

Reconnaissance and Targeted Flora and Vegetation Survey at pt. Reserve 34343, Collie



Prepared for the Shire of Collie
November 2018



PO Box 1180 Bunbury WA 6231
enquiries@ecoedge.com.au

Version	Origin	Review	Review date	Ecoedge release approval	Issue date
V1	C. Spencer	M. Portman	17/11/2018		
V2	R. Smith	M. Portman	19/11/2018		
Final Draft	R. Smith	K. Tripp (Shire of Collie)	24/12/2018	M. Portman	26/11/2018
Final	M. Portman			M. Portman	27/12/2018

Executive Summary

Ecoedge was engaged by the Shire of Collie (the Shire) in September of 2018 to undertake a Reconnaissance and Targeted flora survey across approximately 70 hectares of remnant bushland in two separate reserves located at Mininnup Pools approximately 1 and 2.5 kilometers south of the Collie Town Site (the 'Survey Area').

In a recently issued Economic Development Task Force Report, tourism was identified as a key industry sector for Collie, and one of the suggested initiatives was the development of a nature-based hub at Mininnup Pool, linking with the Munda Bididi Trail and the Bibbulmun Track and featuring accommodation and activity options.

The purpose of the survey was to delineate key flora and vegetation values and their potential sensitivity to impact that may result from the proposed development.

Both Reconnaissance and Targeted surveys were required as part of the scope, in accordance with the Environmental Protection Authority's 'Technical Guidance' (Environmental Protection Authority, 2016).

The survey was conducted on 29 September and 9 October, 2018 in accordance with State and Commonwealth requirements for the bioregion and species and communities present, and the Environmental Protection Authority's 'Technical Guidance'.

A total of 198 vascular flora taxa were identified within the 70.45 ha¹ of remnant vegetation within the Survey Area, of which 14 were introduced or non-native species.

No Declared Pest Plants (DAFWA, 2018) were found within the Survey Area, however several significant environmental weeds were seen. The most widespread of these was the bulbous herb **Watsonia meriana* var. *bulbifera*. The small tree **Acacia dealbata* was observed in two locations and **Babiana angustifolia* in one.

Two species of Priority flora, *Synaphea hians* (P3) and *Grevillea ripicola* (P4) and one significant range extension species (*Stylidium scandens*) were found within the Survey Area.

Seven vegetation units dominated by native vegetation were recognised within the Survey Area. They range in structure from open forest through low open woodland, to tall shrubland, to low sedgeland. None of them resembles a recognised Threatened or Priority Ecological Community.

The vegetation in the Survey Area is mapped as the Muja (MJ) complex, of which 59.5% of the original areal extent remains. This is well above the Commonwealth government's retention target of 30%.

¹ Adjusted boundary to include all shoreline of the Collie River, but excluding the river itself.

Two regional ecological linkages cross the Survey Area, one forming a north-south link, and the other located in the south associated with the Collie River.

No Environmentally Sensitive Areas have been mapped within the Survey Area according to the DER database (DER, 2016).

Most (90%) of the Survey Area vegetation was rated as being in 'Very Good' or 'Excellent' condition.

Contents

Executive Summary.....	3
Statement of Limitations	8
Reliance on Data	8
Report for Benefit of Client.....	8
1 Introduction.....	9
1.1 Scope and Objectives	9
1.2 Biogeographic Region and Location.....	12
1.3 Geology	12
1.4 Vegetation Description according to pre-European Mapping Datasets.....	15
1.4.1 Vegetation Complexes	15
1.4.2 Assessment of Remaining Extent against Pre-European Extent	15
1.5 Threatened and Priority Ecological Communities.....	17
1.6 Threatened and Priority Flora	17
1.7 Regional Ecological Linkages	23
1.8 Environmentally Sensitive Areas.....	24
2 Methods.....	27
2.1 Desktop Assessment	27
2.2 Field Survey	27
2.3 Survey Limitations	27
3 Results.....	28
3.1 Flora.....	28
3.2 Declared Weeds and Pest Plants.....	28
3.3 Priority Flora and Other Flora of Conservation Significance.....	30
3.3.1 Synaphea hians (P3).....	30
3.3.2 Grevillea ripicola (P4).....	30
3.3.3 Stylidium scandens	30
3.4 Vegetation Units.....	34
3.5 Vegetation Condition	36
4 Discussion	39
4.1 Conservation significance of the flora and vegetation	39
4.1.1 Flora	39

4.1.2	Vegetation.....	39
4.2	Potential Impacts from the Proposed Nature Hub	39
5	Recommendations.....	40
6	Conclusions.....	41
7	References	42
Appendix 1. Categories of Threatened Ecological Communities under the EPBC Act (DotEE, 2017a).		
Appendix 2. Protected Matters Search Tool and NatureMap reports.		
Appendix 3. Definitions of Threatened and Priority List flora (DBCA, 2017b).		
Appendix 4. Categories of Threatened Species under the EPBC Act (DotEE, 2017c).....		
Appendix 5. Vegetation Condition Scale (EPA, 2016).....		
Appendix 6. List of Vascular Flora found within the Survey Area.		
Appendix 7. Completed Threatened and Priority Flora Reporting Form.		
Appendix 8. Photographs of Vegetation Units mapped within the Survey Area.		

Table of Tables

Table 1.	Soil mapping units occurring within the Survey Area (Tille, 1996).....	12
Table 2.	The Muja complex with regard to the Commonwealth retention target (Government of Western Australia, 2017).	15
Table 3.	Threatened and Priority flora known to occur within 10 km of the Survey Area (DBCA, 2018a, 2018b; DotEE, 2018b).	19
Table 4.	Linkage proximity rating values assigned to patches of remnant vegetation within a landscape (from Molloy et al., 2009).....	24
Table 5.	Limitations with regard to assessment adequacy and accuracy.	28
Table 6.	Locations of Threatened and Priority flora and Conservation Significant taxa within the Survey Area.....	32
Table 7.	Descriptions of vegetation units mapped during the field survey.	35
Table 8.	Area of each vegetation unit within the Survey Area.....	36
Table 9.	Summary of vegetation condition classes within the Survey Area.....	36

Table of Figures

Figure 1.	Map showing the Survey Area location.....	10
Figure 2.	Survey Area showing surrounding land uses and geographical features.....	13
Figure 3.	Soil mapping units mapped for the Survey Area Tille (1996).....	14

Figure 4. The Survey Area was mapped as comprising the Muja (MJ) complex (Webb <i>et al.</i> , 2016).	16
Figure 5. Known occurrences of Threatened and Priority flora within 10 km of the Survey Area (DBCA, 2018a).....	22
Figure 6. The Survey Area in relation to regional ecological linkages (Molloy <i>et al.</i> , 2009)...	25
Figure 7. ESAs mapped within proximity to the Survey Area (DER, 2016).	26
Figure 8. Location of conservation significant taxa within the Survey Area.	29
Figure 9. Location of conservation significant taxa within the Survey Area.	31
Figure 10. <i>Synaphea hians</i>	33
Figure 11. <i>Grevillea ripicola</i>	33
Figure 12. <i>Stylidium scandens</i>	34
Figure 13. Vegetation units mapped within the Survey Area.....	37
Figure 14. Condition of vegetation within the Survey Area.	38

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 the Shire of Collie (the Shire) in September of 2018 to undertake a Reconnaissance and Targeted flora and vegetation survey across approximately 70 hectares (ha) of remnant bushland in two separate reserves located in the Minninnup Pools area approximately 1 and 2.5 kilometers (km) south of the Collie Town Site (**Figure 1**).

In a recently issued Economic Development Task Force Report, tourism was identified as a key industry sector for Collie, and one of the suggested initiatives was the development of a nature-based hub at Minninnup Pool, linking with the Munda Bididi Trail and the Bibbulmun Track and featuring accommodation and activity options. To facilitate the investigation of the viability of this suggestion, the Shire requires information about the flora, vegetation and fauna values of the site, and their potential sensitivities to impacts that may result from the proposed development.

The field survey was undertaken in accordance with the Environmental Protection Authority's (EPAs) Technical guidance (EPA, 2016), and the project brief supplied by Main Roads. This report compiles findings of the field survey.

1.1 Scope and Objectives

The purpose of the survey was to determine the flora and vegetation values onsite and their potential sensitivity to impacts from the proposed development.

The scope of works was defined by the Shire as:

- Document and map ecological values of the site including quality and extent;
- A description of the vegetation complex of the site;
- A description of the geology and soil types of the site;
- Known environmentally sensitive areas;
- Survey for threatened & priority listed flora within and immediately adjacent to the proposed development area;
- Survey for threatened fauna or habitat within and immediately adjacent to the proposed development area;
- Identify potential impacts to these ecological values from the proposed development;
- Outline appropriate measures to avoid, mitigate or offset potential impacts; and
- An assessment of the compatibility of a nature hub that includes accommodation and day use activities, given the results of the above assessments.

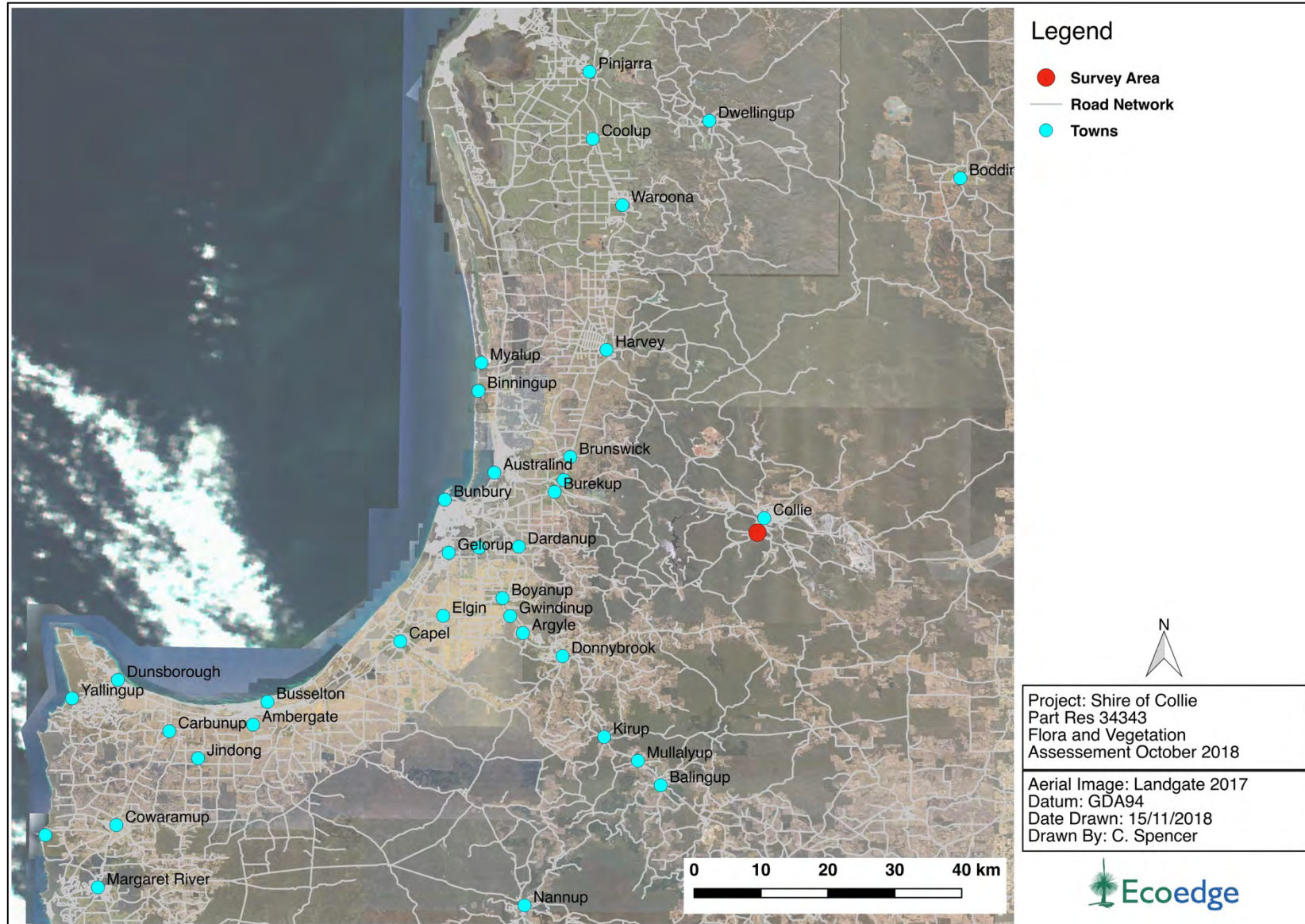


Figure 1. Map showing the Survey Area location.

