APPENDIX 4B

ECOEDGE (2017)- SUPPLEMENTARY LEVEL 1 FLORA AND VEGETATION SURVEY

Report of a supplementary Level 1 Flora and Vegetation survey over part of the Yalyalup Proposed Mine Area

Prepared for Doral Mineral Sands
November 2017

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Version	Origin	Review	Review date	Ecoedge release approval	Issue date
V1	M. Portman (previously Strang)	R. Smith	7/11/2017		
V2	R. Smith	M. Portman	10/11/2017		
Final draft	M. Portman	Doral			
Final					

Executive Summary

Ecoedge was engaged by Doral Mineral Sands in October 2017 to undertake a supplementary Level 1 Flora and Vegetation Survey of remnant vegetation within the proposed mining area at Yalyalup that was not able to be accessed during the 2015 flora and vegetation survey.

The Survey Area, which totalled approximately 290 ha, contained about 2 ha of remnant native vegetation.

The field assessment was carried out on 9th and 11th October 2017 in accordance with the Environmental Protection Authority (EPA) Technical Guidance (EPA, 2016). All areas of remnant native vegetation within the Survey Area were visited on foot or by vehicle and data on plant species composition and vegetation condition was collected at six sites.

The survey resulted in the identification of only 22 species of flora within the Survey Area, of which five were native taxa. The low number of native species found within the remnant native vegetation in the Survey Area is a result of many years of degradation of the small fragments of native bush.

No Declared Rare Flora, Priority Flora, species of flora listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* or other flora of conservation significance were found within the Survey Area.

One weed present within the Survey Area, *Zantedeschia aethiopica**, is listed as a Pest Plant by the Department of Agriculture and Food. It is in the C3 (management) category for the whole of the State.

One vegetation unit was recognised in the Survey Area. This unit, Vegetation Unit C1 (Ecoedge, 2016), is associated with the winter streams that flow northwards to empty into the Sabina River. Unit C1 appears to belong to the "Riverine Jindong Plant Communities", as described in Webb *et al*., (2008), associated as it is with the loams of the Jindong soil-landscape subsystem of the Abba Plains.

All remnant vegetation in the Survey Area is in "Completely Degraded" condition.

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Statement of limitations

Reliance on Data

In the preparation of this report, Ecoedge has relied on data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report. Unless stated otherwise in the report, Ecoedge has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report are based in whole or in part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Ecoedge will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, unavailable, misrepresented or otherwise not fully disclosed to Ecoedge.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and for no other party. Ecoedge assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including, without limitation, matters arising from any negligent act or omission of Ecoedge or for any loss or damage suffered by any other party relying on the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions, and should make their own enquiries and obtain independent advice in relation to such matters.

1 Introduction

Ecoedge was engaged by Doral Mineral Sands (Doral) in October 2017 to undertake a supplementary Level 1 Flora and Vegetation Survey of remnant vegetation within the proposed mining area at Yalyalup. The Survey Area comprised land that was not able to be accessed during the Level 1 flora and vegetation survey undertaken for Doral by Ecoedge in 2015 (Ecoedge, 2016). The intent of the survey was to assess vegetation within and around the known mineral resource.

The 2015 Survey Area is shown in **Figure 1.** The areas marked as 'No Access' in **Figure 2** – from the 2015 survey - constitute the 2017 Survey Area, being Sussex Lots 103, 104, 200, 667 and 1426 (**Figure 3**). They total approximately 290 ha, and together contain about 2 ha of remnant native vegetation

In addition to the Ecoedge survey in 2015, only one other flora survey is known to have been carried out near to the Survey Area, that being restricted to the Busselton ironstone vegetation (and its vicinity) on McGibbon Track prior to 2007 by Andrew Webb of the Department of Biodiversity, Conservation and Attractions (DBCA)[1]. A list of the species recorded for the McGibbon Road ironstone vegetation by Mr. Webb is provided in **Appendix 1**.

The field assessment was carried out on 9th October 2017 in accordance with the Environmental Protection Authority (EPA) Technical Guidance (EPA, 2016).

This report compiles findings of the field assessment. As the desktop study undertaken for the 2015 Level 1 flora and vegetation survey incorporated the 2017 Survey Area, a desktop study is not included in this report. However new NatureMap DBCA (2017a) and Protected Matters Search Tool (PMST) (Department of the Environment and Energy (DotEE), 2017a) reports were generated for the 2017 survey (see **Appendix 2**) using the same centre point and radii as the 2015 reports.

Fewer species were listed on the 2017 NatureMap report than were included on the 2015 report. No species were listed in the 2017 report that were not also listed on the 2015 report.

In regards to the PMST report, the 2017 version includes the recently listed 'Banksia Woodlands of the Swan Coastal Plain ecological community', which is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The 2017 PMST report includes fewer Threatened plant taxa than the 2015 version, however two species are included on the 2017 report that were not on the 2015 report, vis.

[1] Mr A. Webb, botanist, Department of Biodiversity, Conservation and Attractions, Bunbury, *pers. comm*. 17/02/2016.

Synaphea sp. Fairbridge Farm (D. Papenfus 696) and *Verticordia densiflora* var. *pedunculata*, which are listed as Critically Endangered and Endangered under the EPBC Act, respectively.

1.1 Scope and objectives

Carry out a Level 1 flora and vegetation assessment (incorporating both reconnaissance and targeted surveys) over five Lots within the Yalyalup proposed mine area, as shown in **Figure 3**., to determine whether there are any significant flora values within the Survey Area. Specifically:

- Verify / groundtruth the desktop assessment findings through reconnaissance and targeted surveys;
- Undertake vegetation community/type mapping to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) structure and floristics;
- Assess the survey area's plant species diversity, density, composition, structure and weed cover;
- Undertake vegetation condition mapping using EPA (2016) condition scale;
- Undertake a targeted survey for rare and priority flora based on desktop likelihood of occurrence and habitat availability. When populations are identified, survey and map extent of populations to determine number and habitat area for each population.
- Identify the location of any Weeds of National Significance or Declared Pests.
- Provide a detailed report, including mapping, summarising the findings of the survey.

