the various stands of predominantly *Eucalyptus wandoo* (Wandoo) and the occasional *Corymbia calophylla* (Marri) and *Eucalyptus marginata* (Jarrah) over very sparse understorey species dominated by grasses and herbs; as well as the two trees with suitable hollows for Black-Cockatoos and also the trees which support Black-Cockatoo foraging activities.

In terms of the ten native vegetation clearing principles, only Principle (b) associated with the fauna species may be at variance with the clearing principles in some seasonal activities. However as the trees with suitable hollows will be avoided in the expansion, the remaining impact relates primarily to the reduction in tree canopy for foraging.

8. ACKNOWLEDGEMENTS

The authors would like to thank the environmental team from Midland Brick for assistance with this project.

9. LIST OF PERSONNEL

The following Mattiske Consulting Pty Ltd personnel were involved in this project:

Name	Position	Project Involvement	Flora Collection Permit
Dr E.M. Mattiske	Managing Director & Principal Ecologist	Planning, Field work, Management & Reporting	FB62000019
Tony Kirkby	Specialist Black-Cockatoo Researcher	Field Studies and Reporting	-

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APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), **threatened flora** are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of Threatened Flora Species

Note: Adapted from section 179 of the *EPBC Act 1999.*

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

The *Biodiversity Conservation Act 2016* (*BC Act*) provides for (amongst other things) the protection of flora facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future in Western Australia under Part 10, Division 2.

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2 of the *BC Act*; DBCA 2022a) and are categorised under Schedules 1-3**.** A flora species is defined as **threatened** if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the *BC Act*. Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of Threatened Flora Species

Note: Adapted from DBCA (2022a).

CODE	CATEGORY	DEFINITION
CR	**Critically endangered**	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
EN	**Endangered**	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
VU	**Vulnerable**	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the *Wildlife Conservation (Rare Flora) Notice 2018*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient; or are adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list for other than taxonomic reasons" (DBCA 2022a). Priority species are not afforded any additional protection under state or federal legislation, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b). The Department of Biodiversity, Conservation and Attractions categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of Priority Flora Species

Note: Adapted from DBCA (2022a).

CODE	CATEGORY	DEFINITION
P1	**Priority 1:** Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	**Priority 2:** Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	**Priority 3:** Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	**Priority 4:** Rare, Near Threatened, and other species in need of monitoring	**a) Rare - Species** 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 species are usually represented on conservation lands. **b) Near Threatened -** Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. **c) Other -** Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

Under section 181 of the *EPBC Act 1999*, **threatened ecological communities** are categorised as critically endangered, endangered and vulnerable (Table A2.1).

Table A2.1 Federal definition of Threatened Ecological Communities

Note: Adapted from section 181 and section 182 of the *EPBC Act*.

CATEGORY	DEFINITION
Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

The *Biodiversity Conservation Act 2016* (*BC Act*) provides for (amongst other things) some protection of ecological communities at risk of collapse in Western Australia under Part 3 (Division 2).

Threatened ecological communities (TECs) are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment (28 June 2018)* (under Part 2 of the *BC Act*; DBCA 2022b). An ecological community is defined as **threatened** if "it is facing an extremely high risk of collapse in the immediate, near or medium-term future", pursuant to sections 28, 29 and 30 of the *BC Act*. Threatened ecological communities are categorised as critically endangered, endangered, and vulnerable (Table A2.2). Some of these TECs are also endorsed by the Federal Minister as threatened, and some of these are listed under the *EPBC Act* and therefore afforded legislative protection at the Commonwealth level.

Table A2.2 State definition of Threatened Ecological Communities

Note: Adapted from DBCA (2022b).