To comply with the requested scope of works, the assessments included the following:

Desktop survey

- Identification of all vegetation and flora features and constraints in, and nearby the Survey Area, including presentation and review of data from the Department of the Environment and Energy's (DotEE's) Protected Matters Search Tool, the Department of Biodiversity, Conservation and Attractions' (DCBA's) NatureMap and FloraBase, and an extract from DBCA's Species & Communities Branch flora database; and
- Identification of significant flora, vegetation/ecological communities values and their potential sensitivity to impact.

Field survey

Implementation of a Reconnaissance and Targeted flora and vegetation assessment as per the requirements of EPA (2016). Specifically;

- verification / ground-truthing the desktop assessment findings through field surveys;
- vegetation community/type mapping;
- An assessment of the survey area's plant species diversity, composition, structure and weed cover;
- vegetation condition mapping using the EPA (2016) condition scale;
- 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. Shapefiles shall be provided if required with point data indicating the number of plants identified at each point. If more than 100, the edges of the population boundary will be mapped. If the population extends outside the survey area, the survey will map the extent of the population. All Threatened flora will be mapped with a GPS; and
- identification of the location of any Weeds of National Significance or Declared Pests.

Report

A concise report detailing the methodology used in and findings of the biological survey, addressing the following:

- Environmental constraints via provision of environmental constraints maps using GIS mapping software (e.g. ArcMap) for flora, fauna, ecological communities, watercourse, wetlands, ESAs etc.;
- flora and vegetation biological aspects likely to require referral of the project to the EPA;
- Potential impacts on MNES as protected under the EPBC Act which are likely to require referral of the project to the Commonwealth DotEE.

- justification of decision as to whether a referral to DotEE is likely to be required in accordance with reference to relevant Commonwealth significant impact guidelines;

1.2 Biogeographic Region and Location

The Survey Area is situated within Southern Jarrah Forest JF02 sub-region of the Jarrah Forest biogeographic region, as defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (Commonwealth of Australia, 2016). It comprises two remnant bushland areas situated approximately 1 and 2.5 km south of the Collie Town Site (**Figure 2**). The first and smaller reserve area is approximately 1 ha in size (excluding open water) and is located at the NE of the Collie Golf Course and on the west side of the Collie River East. It comprises mostly of cleared parkland with some remnant vegetation along the river bank. The second larger Survey Area, ‘Minninup Pools’, is approximately 69.4 ha in size and is located on the north bank of the Collie River East. It comprises mostly of native vegetation. Both survey areas are situated on Crown Land managed by the Shire.

1.3 Geology

Within the Southern Jarrah Forest biogeographical region, the Survey Area is situated on the Western Darling Range Zone (255) which is described as a moderately dissected lateritic plateau on granite with deeply incised valleys. It includes the Darling Scarp on the western margin. Soils are formed in laterite, lateritic colluvium and weathered in-situ granite and gneiss (Tille, 1996). Three soil landscape systems have been mapped for the Western Darling Range Zone; the Coalfields (255Cf), Darling Plateau (255Dp) and Lowden Valleys (255Lv) Systems, of which only the Coalfields system is represented within the Survey Area and described below:

Coalfields (255Cf) system: Gently undulating plain over coal basins, in the south of the Western Darling Range. Sandy gravel, deep sand and non-saline wet soils. The associated vegetation is Jarrah-marri-paperbark woodland, Tille (1996).

Based on the landscape position and characteristics, soil landscape systems have been separated into soil mapping units or phases, which are mapped at a finer scale than systems. Three soil mapping units were mapped for the Survey Area by Tille (1996); these are mapped in **Figure 3** and described in **Table 1**.

Table 1. Soil mapping units occurring within the Survey Area (Tille, 1996).

Soil Mapping Unit	Description
CfMU2	Duplex sandy gravels, Pale deep sands, Gravelly pale deep sands and Yellow deep sands.
CfMuf	Pale deep sands, Yellow deep sands, Duplex sandy gravels and Yellow sandy earths.
CfCF	Low lying poorly drained flats over coal measures. Soils are deep sands and wet soils.

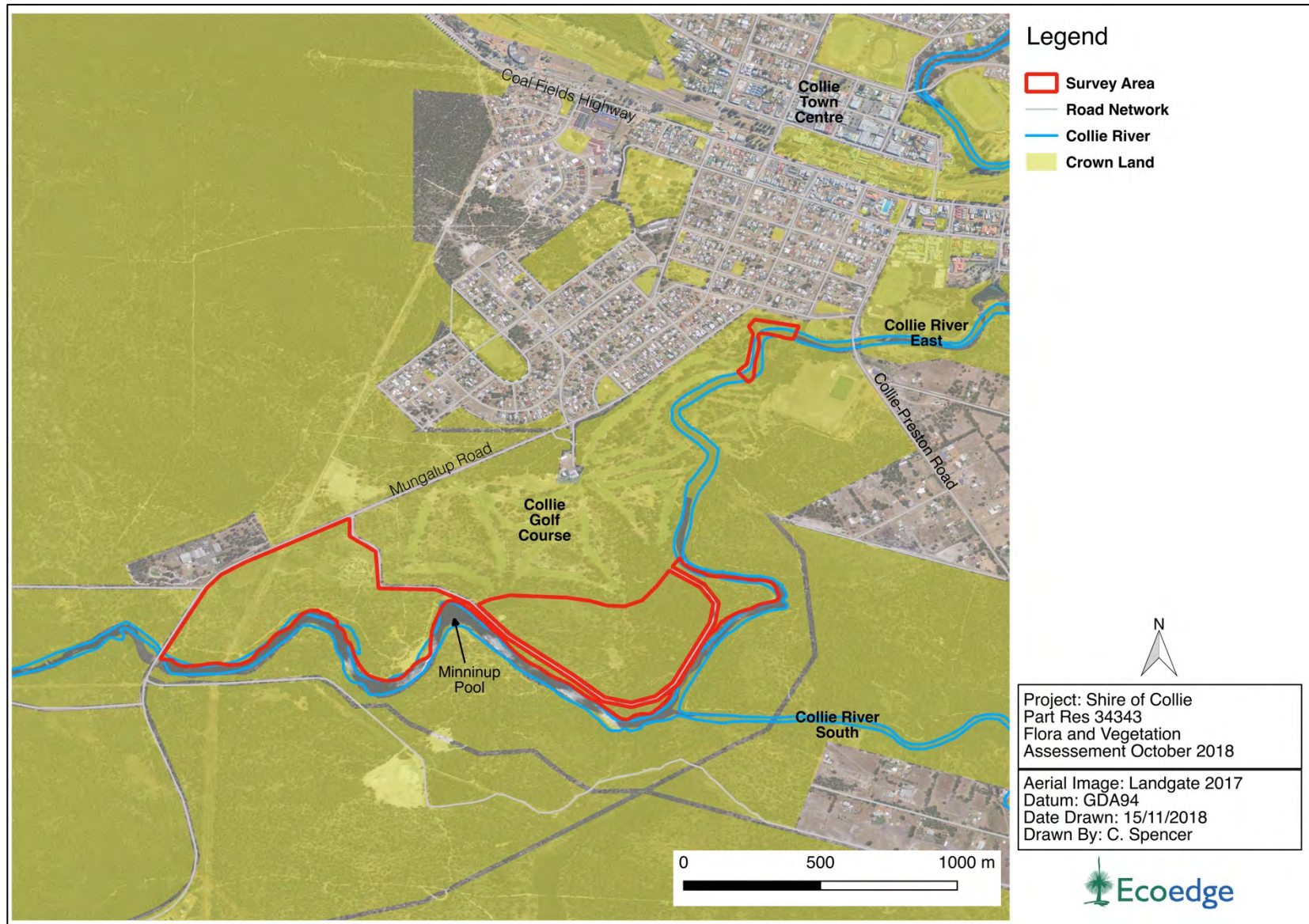


Figure 2. Survey Area showing surrounding land uses and geographical features.

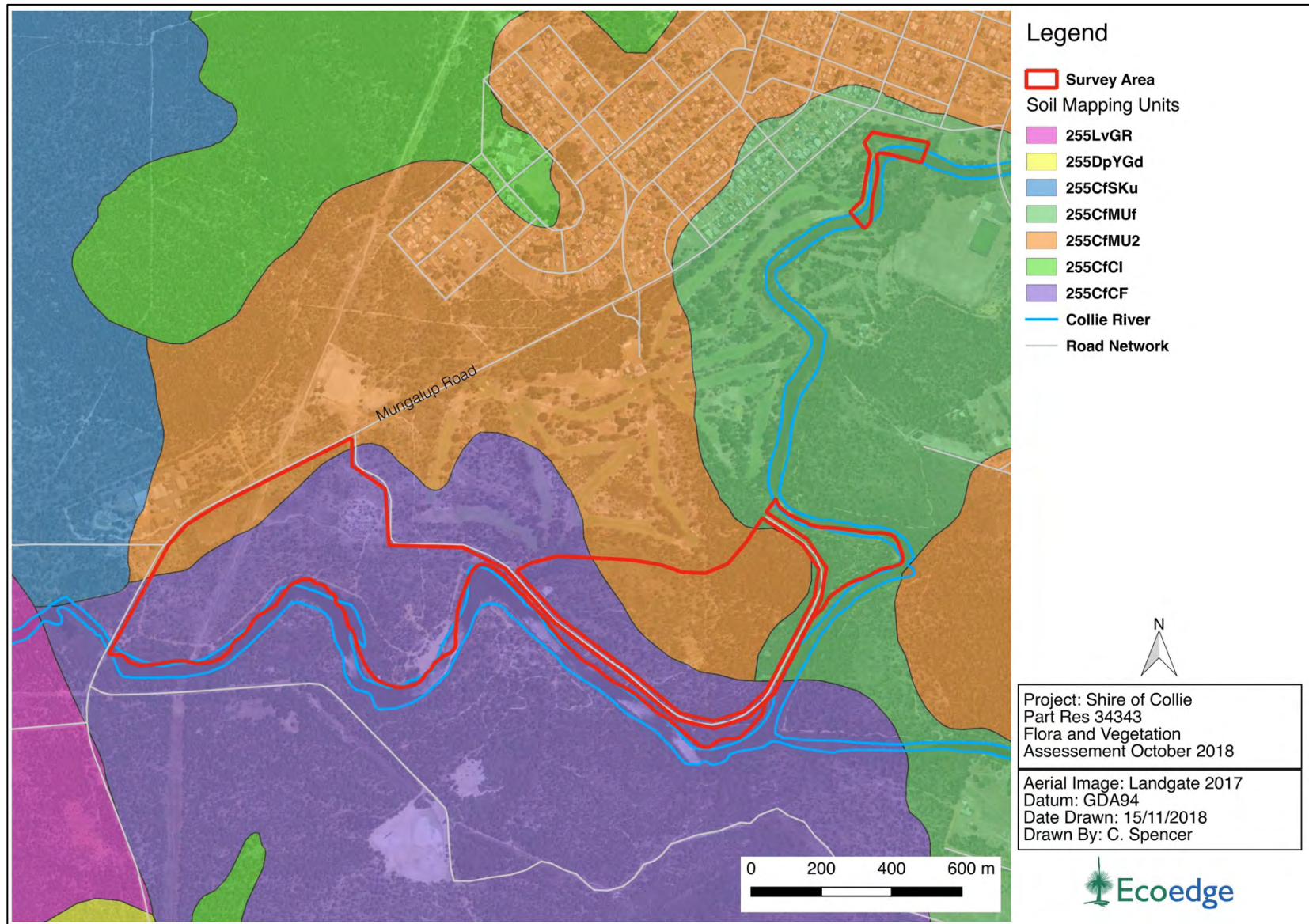


Figure 3. Soil mapping units mapped for the Survey Area Tille (1996).