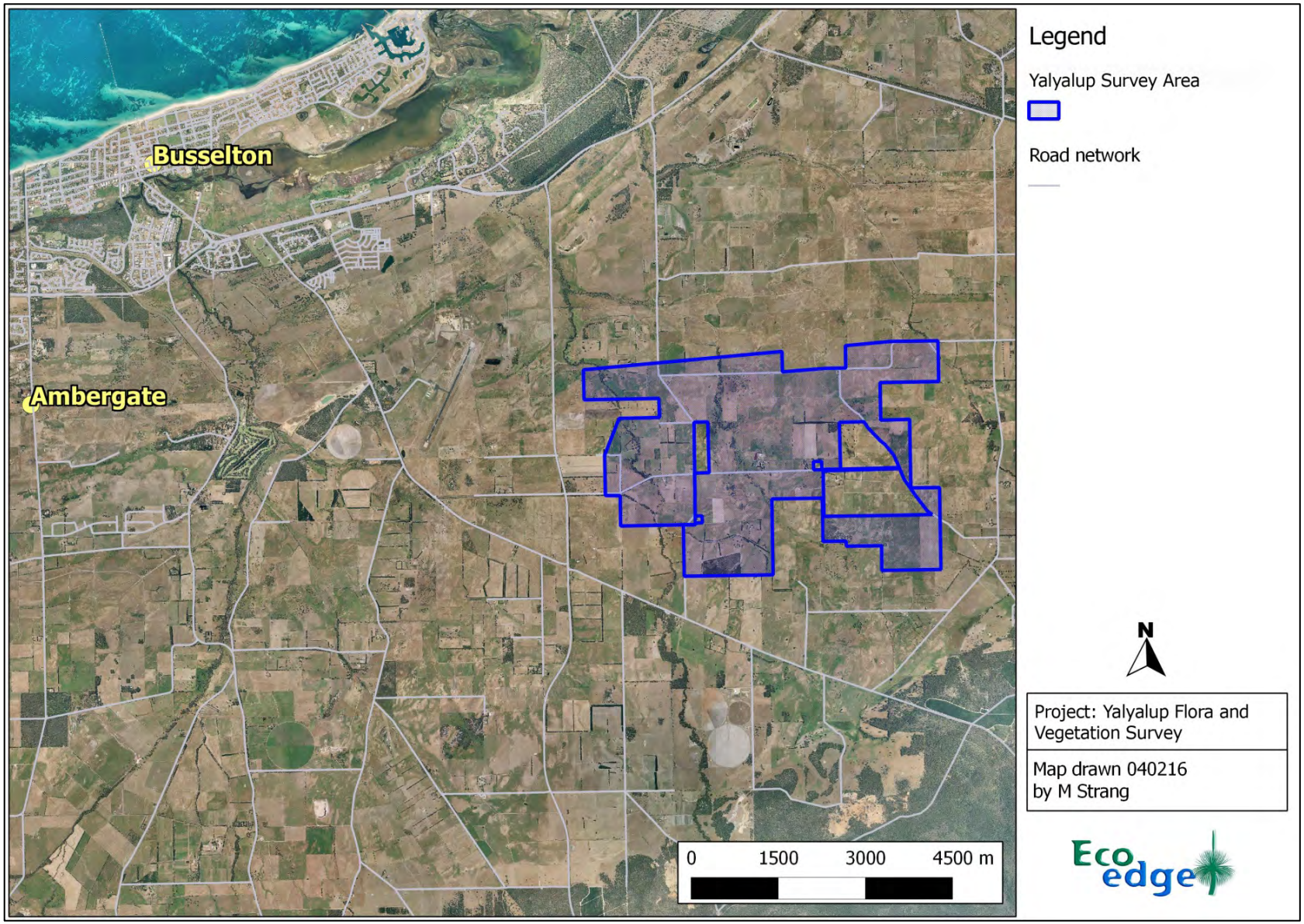

Figure 1. Aerial Photograph showing location of Survey Area.