CODE	CATEGORY	DEFINITION
CR	**Critically Endangered**	An ecological community will be listed as CR when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting **any one or more of** the following criteria: **1.** The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; **2.** The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or **3.** The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	**Endangered**	An ecological community will be listed as EN when it has been adequately surveyed and is not CR, but is facing a very high risk of total destruction in the near future. The ecological community must meet **any one or more of** the following criteria: **1.** The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; **2.** The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or **3.** The ecological community is highly modified with potential of being rehabilitated in the short term future.
VU	**Vulnerable**	An ecological community will be listed as VU when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet **any one or more of** the following criteria: **1.** The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; **2.** The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or **3.** The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the DBCA (2022c) in the *Priority Ecological Communities for Western Australia – Version 32 (15 July 2021)*. Similarly, to priority flora, PECs are not afforded additional legislative protection, however are considered significant under the EPA (2016b) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions categorises priority ecological communities into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities

Note: Adapted from DBCA (2022c).

CODE	CATEGORY	DEFINITION
P1	**Priority 1** (Poorly known ecological communities)	Ecological communities that are known from very few, restricted occurrences (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Most of these occurrences are not actively managed for conservation (e.g. located within agricultural or pastoral lands, urban areas, or active mineral leases) and for which immediate threats exist.
P2	**Priority 2** (Poorly known ecological communities)	Communities that are known from few small occurrences (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.
P3	**Priority 3** (Poorly known ecological communities)	**1.** 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; **2.** Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or **3.** Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	**Priority 4** (Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring)	**1.** Rare – Communities known from few occurrences that are considered to have been adequately surveyed, sufficient knowledge is available, and are considered not to be currently threatened. **2.** Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable. **3.** Communities that have been removed from the list of threatened communities during the past five years.
P5	**Priority 5** (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 A3: CATEGORIES AND CONTROL MEASURES OF DECLARED PEST (PLANT) ORGANISMS IN WESTERN AUSTRALIA

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (Section 12), or an organism for which a declaration under Section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (DPIRD 2022).

Table A3.1 Categories and control measures of declared pest (plant) organisms

Note: Adapted from *Biosecurity and Agriculture Management Regulations 2013*.

CONTROL CATEGORY	CONTROL MEASURES
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.' Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to: **(i)** alleviate the harmful impact of the declared pest in the area; or **(ii)** reduce the number or distribution of the declared pest in the area; or **(iii)** prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to: **(a)** alleviate the harmful impact of the declared pest in the area for which it is declared; or **(b)** reduce the number or distribution of the declared pest in the area for which it is declared; or **(c)** prevent or contain the spread of the declared pest in the area for which it is declared.

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

Environmentally sensitive areas are declared by the State Minister under section 51B of the *Environmental Protection Act 1986* (EP Act) and are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, gazetted 8 April 2005. Specific environmentally sensitive areas relevant to this report include: a defined wetland and the area within 50 metres of the wetland; the area covered by vegetation within 50 metres of rare flora; the area covered by a threatened ecological community; a Bush Forever site – further areas and information are described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Conservation significant flora

Under the *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b), flora may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority species;
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Conservation significant vegetation

Under the *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority ecological communities;
- restricted distribution;
- degree of historical impact from threatening processes;
- a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem.

APPENIX A5: DEFINITION OF VEGETATION CONDITION SCALE FOR THE SOUTH WEST AND INTERZONE BOTANICAL PROVINCES

Vegetation condition ratings relate to vegetation structure, level of disturbance at each structural layer and the ability of the vegetation unit to regenerate (Table 5.1). Vegetation condition provides complementary information for assessing the significance of potential impacts.

Table 5.1 Definition of Vegetation Condition Categories

Note: Adapted from Keighery (1994).

CATEGORY	DEFINITION
1 (Pristine)	Pristine or nearly so, no obvious sign of disturbance or damage caused by human activities since European settlement.
2 (Excellent)	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
3 (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.
4 (Good)	Vegetation structure significantly altered by 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 very aggressive weeds, partial clearing, dieback and grazing.
5 (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 at high density, partial clearing, dieback and grazing.
6 (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.