1.4 Vegetation Description according to pre-European Mapping Datasets

The Survey Area covers approximately 71.2 ha and contains approximately 70.45 ha of remnant native vegetation.

1.4.1 Vegetation Complexes

In 2016, the then Department of Parks and Wildlife (DPaW) revised the datasets from the Darling Scarp and Plateau Regional Forest Agreement (RFA) mapping of Mattiske and Havel (1998) and the Swan Coastal Plain mapping of Heddle *et al.* (1980). The purpose of the revision was to fill data gaps and improve alignment and correlation between the two datasets (Webb, *et al.*, 2016).

According to the 1:50,000 Mapping of Vegetation Complexes in the South West Forest Region of Western Australia (Mattiske & Havel 1998) as updated by Webb *et al.* (2016), vegetation of the Survey Area was mapped as comprising the Muja (MJ) vegetation complex (**Figure 4**). The Muja complex is described as “Open woodland of *Melaleuca preissiana*-*Banksia littoralis*-*Banksia ilicifolia* with some *Eucalyptus patens* on moister sites, *Banksia* spp. on drier sites of valley floors in the subhumid zone”.

1.4.2 Assessment of Remaining Extent against Pre-European Extent

In 2001, the Commonwealth of Australia stated National Targets and Objectives for Biodiversity Conservation, which recognised that the retention of 30%, or more, of the pre-clearing extent of each ecological community was necessary if Australia's biological diversity was to be protected (Environment Australia, 2001).

In its report on the Statewide Vegetation Statistics incorporating the CAR Reserve Analysis, the Government of Western Australia provides information on the pre-European and current extent of the ecological communities of Western Australia and reports on the status of the Comprehensive, Adequate and Representative (CAR) reserve system for WA (Government of Western Australia, 2017). This system is also based on the National retention targets of 30% overall. Only reserves managed by DBCA under the *Conservation and Land Management Act 1984* are considered for inclusion in the “CAR Reserve Analysis”.

Table 2 lists the percentage remaining of Muja (MJ) vegetation complex and indicates that the Commonwealth 30% retention target is met.

Table 2. The Muja complex with regard to the Commonwealth retention target (Government of Western Australia, 2017).

Vegetation Complex	% Remaining of pre-European	Is the 30% Target Met?	% in DBCA Managed Lands*
Muja (MJ)	59.51	Yes	43.83

* Excludes Crown Freehold Department Interest Lands that are managed under Section 8(a) of the CALM Act.

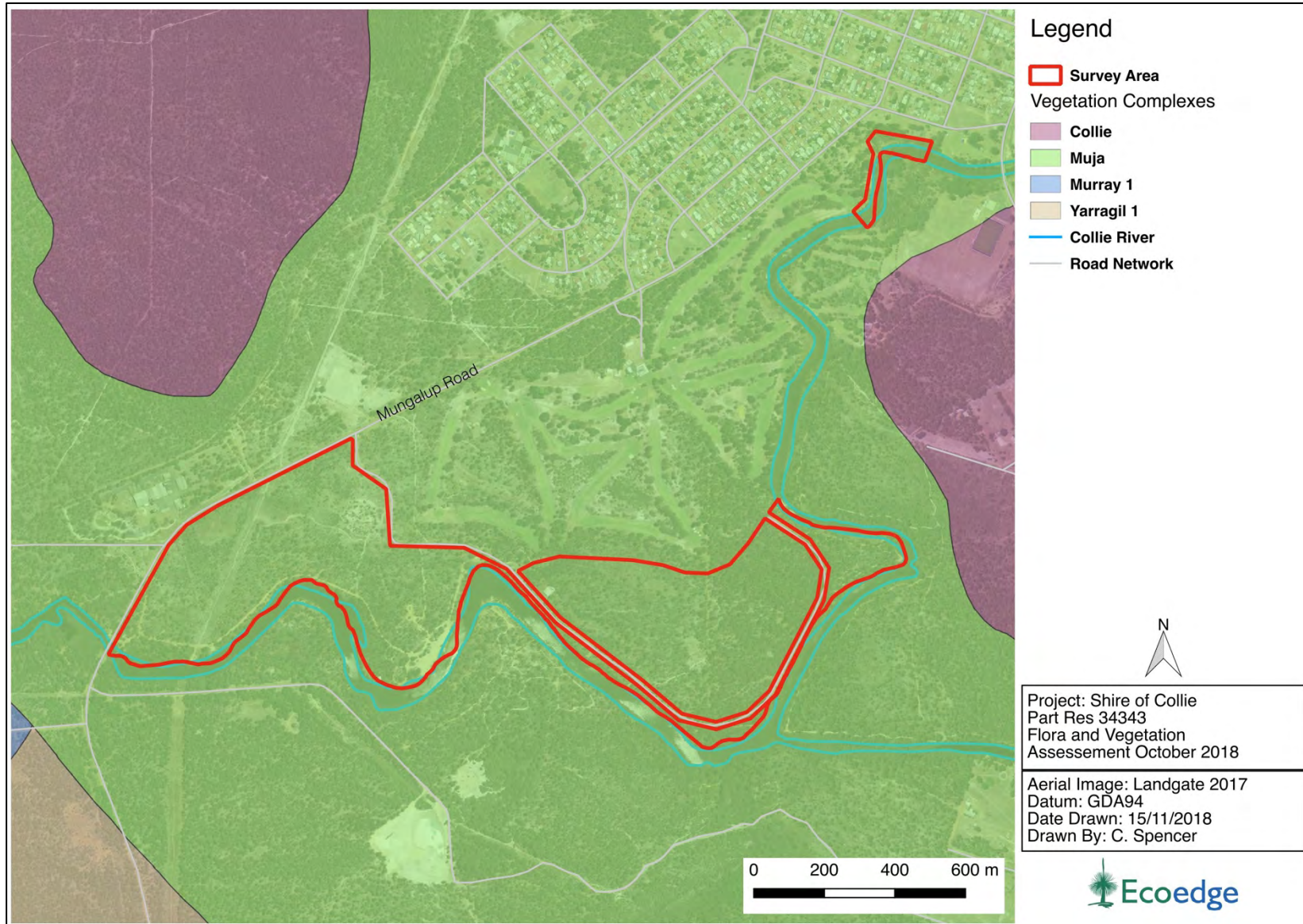


Figure 4. The Survey Area was mapped as comprising the Muja (MJ) complex (Webb *et al.*, 2016).

1.5 Threatened and Priority Ecological Communities

Ecological communities are defined by Western Australia's DBCA (previously DPaW and the Department of Environment and Conservation (DEC)) as "...naturally occurring biological assemblages that occur in a particular type of habitat. They are the sum of species within an ecosystem and, as a whole, they provide many of the processes which support specific ecosystems and provide ecological services." (DEC, 2013).

Through a non-statutory process, the Minister for Environment (Western Australia) may list communities that are considered to be at threat as either Threatened or Priority Ecological Communities. A Threatened Ecological Community (TEC) is one which is found to fit into one of the following categories; Presumed Totally Destroyed (PD), Critically Endangered (CE), Endangered (E) or Vulnerable (V) (DEC, 2013). Possible TECs that do not meet survey criteria are added to DBCA's Priority ecological community Lists under Priorities 1, 2 and 3 (referred to as P1, P2, P3). Ecological communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4 (P4). These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5 (P5) (DEC, 2013).

The current listing of TECs and PECs are specified in DPaW (2016) and DBCA (2017a).

TECs can also be listed under the Commonwealth EPBC Act (Department of the Environment and Energy (DotEE), 2017a; Department of Environment, Water, Heritage and the Arts (DEWHA), 1999). There are three categories of TEC under the EPBC Act: Critically Endangered (CE), Endangered (E) and Vulnerable (V). These are defined in **Appendix 1** (DotEE, 2018a).

A Protected Matters Search report was generated to provide information regarding Matters of National Environmental Significance (MNES) known or potentially occurring within 10 km of the Survey Area (DotEE, 2018b **Appendix 2**), and the current DPaW and DBCA TEC and PEC listings were consulted (DPaW, 2016; DBCA, 2017a).

There are no Threatened or Priority Ecological Communities mapped within 10 km of the Survey Area.

1.6 Threatened and Priority Flora

Species of flora and fauna are defined as having Threatened or Priority conservation status where their populations are restricted geographically or threatened by local processes. The Department of Water and Environment Regulation recognises these threats of extinction and consequently applies regulations towards population and species protection.

Threatened Flora species are gazetted under Subsection 2 of Section 23F of the *Wildlife Conservation Act 1950* (WC Act)² and therefore it is an offence to “take” or damage rare flora without Ministerial approval. Section 6 of the WC Act defines “to take” as “... to gather, pick, 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 are under consideration for future declaration as “rare flora”, dependent on more information. Species classified as Priority One to Three (referred to as P1, P2 and P3) are in need of further survey to determine their status, while Priority Four (P4) species require monitoring every 5-10 years. Under the WC Act, Threatened flora are ranked according to their level of threat using IUCN Red List categories and criteria of Extinct (EX), Critically Endangered (CE), Endangered (EN) or Vulnerable (VU). **Appendix 3** presents the categories of Threatened and Priority Flora as defined by the WC Act (DPaW, 2017).

Under the EPBC Act, a species may be listed in one of six categories; the definitions of these categories are summarised in **Appendix 4** (DotEE, 2018c).

Threatened or Priority flora occurring within 10 km of the Survey Area generated from an extract from the DBCA databases (DBCA, 2018a and a NatureMap search (DBCA, 2018b) are listed in **Table 3**. Taxa listed under the EPBC Act (based on results of the Protected Matters Search Tool query (DotEE, 2018b) are noted. The results of the DBCA datasearch are mapped in **Figure 5**.

Some of the species listed in **Table 3** could occur within the Survey Area, based on an assessment of their preferred habitats. All species listed would have either been flowering at the time of survey or could be identified in the field without flowers.

² Transition to the *Biodiversity Conservation Act 2016* will commence in the near future. At the time of preparing this report, the WC Act 1950 was current in regards to the conservation of Threatened and Priority flora.

Table 3. Threatened and Priority flora known to occur within 10 km of the Survey Area (DBCA, 2018a, 2018b; DotEE, 2018b).