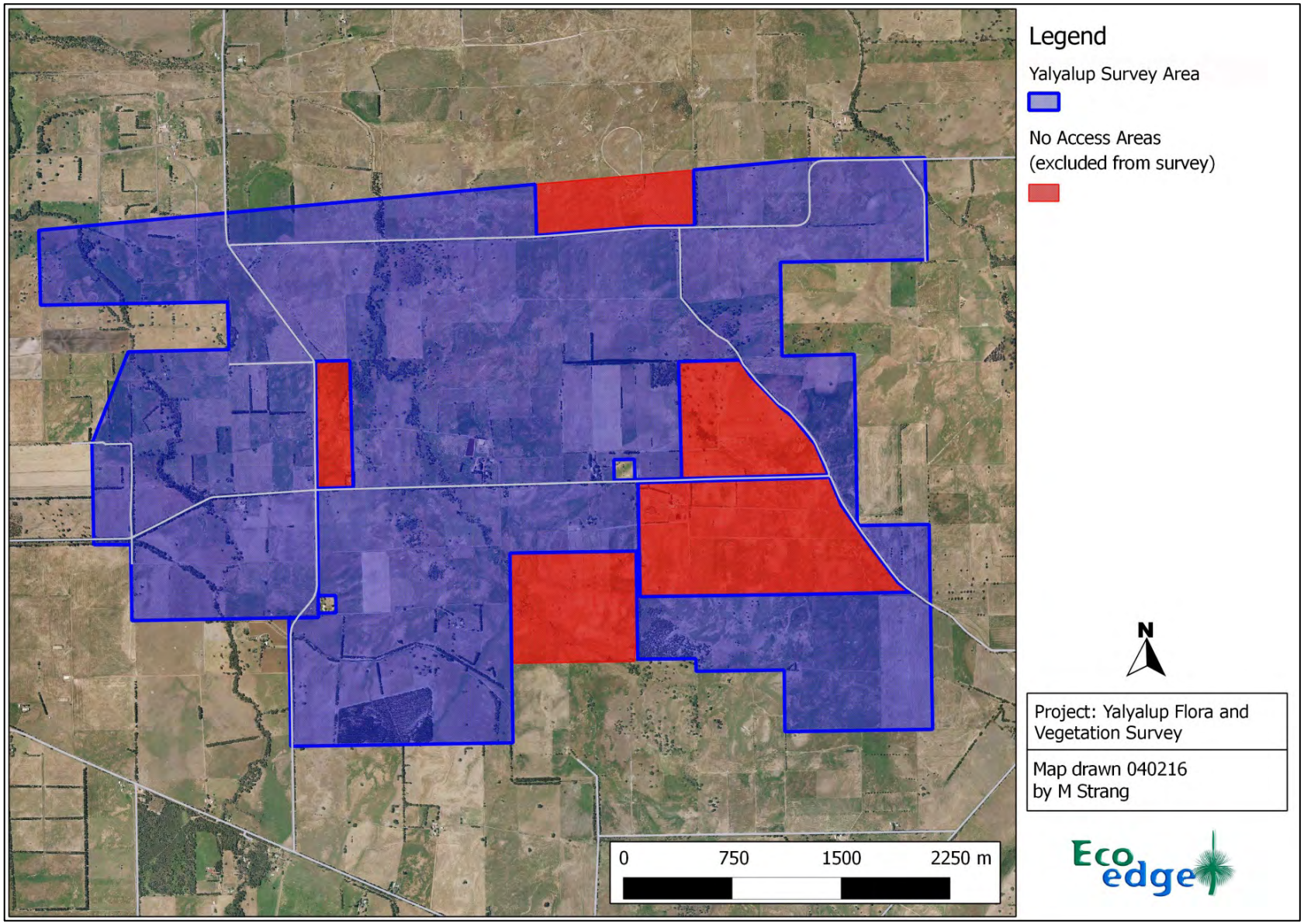

Figure 2. 2015 Yalyalup Survey Area showing the areas not able to be accessed during the 2015 survey due the lack of landholder permission. These areas constitute the 2017 Survey Area.

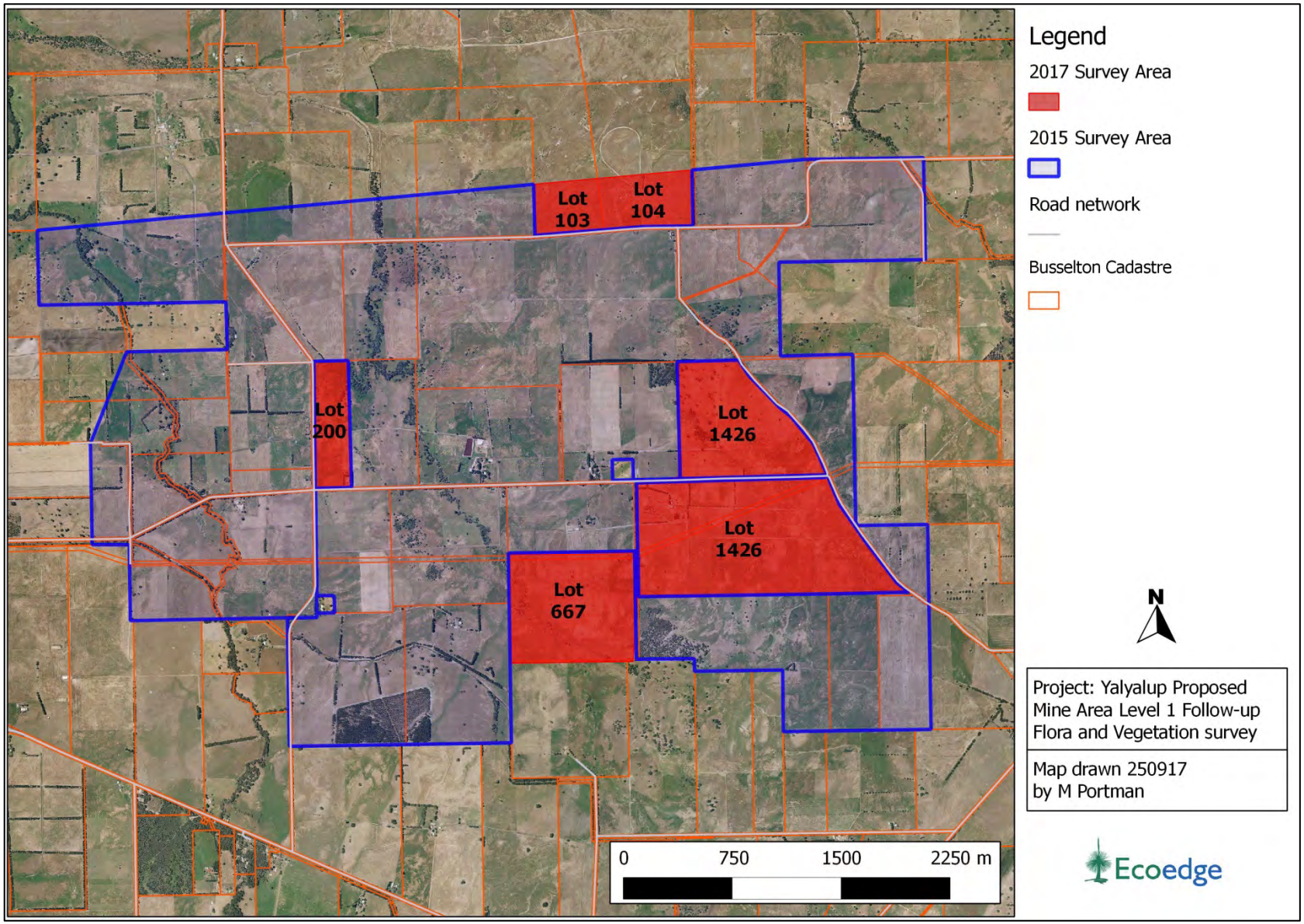

Figure 3. The 2017 Survey Area showing Lot numbers.