Species	Cons Status*	Flowering	Description and Habitat	Likelihood
<i>Caladenia lodgeana</i>	T (CE)	Oct	Tuberous, perennial, herb. Fl. whit. Black loam.	None
<i>Caladenia leucochila</i>	T (EN)	Sep-Oct	Tuberous, perennial herb, single leaf and one or two pale yellow to greenish cream and white flowers with dull red stripes. Only known from near Collie, sandy soil in open forest and scrub.	Moderate
<i>Drakaea confluens</i>	T (EN)	Oct-Nov	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & brown & yellow. White-grey sand.	Low
<i>Jacksonia velveta</i>	T (EN)	Dec	Open, upright, sometimes sprawling shrub, to 1.9 m high. Fl. yellow-orange. Brown gravelly loam, dry grey sand, ironstone. Slight hillslopes, ridges.	Moderate
<i>Diuris micrantha</i>	T (VU)	Sep-Oct	Tuberous, perennial, herb, 0.3–0.6 m high. Fl. yellow, brown. Brown loamy clay. Winter-wet swamps, in shallow water.	Low
<i>Banksia</i> sp. Boyup Brook (L.W. Sage LWS 2366)	P1	No info avail		Low
<i>Caladenia validinervia</i>	P1	Sep-Oct	Tuberous, perennial, herb, single erect, hairy leaf and up to three greenish to creamy white flowers with red stripes on the sepals and petals. Only known from an area between Rocky Gully and Collie. Grows in jarrah and marri woodland.	Moderate
<i>Stylidium acuminatum</i> subsp. <i>acuminatum</i>	P1	Oct-Dec/Jan	Rosetted perennial, herb, Leaves oblanceolate. Inflorescence racemose. Fl. yellow. Clayey sand over laterite. Hillslopes, ridges and valleys. Eucalypt forest, open woodland, Agonis shrubland.	Moderate
<i>Juncus meianthus</i>	P2	Nov-Jan	Tufted perennial, herb, 0.05-0.2 m high, to 0.4 m wide. Fl. brown. Black sand, sandy clay. Creeks, seepage areas.	Low
<i>Leucopogon extremus</i>	P2	Sep-Oct	Low spreading shrub to 40 cm high x 70 cm wide, corolla greenish white. Seasonally wet areas.	Low
<i>Logania sylvicola</i>	P2	Aug-Sep	Spreading, compact shrub to 40 cm x 50 cm. Inflorescence more or less pendant. Flowers cream. Mid slopes. Dry brown gravelly, sandy loam over laterite.	Moderate

Species	Cons Status*	Flowering	Description and Habitat	Likelihood
<i>Millotia tenuifolia</i> var. <i>laevis</i>	P2	Sep-Oct	Ascending to erect annual, herb, 0.02-0.1 m high. Fl. yellow. Granite or laterite soils.	Moderate
<i>Sphaerolobium benetectum</i>	P2	Oct-Nov	Slender, caespitose shrub, 0.2-1 m high, to 0.45 m wide. Fl. pink & red & yellow. White gravelly sandy clay, sandy loam, granite, laterite. Ridges, swamps, undulating rises.	Moderate
<i>Thysanotus unicusipensis</i>	P2		Erect perennial dwarf shrub, height to 15 cm, width to 11 cm; flowers purple. Jarrah - Marri forest	Moderate
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	P3	Jul-Jan	Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Fl. white, cream, pink, green. Grey sand, lateritic gravel.	Moderate
<i>Calytrix pulchella</i>	P3	Aug-Nov	Shrub, 0.3-0.7(-1) m high. Fl. pink. Grey or white sand over laterite. Ridges, flats.	Moderate
<i>Eryngium</i> sp. <i>Ferox</i> (G.J. Keighery 16034)	P3	Nov	Erect, open tuberous, herb, 0.1–0.3 m high. Fl. green. Grey to brown loamy to sandy clay, brown cracking clay. Winter-wet flats, swamps, dried claypans, ridges.	Low
<i>Grevillea prominens</i>	P3	Sep-Oct	Spreading shrub, 0.5–1.7 m high, 0.3-1 m wide. Fl. cream, white. Gravelly loam. Along creeklines	Low
<i>Lomandra whicherensis</i>	P3	Nov-Dec	Tufted rhizomatous herb 20 cm high x 30 cm wide. Flowers yellow with purple stripe. Jarrah-marri forest, lateritic soils, sandy clay.	Low
<i>Stylidium rhipidium</i>	P3	Oct-Nov	Slender annual, herb, ca 0.05 m high. Fl. white. Sandy soils. Wet creek flats, swamps, granite outcrops.	Moderate
<i>Synaphea decumbens</i>	P3	Sep-Oct	Decumbent shrub. Fl. yellow. Sand over laterite.	Moderate
<i>Synaphea hians</i>	P3	Jul-Nov	Prostrate or decumbent shrub, 0.15-0.6 m high, to 1 m wide. Fl. Yellow. Sandy soils. Rises.	Moderate
<i>Tetratheca parvifolia</i>	P3	Oct	Small shrub, 0.2-0.3 m high. Fl. pink. Jarrah, woodland, wandoo woodland, gravelly soils.	Moderate
<i>Stylidium lepidum</i>	P3	Oct-Nov	Spreading, rosetted perennial, herb, ca 0.05 m high, forming densely packed colonies. Fl. pink, orange. Gravelly sand or loam, clay. Winter-wet depressions.	Moderate
<i>Acacia cuneifolia</i>	P4	Jul-Oct	Erect or straggly shrub, 1-3 m high. Fl. yellow. Sand, clay or loam over	Low

Species	Cons Status*	Flowering	Description and Habitat	Likelihood
			granite. Granite outcrops & hills, rocky watercourses.	
<i>Acacia semitrullata</i>	P4	May-Oct	Slender, erect, pungent shrub, (0.1-)0.2-0.7(-1.5) m high. Fl. cream, white. White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas.	Moderate
<i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>	P4	Jun-Aug	Erect, multi-stemmed shrub, 1-2 m high. Fl. red. Clay over granite, lateritic soils. Hillsides.	Low
<i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>	P4	Jul-Sep	Tree, 5-20 m high, bark rough, box-type. Fl. white. Loam. Flats, hillsides.	Moderate
<i>Grevillea ripicola</i>	P4	Jan-Apr /Nov-Dec	Spreading, much-branched, non-lignotuberous shrub, 0.6-2(-3) m high, to 4 m wide. Fl. red, orange. Sandy clay, clay or gravelly loam. Swampy flats, granite outcrops, along watercourses.	High
<i>Hypolaena robusta</i>	P4	Sep-Oct	Dioecious rhizomatous, perennial, herb, ca 0.5 m high. White sand. Sandplains.	Moderate
<i>Lasiopetalum cardiophyllum</i>	P4	Aug-Jan	Erect, multi-stemmed shrub, 0.2–0.5 m high. Fl. pink. Lateritic gravelly soils, sandy clay. Flats, hillslopes.	Moderate
<i>Pultenaea skinneri</i>	P4	Jul-Sep	Slender shrub, 1-2 m high. Fl. yellow, orange, red. Sandy or clayey soils. Winter-wet depressions.	Moderate

Note: The WC Act Conservation Status is shown, EPBC Act status, where relevant, is in brackets.

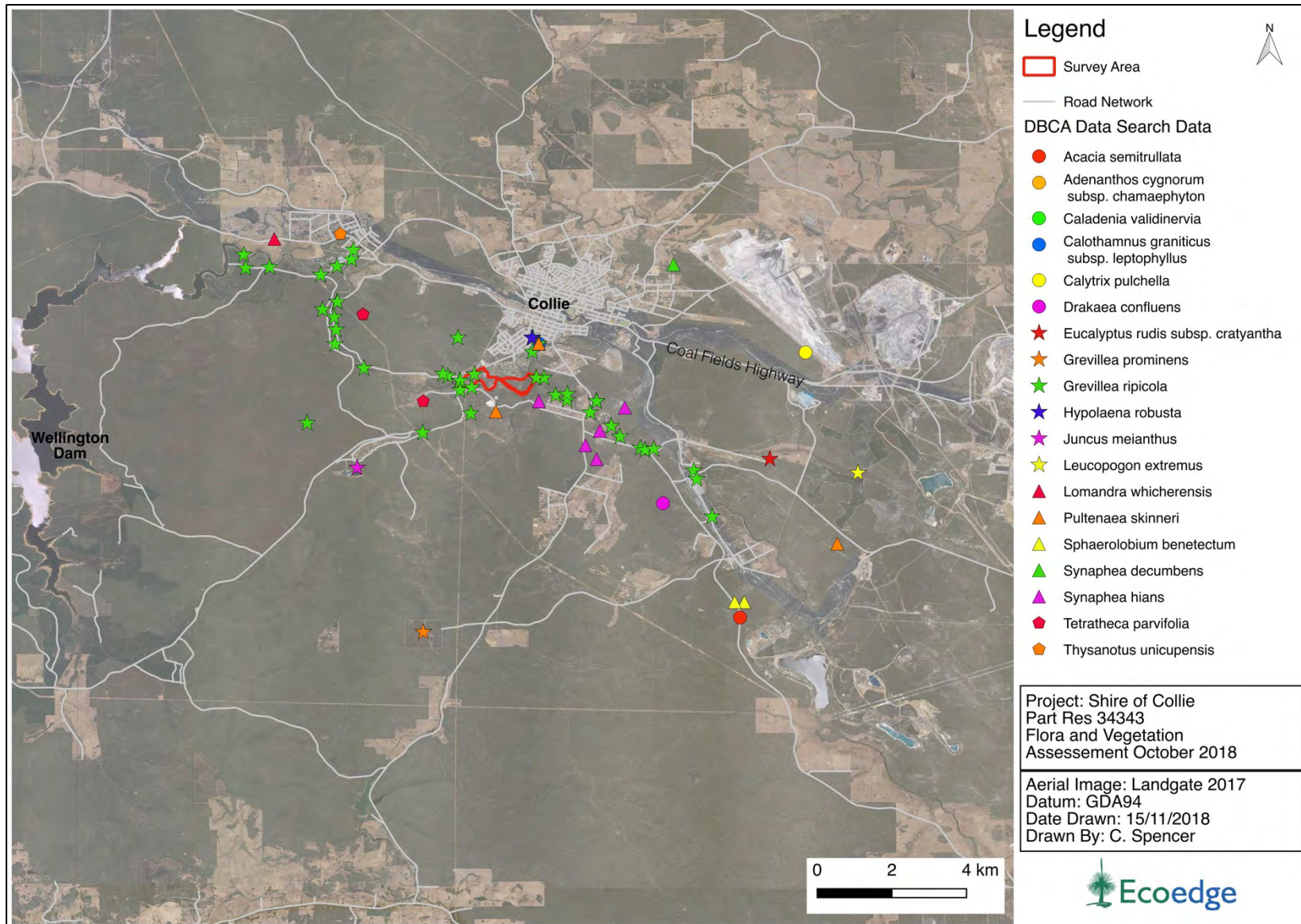


Figure 5. Known occurrences of Threatened and Priority flora within 10 km of the Survey Area (DBCAs, 2018a).

1.7 Regional Ecological Linkages

Information for this section is taken from Molloy *et al.* (2009) and their report on the South West Regional Ecological Linkages (SWREL) Project.

Ecological linkages are defined as:

“A series of (both contiguous and non-contiguous) patches which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape.”

Regional ecological linkages link protected patches of regional significance by retaining the best (condition) patches available as stepping stones for flora and fauna between regionally significant areas. This increases the long-term viability of all the constituent areas.

The SWREL report is the result of collaboration between the Western Australian Local Government Association’s *South West Biodiversity Project* and the then Department of Environment and Conservation’s *Swan Bioplan* to provide a tool for the identification of ecological linkages and guidance for the protection of linkages through planning policy documents.

Molloy *et al.* (2009) assessed and assigned “proximity value ratings” to all patches of remnant native vegetation as a way of indicating their distance from the nearest regional ecological linkage axis line. These values are defined in **Table 4**. It should be noted however, that the proximity value of a patch of remnant vegetation to an ecological linkage is not intended to replace the need to consider the other biodiversity conservation values of that patch of remnant vegetation.

A north-south linkage axis line crosses through both Survey Areas and a second, associated with the Collie River, crosses and runs along the southern boundary of the larger Minninup Pools Survey Area.

As a result of the location of these axis lines, vegetation in the Survey Area is assigned proximity ratings of “1a” which is the highest rating, and indicates that the vegetation directly forms part of one or more regional ecological linkages (**Figure 6**).

While there is no statutory basis for regional ecological linkages identified through the SWREL project, the importance of ecological linkages have been recognised as an environmental policy consideration in EPA and Planning policy over the last decade (EPA, 2009 and references therein). In its statement regarding the SWREL Project, the EPA stated that even though Ecological Linkages are just one measure of the conservation values of a patch of remnant vegetation it expected that:

In preparing plans and proposals for development, consideration will be given to both the site-specific biodiversity conservation values of patches of native

vegetation, as well as the landscape function and core linkage significance of a patch in supporting the maintenance of ecological linkage (EPA, 2009).

Table 4. Linkage proximity rating values assigned to patches of remnant vegetation within a landscape (from Molloy et al., 2009).

1a: with an edge touching or <100m from a linkage
1b: with an edge touching or <100m from a natural area selected in 1a
1c: with an edge touching or <100m from a natural area selected in 1b
2a: with an edge touching or <500m from a linkage
2b: with an edge touching or <500m from a natural area selected in 2a
2c: with an edge touching or <500m from a natural area selected in 2b
3a: with an edge touching or <1000m from a linkage
3b: with an edge touching or <1000m from a natural area selected in 3a
3c: with an edge touching or <1000m from a natural area selected in 3b

1.8 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are protected under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 and are selected for their environmental values at state or national levels (Government of Western Australia, 2005). They include;

- Defined wetlands and riparian vegetation within 50 m;
- Areas covered by Threatened Ecological Communities;
- Area of vegetation within 50 m of Threatened flora;
- Bush Forever sites; and
- Declared World Heritage property sites.

The most recent Department of Environment Regulation (DER) mapping dataset (DER, 2016) showed that there are no ESA within ten kilometres of the Survey Area, with the closest located approximately 16.5 km north east of the site, as shown in **Figure 7**.

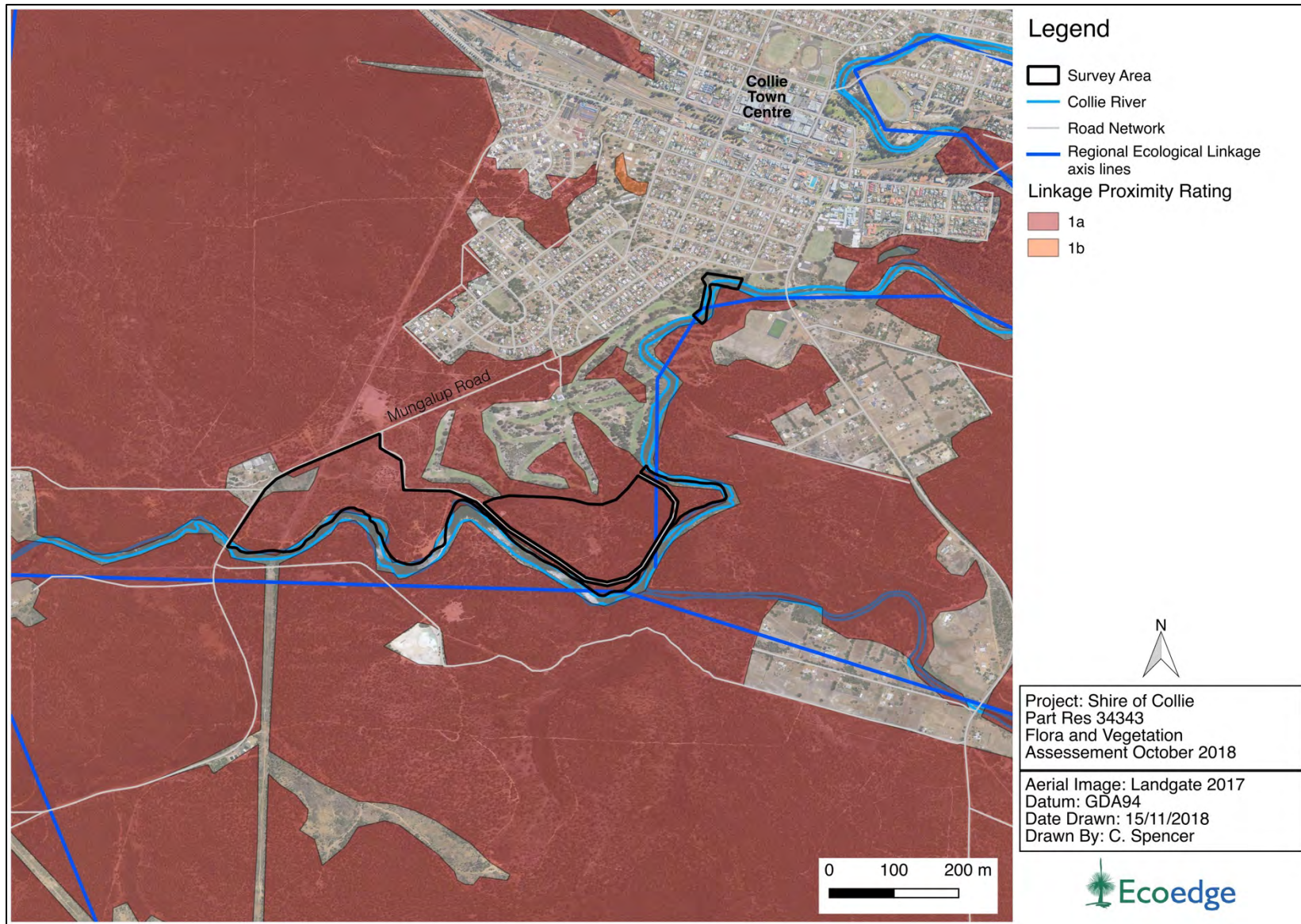


Figure 6. The Survey Area in relation to regional ecological linkages (Molloy *et al.*, 2009).

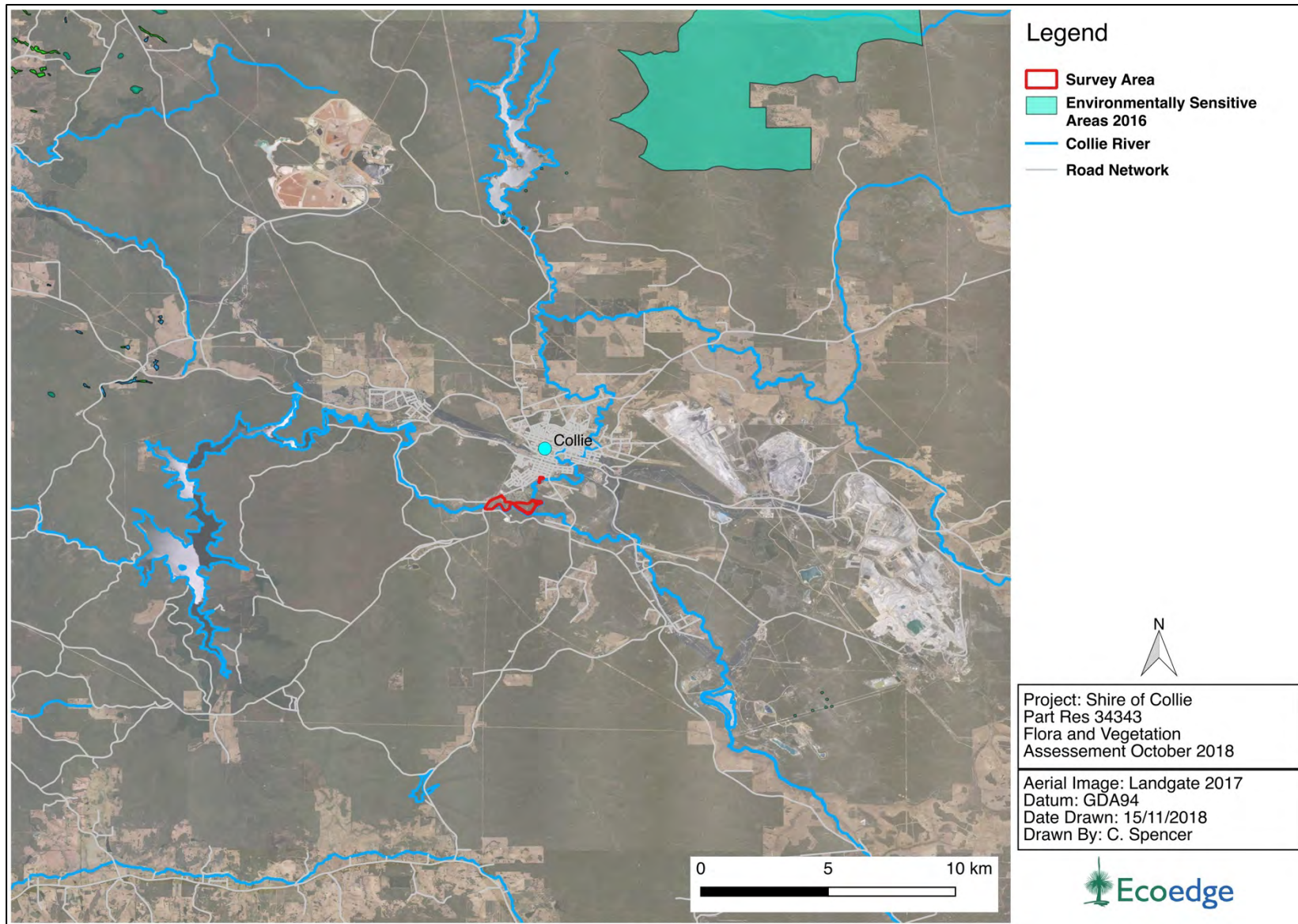


Figure 7. ESAs mapped within proximity to the Survey Area (DER, 2016).

2 Methods

2.1 Desktop Assessment

Prior to the field survey, a “desktop assessment” was carried out by downloading from the Threatened and Priority flora (TPFL) and W.A. Herbarium databases of records occurring within 10 km of the Survey Area (DBCA, 2018a). A NatureMap report was generated listing of all flora (including Threatened flora) occurring within 10 km of the Survey Area (DBCA, 2018b) (**Appendix 2**). A Protected Matters Search report was generated to provide information regarding Matters of National Environmental Significance (MNES) known or potentially occurring within 10 km of the Survey Area (DotEE, 2018) (**Appendix 2**). This data was used to establish the list of Threatened 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.

2.2 Field Survey

The field survey was undertaken by Russell Smith (flora permit SL012218) and Colin Spencer (SL012460) on 29 September and 9 October 2018. The survey was carried out along transects about 40 m apart walked through the Survey Area. A comprehensive list of vascular flora species was compiled, and notes were taken of dominant species, vegetation condition and soil at more than 150 unmarked relevé survey sites. Taxonomy and conservation status were checked against the WA Herbarium database of names (DBCA, 2018c; 2018d). Taxa not able to be identified in the field were photographed for later determination.

Vegetation condition was assessed against the method of the EPA (2016) (**Appendix 5**).

2.3 Survey Limitations

Potential limitations with regard to the assessment are addressed in **Table 5**.