1.2 Environmentally Sensitive Areas

DBCA released an updated Environmentally Sensitive Area (ESA) GIS dataset in 2016. In regards to ESAs within or near to the Survey Area, there has been no change since 2014, which is when the dataset used in preparation of the 2015 report was dated.

2 Methods

2.1 Desktop Study

Data from the NatureMap (DPaW, 2017a) and Protected Matters Search Tool (DotEE, 2017a) reports was used to establish the list of Declared Rare Flora and Priority flora to target during the survey, as well as providing a list of what other plant taxa might be encountered during the survey.

Vegetation condition was assessed against the method of EPA (2016) (**Table 1**).

Table 1. Vegetation condition ratings according to EPA (2016).

Vegetation Condition	South West and Interzone Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
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.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

2.2 Field survey

The field assessment was carried over two days, on 9 and 11 October 2017.

During the visits to the study area, a comprehensive list of native and many non-native vascular flora was compiled. Taxa not able to be identified with certainty in the field were photographed for later identification. Taxonomy and conservation status was checked against the WA Herbarium Census of WA Plants Database (WACENSUS) (DBCA, 2017b).

Vegetation condition and vegetation units were mapped using aerial photography and notes taken during the survey.

2.3 Survey limitations

Potential limitations with regard to the assessment are addressed in **Table 2**.

Table 2. Limitations with regard to assessment adequacy and accuracy.

Aspect	Constraint	Comment
Scope	No	The survey scope was prepared in consultation with the client and was designed to comply with EPA requirements.
Climatic and seasonal effects	Moderate	Rainfall for the wet season in the South West (1st April – 30th September) was very much below average. However, September rainfall was average and rainfall is not likely to have affected the outcome of this survey.
Proportion of flora identified	Negligible	The survey was carried out in early October which experience has shown to be within the main flowering season for plants on the southern Swan Coastal Plain. All native species were identified.
Availability of contextual information	Negligible	Comprehensive regional surveys of remnant vegetation, as well as more localised surveys, have been carried out in the southern Swan Coastal Plain.
Completeness of the survey	Negligible	Vegetation within the Survey Area was thoroughly searched on foot. Further assessments outside the spring season would add to the completeness of the species list but probably only marginally affect the conclusions
Skill and knowledge of the botanists	Negligible	The senior field botanist conducting the survey has had extensive experience in botanical survey in south west Australia over a period of 25 years.

3 Results

3.1 Flora

Only 22 species of flora were found within the Survey Area, of which five were native taxa (**Appendix 3**). The low number of native species found within native vegetation in the Survey Area is a result of many years of degradation of the small fragments of native bush.

No remnant native vegetation was present on Lot 103 or Lot 104.

3.2 Rare Flora

No Declared Rare Flora, Priority Flora, species of flora listed as Endangered under the EPBC Act or other flora of conservation significance were found within the Survey Area.

3.3 Declared Plants

One weed present within Lot 1426 of the Survey Area, *Zantedeschia aethiopica** (Arum Lily) (**Figure 4**), is listed as a Pest Plant by the Department of Agriculture and Food. It is in the C3 (management) category for the whole of the State (DAFWA, 2017).

3.4 Vegetation Units

One vegetation unit was recognised in the Survey Area. This unit, Vegetation Unit C1 (Ecoedge, 2016), is associated with the winter streams that flow northwards to empty into the Sabina River. Unit C1 appears to belong to the "Riverine Jindong Plant Communities", associated as it is with the loams of the Jindong soil-landscape subsystem of the Abba Plain. Unit C1 is probably associated with the 'Riverine Jindong Plant Communities' described in Webb *et al*., (2008).

A description of the vegetation unit is given below:

<u>Vegetation Unit C1</u>

Woodland of *Eucalyptus rudis* (and sometimes *Corymbia calophylla*) over scattered *Agonis flexuosa* and *Melaleuca rhaphiophylla* over weeds on grey-brown clayey loams in drainage lines (from Ecoedge, 2016).

3.5 Vegetation Condition

Vegetation condition within the Survey Area was all classified as 'Completely Degraded'. As the description for Vegetation Unit C1, above, implies remnant vegetation in the Survey Area consisted mainly of the three trees *E. rudis*, *A. flexuosa* and *M. rhaphiophylla* (although all three were not always present within each of the remnants). The understorey consisted of a range of pasture species and weeds of agricultural land, with only the herb *Cotula coronopifolia* and the rush *Juncus pallidus* remaining of the original native understorey.

Figure 4 shows the remnant vegetation that was assessed on Lot 1426. Remnant vegetation that was assessed on Lots 200 and 667 is mapped in **Figures 5** and **6** respectively.

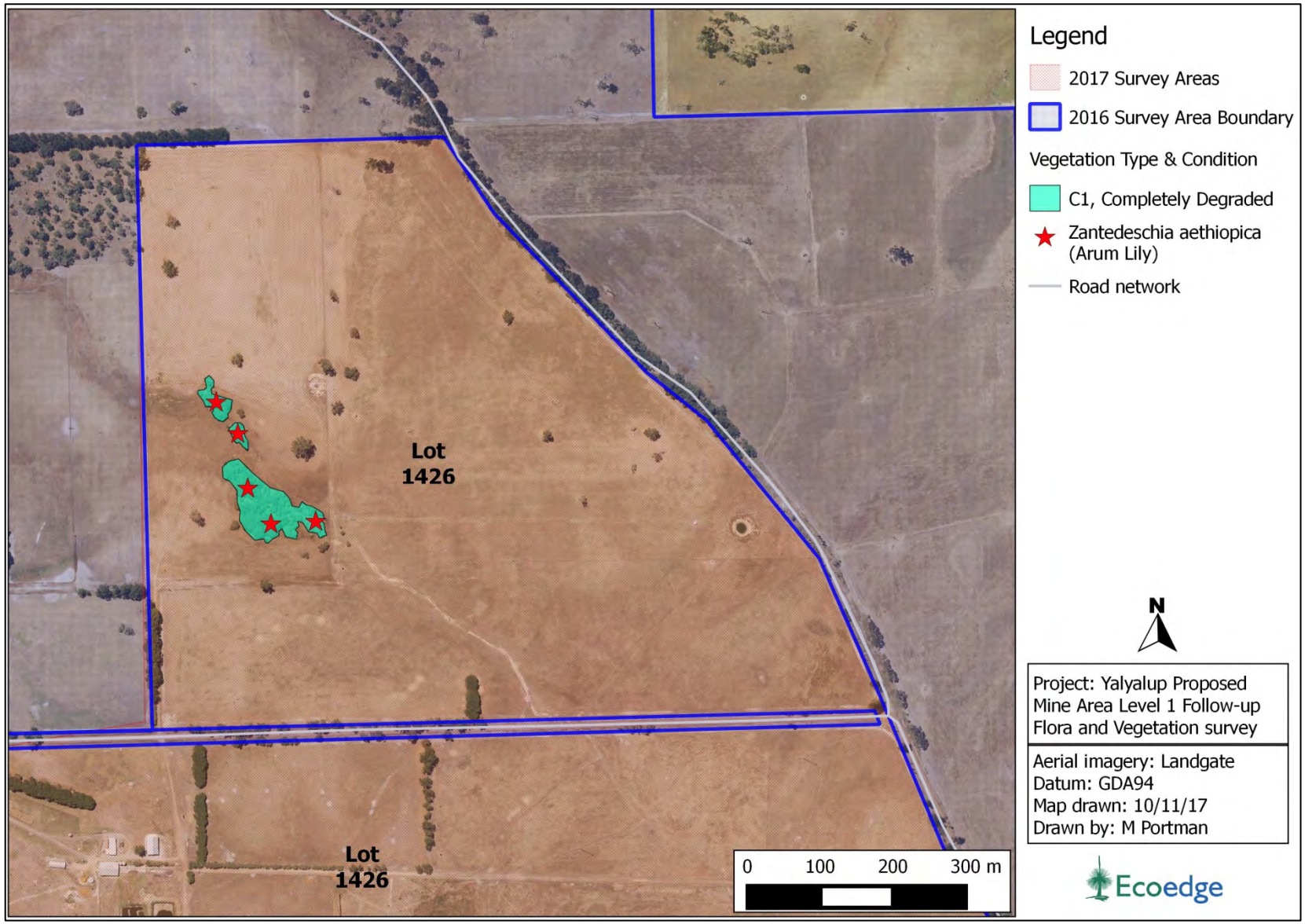

Figure 4. The weed *Zantedeschia aethiopica** (Arum Lily) was located in remnant vegetation on Lot 1426.

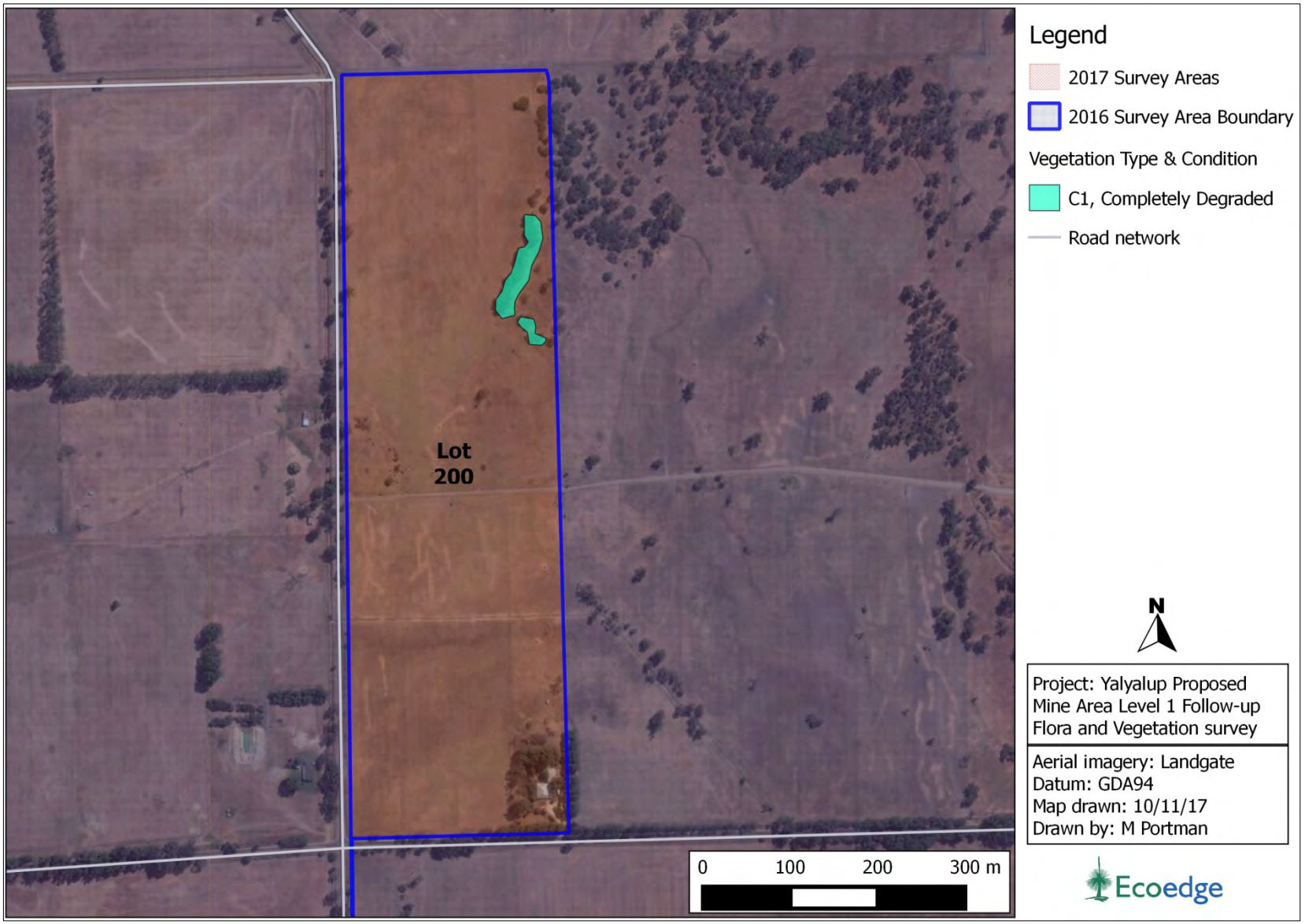

Figure 5. Approximately 0.3 ha of remnant vegetation on Lot 200 was assessed.