Table 5. 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.
Proportion of flora identified	Negligible	The survey was conducted at the prime time for flowering in south west forests.
Climatic and seasonal effects	Minor	Rainfall during the winter season in the south-west of Western Australia was slightly below average to average. It did not appear to have significantly affected the flowering of annual or annually-renewed plants species.
Availability of contextual information	Minor	Regional scale vegetation surveys are available for the northern and southern Jarrah forest. However, there has been no sub-regional vegetation survey and there is no information available of the conservation status of particular vegetation types in the Collie Basin.
Completeness of the survey	Negligible	All of the survey area was easily accessed.
Skill and knowledge of the botanists	Negligible	The senior field botanist conducting the survey has had extensive experience in botanical surveys in south west Australia over a period of 25 years.

3 Results

3.1 Flora

A total of 198 vascular flora taxa were identified within the 70.45 ha³ Survey Area (**Appendix 6**), of which 14 were introduced or non-native species.

3.2 Declared Weeds and Pest Plants

No Declared Pest Plants (DAFWA, 2018) were found within the Survey Area. However, several significant environmental weeds were seen. The most widespread of these was the bulbous herb **Watsonia meriana* var. *bulbifera*. The small tree **Acacia dealbata* was observed in two locations and **Babiana angustifolia* (another bulbous weed) in one. The locations of these environmental weeds are shown in **Figure 8**.

³ Adjusted boundary to include all shoreline of the Collie River, but excluding the river itself.

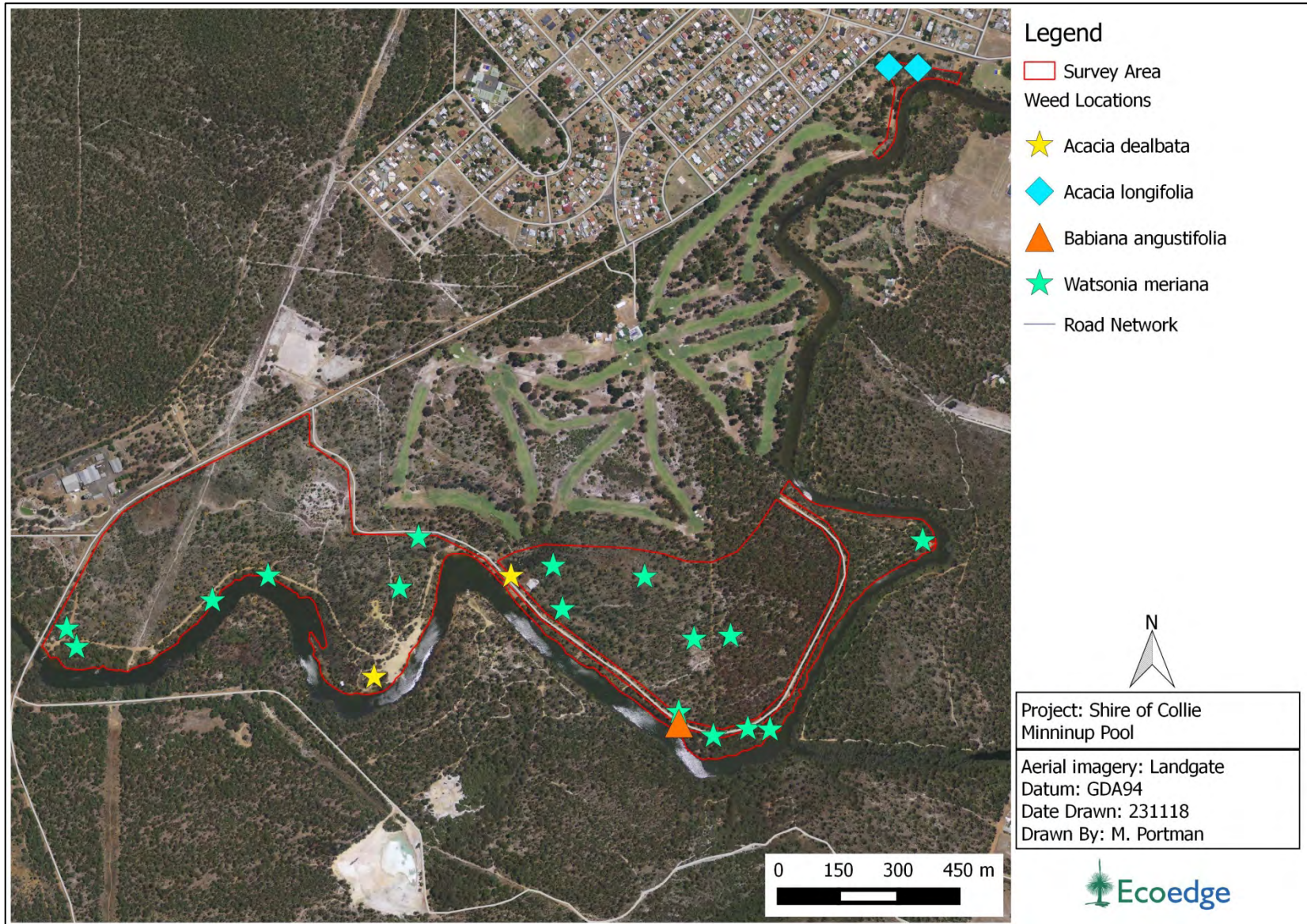


Figure 8. Location of conservation significant taxa within the Survey Area.

3.3 Priority Flora and Other Flora of Conservation Significance

Two species of Priority flora, *Synaphea hians* (P3) and *Grevillea ripicola* (P4) and one significant range extension species (*Stylidium scandens*) were found within the Survey Area (**Figure 9**). These are discussed below.

A completed Threatened and Priority Flora Reporting Form is included in **Appendix 7**.

3.3.1 *Synaphea hians* (P3)

Synaphea hians (**Figure 10**) was found growing at two locations within the Survey Area. It is distributed on the Swan Coastal Plain between Bunbury and Dunsborough, and on the Darling Plateau between Collie and Kojonup. There are also outlying populations on the Blackwood Plateau near Nannup and at Unicup east of Manjimup. There are 54 records for the species in DBCA databases. The populations on the coastal plain are at some risk through urban and infrastructure development.

3.3.2 *Grevillea ripicola* (P4)

Grevillea ripicola (**Figure 11**) was found along much of the riverbank within the Survey Area, usually on the narrow band of alluvial soils along the Collie River. It appears to be a disturbance opportunist and was found growing in other areas where machinery may have carried seed. The records in **Table 6**, below, only relate to part of the total occurrence in the Survey Area and it is estimated that several hundred plants occur there.

G. ripicola is mainly confined to a 15 km stretch of the valley of the Collie River, growing mostly with 50 m of the riverbank. There are a few outlying populations south-east of Donnybrook and near Greenbushes. It is represented by 56 records in DBCA databases, mostly representing populations within 10 km of Collie.

3.3.3 *Stylidium scandens*

Stylidium scandens (**Figure 12**) is a common species within its normal range along the south and south-west coast between the Fitzgerald River National Park and Capel. Apart from one outlying population near Bannister the disjunct population found near the Collie River within the Survey Area is the furthest outlier from the main range of the species. Like the other outlying population at Bannister (Wege, 2010), the one within the Survey Area may display non-typical morphological characteristics and be important for study of variation within the species. Specimens were taken for lodgement at the W.A. Herbarium.

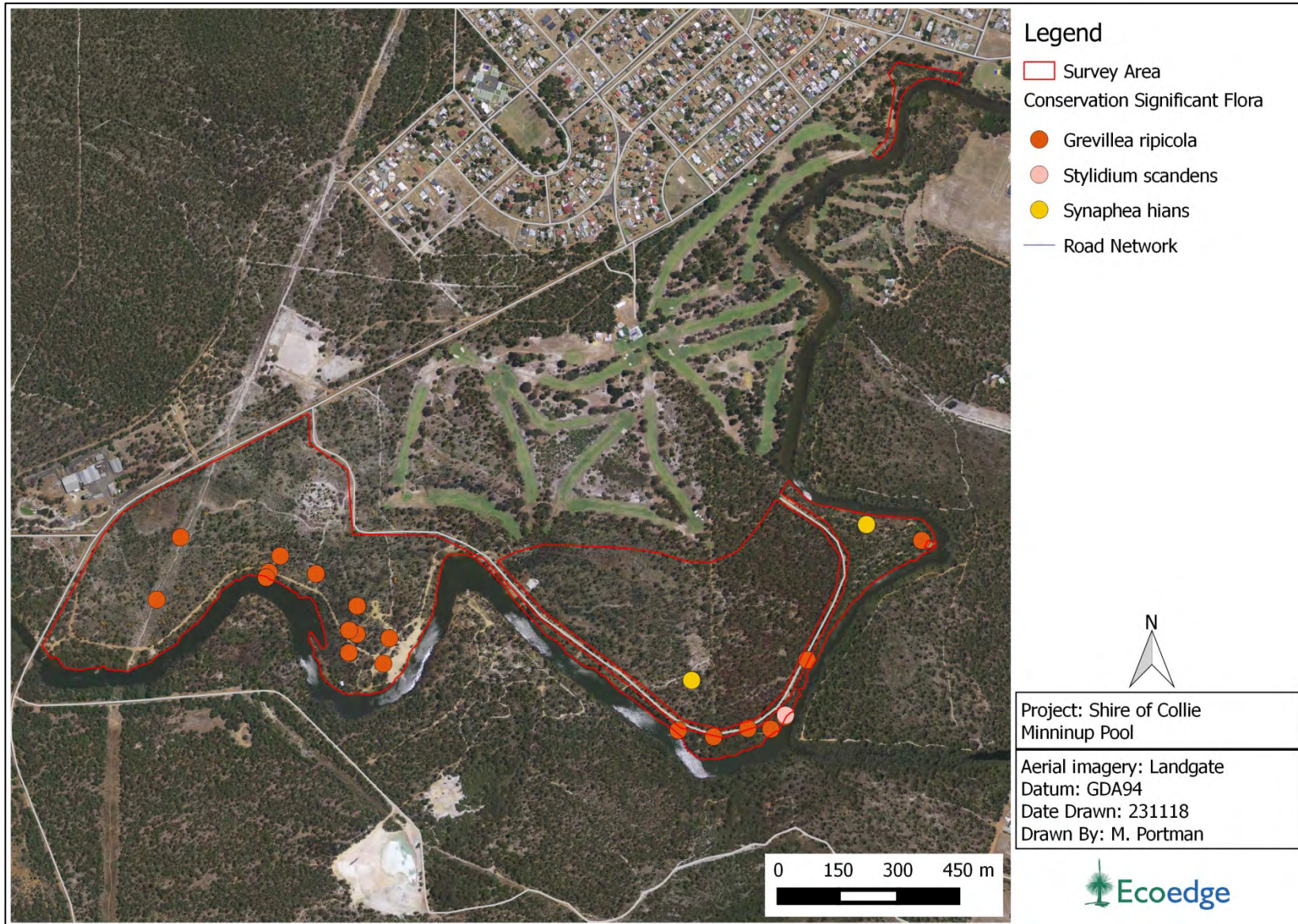


Figure 9. Location of conservation significant taxa within the Survey Area.

Table 6. Locations of Threatened and Priority flora and Conservation Significant taxa within the Survey Area.

Occurrence	Easting	Northing	Taxon	Cons. Code	No. Plants
1	420421.261	6306287.013	<i>Synaphea hians</i>	P3	3
2	420860.99	6306678.501	<i>Synaphea hians</i>	P3	3
1	420658.067	6306197.907	<i>Stylidium scandens</i>		5
1	419663.519	6306392.937	<i>Grevillea ripicola</i>	P4	5-10
2	420657.306	6306196.972	<i>Grevillea ripicola</i>	P4	5-10
3	419564.329	6306357.25	<i>Grevillea ripicola</i>	P4	5-10
4	419582.698	6306403.958	<i>Grevillea ripicola</i>	P4	5-10
5	419584.272	6306474.808	<i>Grevillea ripicola</i>	P4	5-10
6	419561.705	6306413.93	<i>Grevillea ripicola</i>	P4	5-10
7	419480.012	6306555.803	<i>Grevillea ripicola</i>	P4	5-10
8	420389.268	6306161.068	<i>Grevillea ripicola</i>	P4	5-10
9	419361.93	6306560.176	<i>Grevillea ripicola</i>	P4	5-10
10	419355.34	6306544.629	<i>Grevillea ripicola</i>	P4	5-10
11	419142.975	6306645.308	<i>Grevillea ripicola</i>	P4	5-10
12	419080.29	6306490.783	<i>Grevillea ripicola</i>	P4	5-10
13	420621.658	6306165.938	<i>Grevillea ripicola</i>	P4	5-10
14	420562.375	6306166.909	<i>Grevillea ripicola</i>	P4	5-10
15	420713.012	6306340.87	<i>Grevillea ripicola</i>	P4	5-10
16	421001.651	6306639.228	<i>Grevillea ripicola</i>	P4	5-10
17	420477.889	6306146.092	<i>Grevillea ripicola</i>	P4	5-10
18	420386.684	6306162.456	<i>Grevillea ripicola</i>	P4	5-10
19	420622.287	6306165.027	<i>Grevillea ripicola</i>	P4	5-10



Figure 10. *Synaphea hians*.



Figure 11. *Grevillea ripicola*.



Figure 12. *Styloidium scandens*.

3.4 Vegetation Units

Seven vegetation units were recognised within the Survey Area and are described in **Table 7**, below. In addition, there were two other mapping units comprising heavily disturbed areas, where there is little of original vegetation left, and areas that have been previously cleared (e.g. for gravel extraction) and have been replanted.

Photographs of each of the vegetation units are provided in **Appendix 8**. The extent (in hectares) of each vegetation unit within the Survey Area is provided in **Table 8**. The distribution of vegetation units is mapped in **Figure 13**.

Vegetation unit A, which is restricted to the western part of the Survey Area, forms a narrow strip (50-80 m wide) along the shoreline of the Collie River. It occurs on freer draining soil than unit B which abuts it to the north, and lacks wetland species such as *Banksia littoralis* and *Cyathochaeta avenacea*.

Vegetation units B and C are the most widely distributed in the Survey Area, with unit B being confined to the western part and unit C to the eastern part. The two units are similar in structure, being open forest to woodland dominated by Jarrah (*Eucalyptus marginata*), but unit B has more taxa characteristic of wetland vegetation, such as *Banksia littoralis* and *Melaleuca preissiana*. This is attributable to its clayier soils, with impeded drainage.

Vegetation unit D was Jarrah-dominated open forest confined to the lateritic gravels that occur in the easternmost portion of the Survey Area. It has a characteristic group of understorey taxa not found elsewhere in the Survey Area, such as *Banksia dallanneyi*, *Bossiaea ornata* and *Hakea lissocarpha*.

The structure of vegetation unit E varies from sedgeland, to shrubland to low open woodland (with emergent *Melaleuca preissiana*, *Eucalyptus patens* and *Banksia littoralis* low trees) and is situated on clayey soils with impeded drainage. It intergrades with vegetation unit B in the western part of the Survey Area.

Vegetation unit F is also a wetland, and appears to be formed on a natural spring. It is mostly in excellent condition. Vegetation units G and H (the latter of which is found on the small area of reserve 34343 at the corner of Crampton Street and Mungalup Road) are associated with alluvial loams near the bank of the Collie River.

Table 7. Descriptions of vegetation units mapped during the field survey.

Unit	Description
A	Open forest of <i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> (and occasionally <i>Allocasuarina fraseriana</i> , or <i>E. patens</i>), with the small trees <i>Persoonia longifolia</i> and <i>Xylomelum occidentale</i> over shrubland dominated by <i>Acacia extensa</i> , <i>A. pulchella</i> , (<i>Grevillea ripicola</i>), <i>Hypocalymma angustifolium</i> , <i>Kennedia coccinea</i> , <i>Macrozamia riedlei</i> , and <i>Xanthorrhoea brunonis</i> or <i>X. preissii</i> on sandy loam.
B	Open forest to woodland of <i>Eucalyptus marginata</i> , with in places the small trees <i>Banksia littoralis</i> , <i>Melaleuca preissiana</i> and <i>Nuytsia floribunda</i>) over shrubland dominated by <i>Acacia extensa</i> , <i>A. pulchella</i> , <i>Dasypogon bromeliifolius</i> and <i>Xanthorrhoea brunonis</i> over <i>Cyathochaeta avenacea</i> and <i>Lepidosperma squamatum</i> sedges on greyish sandy clay loams.
C	Open forest to woodland of <i>Eucalyptus marginata</i> , (<i>Allocasuarina fraseriana</i>) over <i>Banksia grandis</i> small trees over shrubland of <i>Acacia extensa</i> , <i>Adenanthos obovatus</i> , <i>Bossiaea eriocarpa</i> , <i>Gompholobium tomentosum</i> , <i>Macrozamia riedlei</i> and <i>Xanthorrhoea preissii</i> with scattered <i>Lepidosperma squamatum</i> sedges on sandy loam.
D	Open forest of <i>Eucalyptus marginata</i> (and occasionally <i>E. patens</i>) over <i>Xylomelum occidentale</i> low trees over shrubland of <i>Acacia extensa</i> , <i>Banksia dallanneyi</i> , <i>Bossiaea ornata</i> , (<i>Grevillea ripicola</i>), <i>Hakea lissocarpha</i> , <i>Hibbertia hypericoides</i> , <i>Hypocalymma angustifolium</i> , <i>Leucopogon propinquus</i> , <i>Macrozamia riedlei</i> and <i>Xanthorrhoea preissii</i> on lateritic gravel.
E	Open to very open woodland to closed or open shrubland of <i>Banksia littoralis</i> or <i>Melaleuca preissiana</i> (occasionally small <i>Eucalyptus patens</i>) over <i>Aotus gracillima</i> , <i>Astartea scoparia</i> , <i>Gastrolobium capitatum</i> , <i>Hakea ceratophylla</i> , <i>Hibbertia stellaris</i> , <i>Melaleuca lateritia</i> over sedgeland which may include <i>Cyathochaeta avenacea</i> , <i>Leptocarpus roycei</i> , and <i>Mesomelaena tetragona</i> on grey clay or sandy clay.
F	Tall closed shrubland/sedgeland of <i>Acacia divergens</i> , <i>Aotus gracillima</i> , <i>Astartea scoparia</i> , <i>Callistemon glaucus</i> , <i>Taxandria linearifolia</i> and <i>Cyathochaeta avenacea</i> , <i>Gahnia decomposita</i> on clay loam.

Unit	Description
G	Open forest of <i>Corymbia calophylla</i> , <i>Eucalyptus patens</i> and <i>E. rudis</i> with scattered <i>Banksia littoralis</i> and <i>Melaleuca preissiana</i> over a variable tall shrubland/shrubland that may include <i>Acacia extensa</i> , <i>A. pulchella</i> , <i>Astartea scoparia</i> , <i>Grevillea ripicola</i> , <i>Hakea lissocarpha</i> , <i>Hypocalymma angustifolium</i> , <i>Melaleuca viminea</i> , <i>Taxandria linearifolia</i> and <i>Xanthorrhoea brunonis</i> on loam.
H	Open forest of <i>Eucalyptus rudis</i> over tall shrubland of * <i>Acacia longifolia</i> , <i>A. extensa</i> , <i>A. pulchella</i> , <i>Taxandria linearifolia</i> over <i>Lepidosperma effusum</i> and * <i>Watsonia meriana</i> on loam.

Table 8. Area of each vegetation unit within the Survey Area.

Vegetation Unit	Area (ha)
A	3.61
B	20.95
C	19.16
D	9.9
E	7.39
F	1.1
G	3.33
H	0.4
Heavily disturbed	2.54
Planted	2.07
Total	70.45

3.5 Vegetation Condition

Most of the Survey Area (90%) was rated as being in 'Very Good' or 'Excellent' condition (Table 9). The 'Degraded' areas have been heavily disturbed in the past and are vegetated with a mixture of native and planted species. The distribution of vegetation condition across the Survey Area is shown in Figure 14.

Table 9. Summary of vegetation condition classes within the Survey Area.

Condition	Area (Ha)	%
Excellent	6.88	9.8
Very Good	56.56	80.3
Good	2.00	2.8
Degraded	2.66	3.8
Completely Degraded	2.35	3.3
Total	70.45	100.0

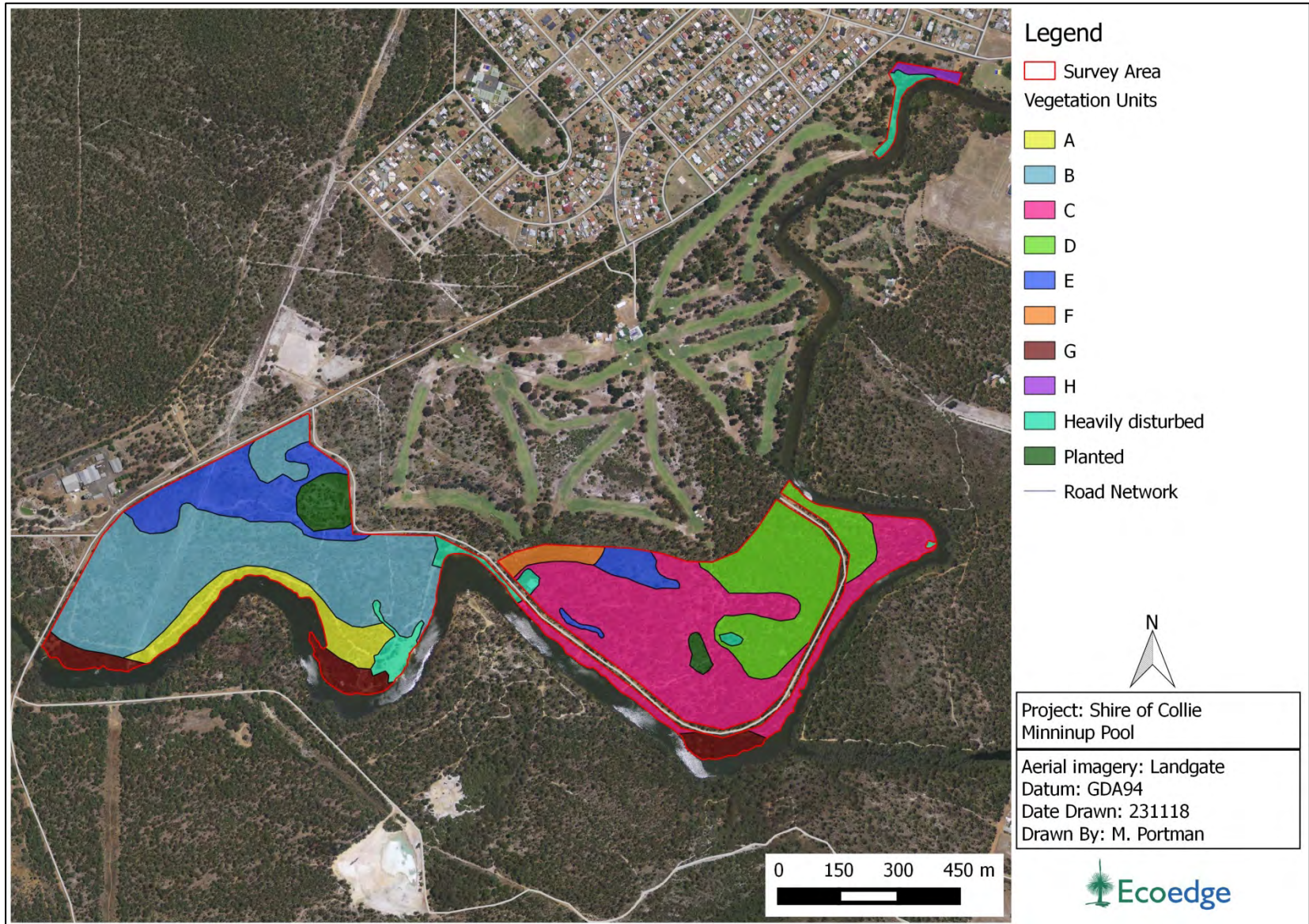


Figure 13. Vegetation units mapped within the Survey Area.