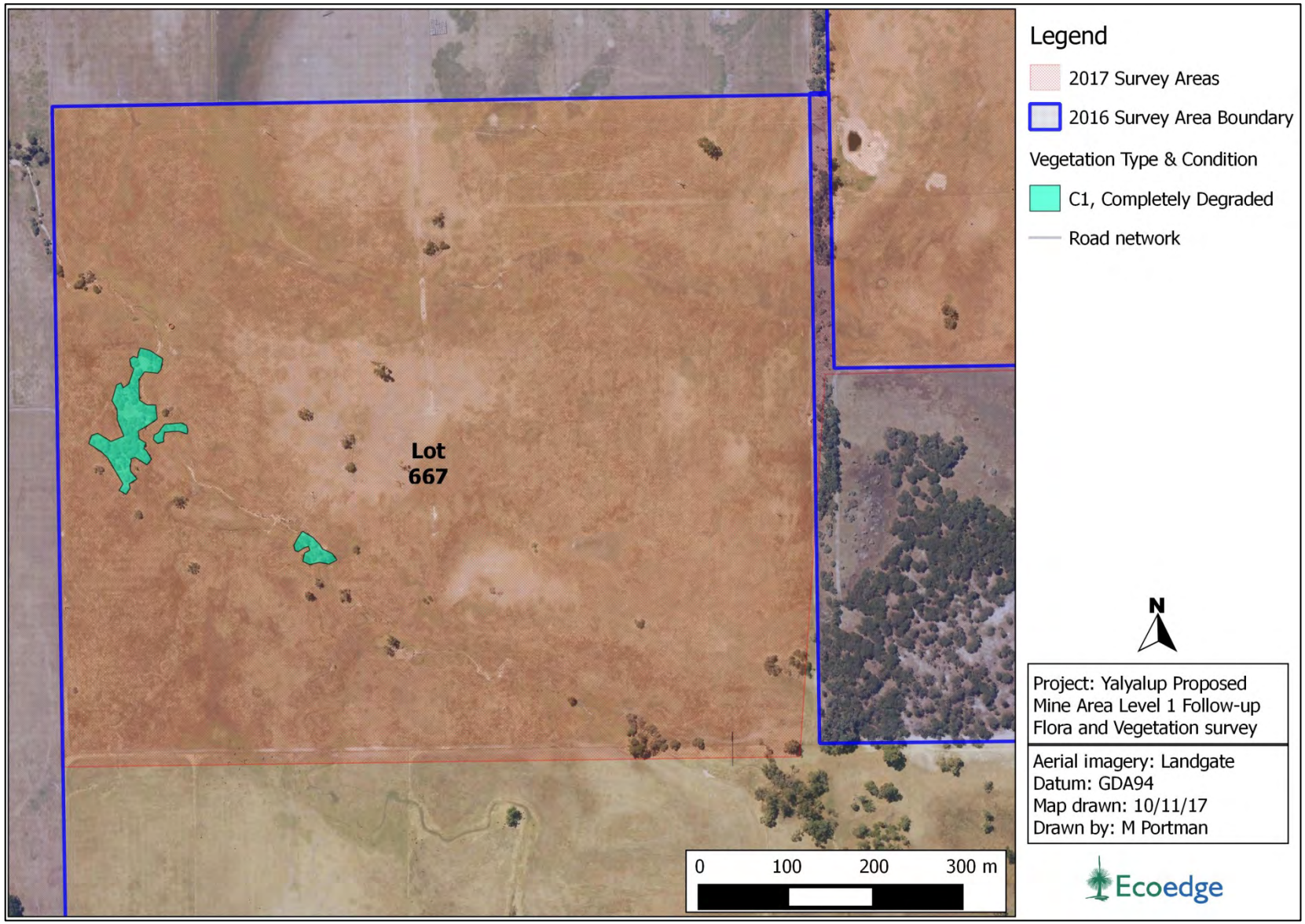

Figure 6. Approximately 0.65 ha of remnant vegetation on Lot 200 was assessed.

4 Discussion and Conclusion

A spring Level 1 flora and vegetation survey of 2 ha of remnant vegetation within the Survey Area at Yalyalup resulted in the following primary findings:

Native flora richness is very low (5 taxa of 22 in total), due to high levels of previous disturbance (chiefly due to livestock grazing) and the small sizes of the remaining patches of native vegetation. No Declared Rare Flora, Priority Flora, species of flora listed as Endangered under the EPBC Act or other flora of conservation significance were found within the Survey Area.

One weed present within the Survey Area, *Zantedeschia aethiopica** (Arum Lily), is listed as a Pest Plant by the Department of Agriculture and Food. It is in the C3 (management) category for the whole of the State (DAFWA, 2017).

Only one vegetation unit, referred to as C1 by Ecoedge (2016) in the survey of the surrounding proposed mining area at Yalyalup, is present within the current Survey Area. All patches of this vegetation unit were classed as 'Completely Degraded', consisting of native trees over agricultural weeds and pasture.

Vegetation in the Survey Area was mapped by Molloy *et al.* (2007) as variants of the Abba Complex, specifically AB, AF and Aw. All these complexes are highly or very highly cleared and are also poorly represented, or in the case of Aw, not at all represented, in formal or informal conservation reserves. As such, remnant areas of these complexes have significance, however all areas of them within the Survey Area are in Completely Degraded condition, retaining only the native canopy species and two common native understorey species. They are not therefore considered to have significant conservation value

In conclusion, there was no particular conservation value within any of the remnant vegetation within the Survey Area.

5 References

Aplin, T.E.H. (1979). *The flora*. In: Environment and Science. Ed: B.J. O'Brien. University of WA Press, Perth.

Department of Agriculture and Food Western Australia (2017). Declared plants. https://www.agric.wa.gov.au/pests-weeds-diseases/weeds/pest-plants

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Department of Parks and Wildlife (DPaW) (2016). *Environmentally Sensitive Areas GIS Mapping Dataset*. 2016 Version. Perth, Western Australia https://www2.landgate.wa.gov.au/web/guest/57 (Dataset DER016).

Department of the Environment and Energy (DotEE) (2017a). *Protected Matters Search Tool query*. Generated 25 October 2017.

Molloy, S., O'Connor, T., Wood, J. and Wallrodt, S. (2007). *Addendum for the South West Biodiversity Survey Area*. Western Australian Local Government Association, West Perth, Western Australia

Muir, B.G. (1977). *Biological Survey of the Western Australian Wheatbelt. Part II. Vegetation and habitat of Bendering Reserve*. Records of the West Australian Museum, Supplement No. 3.

Webb, A, Keighery, B.J., Keighery, G.J., Longman, V. (2009). *The flora and vegetation of the Busselton Plain (Swan Coastal Plain)*: a report for the Department of Environment and Conservation as part of the Swan Bioplan Project. Dept. of Environment and Conservation, Perth, Western Australia.

Appendix 1. Vascular flora recorded along McGibbon Track by A. Webb (DBCA)

Appendix 2. Protected Matters Search Tool and NatureMap reports

Appendix 3. Flora list for the Survey Area at Yalyalup, 2017.

Appendix 1. List of vascular flora found in the vicinity of the ironstone vegetation on McGibbon Track prior to 2007 by Andrew Webb of DBCA, Bunbury.

FAMILY	SPECIES	CONSV_CODE
Anarthriaceae	*Anarthria laevis*	
Asparagaceae	*Lomandra purpurea*	
	Lomandra sonderi	
	Thysanotus sparteus	
Casuarinaceae	*Allocasuarina thuyoides*	
Cyperaceae	*Caustis dioica*	
	Cyathochaeta avenacea	
	Lepidosperma aff. *resinosum*	
	Lepidosperma longitudinale	
	Lepidosperma squamatum	
	Lepidosperma tenue	
	Mesomelaena tetragona	
	Schoenus rigens	
	Tetraria capillaris	
Dasypogonaceae	*Kingia australis*	
Dilleniaceae	*Hibbertia hypericoides*	
	Hibbertia racemosa	
Ericaceae	*Leucopogon australis*	
	Leucopogon sp.	
Fabaceae	*Acacia applanata*	
	Acacia extensa	
	Acacia flagelliformis	4
	Acacia pulchella	
	Acacia saligna	
	Daviesia preissii	
	Gastrolobium praemorsum	
	Hovea trisperma var. *grandiflora*	
	Kennedia coccinea	
	Viminaria juncea	
Haemodoraceae	*Conostylis serrulata*	
	Haemodorum spicatum	
Hemerocallidaceae	*Agrostocrinum scabrum*	
Iridaceae	*Patersonia occidentalis*	
	Patersonia umbrosa	
Loranthaceae	*Nuytsia floribunda*	
Malvaceae	*Thomasia grandiflora*	
Myrtaceae	*Calothamnus quadrifidus* subsp. *teretifolius*	4
	Corymbia calophylla	
	Eucalyptus marginata	
	Eucalyptus rudis	
	Hypocalymma angustifolium	
	Hypocalymma robustum	

FAMILY	SPECIES	CONSV_CODE
Myrtaceae	*Kunzea micrantha*	
	Melaleuca preissiana	
	Melaleuca uncinata	
	Regelia ciliata	
Proteaceae	*Adenanthos meisneri*	
	Banksia dallanneyi	
	Banksia grandis	
	Banksia littoralis	
	Banksia squarrosa subsp. argillacea	DRF
	Hakea ceratophylla	
	Hakea oldfieldii	3
	Hakea prostrata	
	Hakea ruscifolia	
	Hakea varia	
	Isopogon formosus subsp*. dasylepis*	3
	Persoonia elliptica	
	Xylomelum occidentale	
Restionaceae	*Chordifex laxus*	
	Hypolaena exsulca	
	Hypolaena pubescens	
	Loxocarya magna	3
	Stenotalis ramosissima	
	Tremulina tremula	
Thymelaeaceae	*Pimelea* sp.	
Xanthorrhoeaceae	*Xanthorrhoea preissii*	

Appendix 2. Protected Matters Search Tool and NatureMap reports

NatureMap
Mapping Western Australia's biodiversity

Yalyalup con sig spp NatureMap Species Report

Created By Guest user on 25/10/2017

Kingdom Plantae
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 28' 02" E,33° 41' 53" S
Buffer 5km

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	3339	*Acacia flagelliformis*		P4	
2.	3537	*Acacia semitrullata*		P4	
3.	19258	*Actinotus whicheranus*		P2	
4.	4586	*Amperea micrantha*		P2	
5.	17107	*Banksia meisneri subsp. ascendens (Scott River Banksia)*		P4	
6.	32204	*Banksia nivea subsp. uliginosa*		T	
7.	32046	*Banksia squarrosa subsp. argillacea*		T	
8.	20026	*Blennospora doliiformis*		P3	
9.	17804	*Boronia tetragona*		P3	
10.	35796	*Calothamnus quadrifidus subsp. teretifolius*		P4	
11.	19974	*Calytrix sp. Tutunup (G.J. Keighery & N. Gibson 2953)*		P2	
12.	43980	*Chamelaucium sp. S coastal plain (R.D.Royce 4872)*		T	
13.	35657	*Chamelaucium sp. Yoongarillup (G.J. Keighery 3635)*		P4	
14.	17686	*Chordifex gracilior*		P3	
15.	1639	*Drakaea elastica (Glossy-leaved Hammer Orchid)*		T	
16.	20509	*Gastrolobium papilio*		T	
17.	30453	*Gastrolobium sp. Yoongarillup (S.Dilkes s.n. 1/9/1969)*		P1	
18.	7063	*Gratiola pedunculata (Stalked Brooklime)*		P2	
19.	14011	*Grevillea brachystylis subsp. brachystylis*		P3	
20.	2190	*Hakea oldfieldii*		P3	
21.	16522	*Isopogon formosus subsp. dasylepis*		P3	
22.	29492	*Leucopogon sp. Busselton (D. Cooper 243)*		P2	
23.	13779	*Loxocarya magna*		P3	
24.	36200	*Ornduffia submersa*		P4	
25.	1008	*Schoenus pennisetis*		P3	
26.	7756	*Stylidium longitubum (Jumping Jacks)*		P4	
27.	12453	*Verticordia plumosa var. vassensis*		T	

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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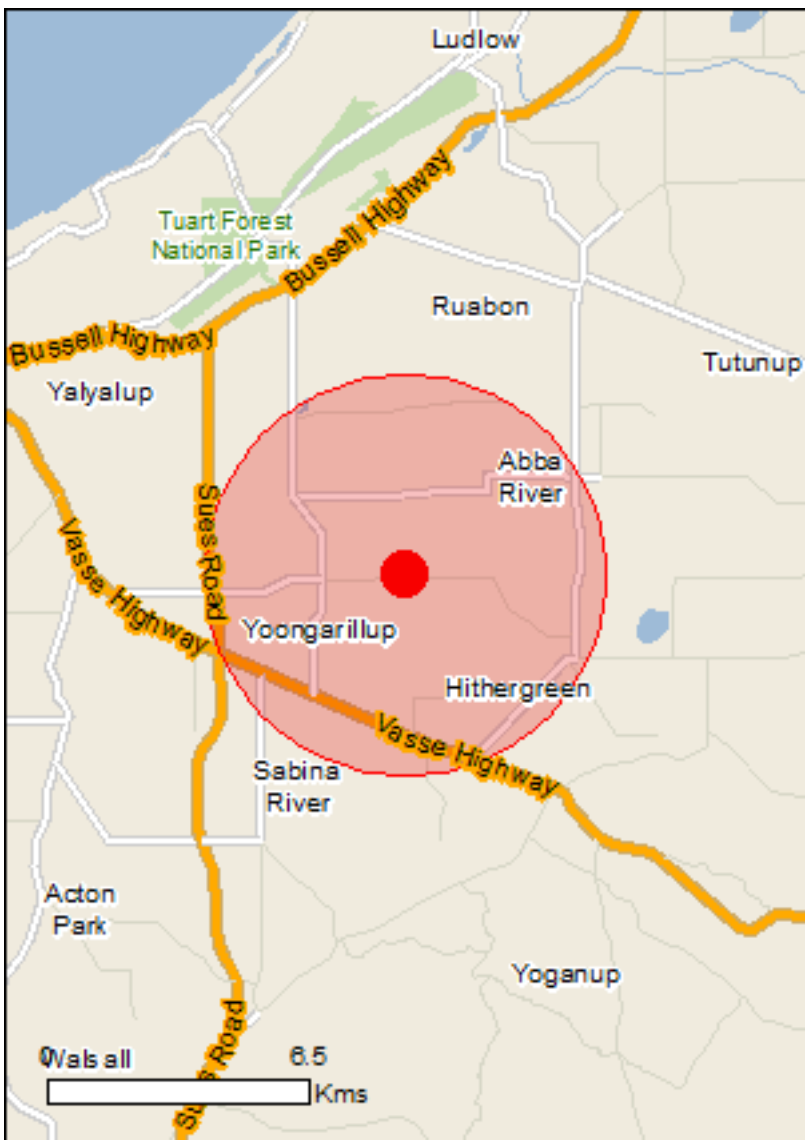

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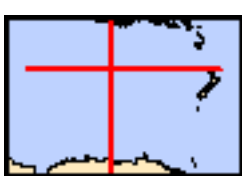

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	28
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	25
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Vasse-wonnerup system	Within 10km of Ramsar

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Fish		
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat known to occur within area
Plants		

Name	Status	Type of Presence
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat known to occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat known to occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat known to occur within area
Darwinia whicherensis Abba Bell [83193]	Endangered	Species or species habitat may occur within area
Daviesia elongata subsp. elongata Long-leaved Daviesia [64883]	Vulnerable	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat likely to occur within area
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	Endangered	Species or species habitat may occur within area
Verticordia densiflora var. pedunculata Long-stalked Featherflower [55689]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
[Verticordia plumosa var. vassensis](#) Vasse Featherflower [55804]	Endangered	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat likely to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Breeding known to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Thinornis rubricollis](#) Hooded Plover [59510]		Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Unnamed WA14567	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.70015 115.4657

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix 3. Flora list for the Survey Area at Yalyalup, 2017.

FAMILY	SPECIES NAME	INTRODUCED
Araceae	*Zantedeschia aethiopica*	*
Asteraceae	*Arctotheca calendula*	*
	Cotula coronopifolia	
	Cotula turbinata	*
	Hypochaeris glabra	*
	Sonchus asper	*
Fabaceae	*Lotus subbiflorus*	*
	Trifolium repens	*
Geraniaceae	*Geranium dissectum*	*
Juncaceae	*Juncus pallidus*	
Malvaveae	*Malva multiflora*	*
Myrtaceae	*Agonis flexuosa*	
	Corymbia calophylla	
	Eucalyptus rudis	*
	Melaleuca rhaphiophylla	
Poaceae	*Bromus diandrus*	*
	Ehrharta longiflora	*
	Holcus lanatus	*
	Hordeum leporinum	*
	Poa annua	*
Polygonaceae	*Rumex obtusifolius*	*
Ranunculaceae	*Ranunculus muricatus*	*