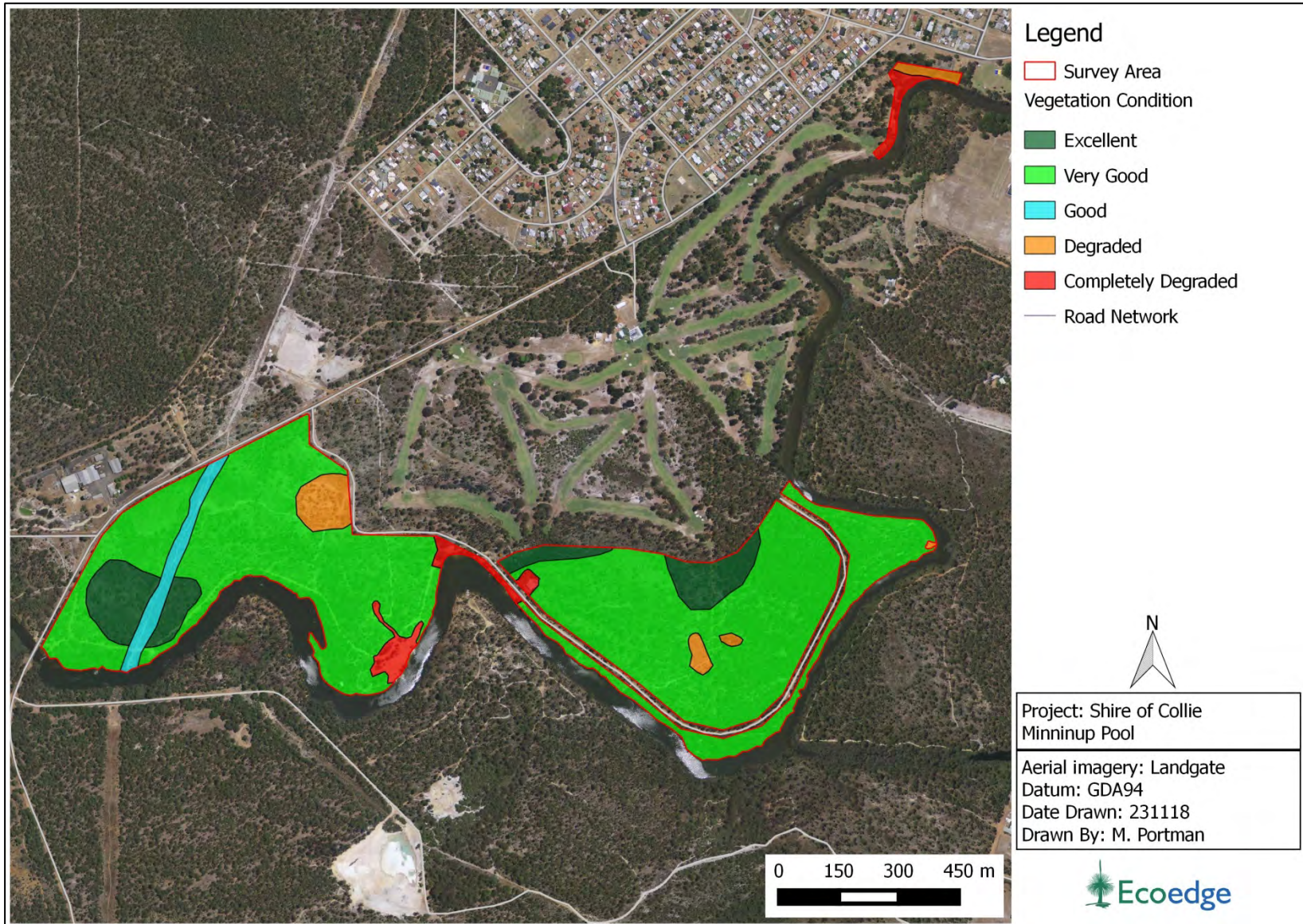


Figure 14. Condition of vegetation within the Survey Area.

4 Discussion

4.1 Conservation significance of the flora and vegetation

4.1.1 Flora

The Survey Area vegetation has a moderately high native plant diversity and contains two listed Priority species (*Synaphea hians* and *Grevillea ripicola*), as well as a highly disjunct population of *Stylidium scandens*. The population of *S. scandens* within the Survey Area, which is 50 km north of its normal range, may be important for studying variation in the species.

4.1.2 Vegetation

Seven vegetation units dominated by native vegetation were recognised within the Survey Area. They range in structure from open forest through low open woodland, to tall shrubland, to low sedgeland. There are no recognised Threatened or Priority Ecological Communities in the Collie Basin and none of the vegetation units within the Survey Area resembles any TEC or PEC. It is not possible to determine whether any of the Survey Area vegetation units is restricted or rare because there has been no comprehensive vegetation survey done in the Collie Basin.

The vegetation in the Survey Area is mapped as the Muja (MJ) complex, of which 59.5% of the original areal extent remains. This is well above the Commonwealth government's target of 30%.

Most (90%) vegetation within the Survey Area is in 'Very Good' or 'Excellent' condition, with only relatively small areas associated with car parking or previous gravel extraction being classified as 'Degraded' or 'Completely Degraded'.

Two regional ecological linkages cross the Survey Area, one forming a north-south link, and the other located in the south associated with the Collie River.

No Environmentally Sensitive Areas have been mapped within the Survey Area according to the DER database (DER, 2016).

4.2 Potential Impacts from the Proposed Nature Hub

Potential direct and indirect impacts of a proposed nature hub to be established within the Survey Area, which would potentially include a nature-based camping ground and visitor day use area, will be discussed below along with appropriate measures to avoid or mitigate these impacts.

There are two main types of negative impact to the native vegetation of the Survey Area, direct and indirect, that might arise from the proposed development.

Firstly, clearing of vegetation is an obvious potential direct impact on the Survey Area. It is desirable that these impacts be minimised by avoiding Threatened and Priority flora (including the disjunct population of *Stylidium scandens*) and by siting the campground or day-use area in a place that has already had significant disturbance.

Other direct negative impacts may be associated with new access tracks or roads built to facilitate use of the campground or day-use area. Again, it is desirable that these impacts be minimised by as much as practicable using already disturbed areas.

Indirect impacts on the vegetation of the Survey Area that may be associated with the proposed developments are the introduction of new weeds and plant diseases. It should be noted here that, particularly in areas already frequently used by visitors, there are substantial infestations of weeds, particularly **Watsonia meriana*. Disease caused by *Phytophthora* ('dieback') is probably present in the Survey Area, though its effects on plant health appear to be minor.

Another potential indirect negative impact of increased visitor use associated with the development of a nature hub is increased trampling of the vegetation by walkers. There are already some walking tracks through the Survey Area, and with appropriate construction methods and information boards and signs it is likely that trampling can be minimised.

Erosion of topsoil is another potential negative effect of increased visitation. There are already areas of bare, erodible soils adjacent to the river at near the Minninup Pool swimming beach. Construction of improved parking facilities would reduce the potential of further erosion in this area.

5 Recommendations

It is considered that development of a nature hub that includes accommodation and day use activities is compatible with protection of the nature conservation values identified by this assessment provided that the following recommendations are followed where practicable:

- That clearing of native vegetation required for the project is kept to a minimum.
- That where possible, any development is located in areas mapped as Degraded or Completely Degraded, so as to minimise impacts to the vegetation.
- That any development is specifically designed to minimise impacts to vegetation in Excellent and Very Good condition in particular, and to minimise impacts to the native vegetation in general.
- That any development is sited so as to minimise impacts on the conservation significant species *Synaphea hians*, *Grevillea ripicola* and in particular the population of *Stylidium scandens*.

- That any development takes into account access routes to desirable facilities (town, water, swimming holes, etc) for vehicles, pedestrians and bicycles, and is planned to minimise the creation of 'sheep tracks' and shortcuts.
- That the development design incorporates clearly defined and high quality access routes and paths to minimise trampling of vegetation.
- That regular maintenance is carried out within the areas surrounding the day-use and camping areas to keep weeds and other pests under control, and stop their spread into the bushland.
- Existing infestations of known environmental weeds should be eradicated or managed to substantially reduce their areas of occupancy. This will assist in minimising the spread of these species into currently uninfested bushland areas.
- A *Phytophthora* dieback assessment is carried out, and *Phytophthora* Management Plan is prepared for the area prior to any development.

6 Conclusions

A spring flora and vegetation survey of approximately 70 ha of part Reserve 34343 in the townsite of Collie recorded 184 native plant taxa and 14 introduced taxa.

Three conservation significant taxa were located, of which two are Priority-listed, and one is a significant range-extension.

No Declared Pest Plants were found within the Survey Area, however several significant environmental weeds are present.

Seven vegetation units dominated by native species were identified, none of which resemble any Threatened or Priority Ecological Communities.

Most (90%) of the Survey Area vegetation was rated as being in 'Very Good' or 'Excellent' condition.

Provided the design of the proposed development takes the values of the flora and vegetation into full consideration, and specifically aims to minimise impacts resulting from construction and the resulting increased use, and that sufficient ongoing management of any threats is implemented, it is possible that the proposed nature hub will not have significant impacts on the flora and vegetation in the Survey Area. There is substantial combined aesthetic and conservation value in this large tract of Excellent to Very Good vegetation remaining in such close proximity to the town.

7 References

- Beeston, G.R., Hopkins, A.J.M. and Shepherd, D.P. (eds) (2001). *Land-use and Vegetation, Western Australia*. Agriculture Western Australia, South Perth and National Land and Water Resources Audit, Canberra, from <http://www.agriculture.gov.au/abares/aclump/Documents/WA%20Luse%201997%20Report.pdf>
- Department of Agriculture and Food Western Australia (2018). Declared plants. <https://www.agric.wa.gov.au/pests-weeds-diseases/weeds/pest-plants>
- Commonwealth of Australia (2016). Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions). Department of the Environment and Energy. <https://data.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7>
- Commonwealth of Australia (2001) *National Objectives and Targets for Biodiversity Conservation 2001-2005*. Environment Australia, Department of Environment and Heritage, Canberra, Australian Capital Territory.
- DAFWA (2005), *Pre-European Vegetation – Western Australia (NVIS Compliant version)*, Department of Agriculture and Food Western Australia, Perth.
- Department of Biodiversity, Conservation and Attractions (DBCA) (2017). *Priority ecological communities list (June 2017)*. Department of Biodiversity Conservation and Attractions. http://www.dbca.wa.gov.au/images/plants-animals/threatened-species/threatened_ecological_communities_endorsed_by_the_minister_for_the_environment_june_2017.pdf
- Department of Biodiversity, Conservation and Attractions (2018a). *Extract from the Department's Threatened Flora database and the Western Australian Herbarium*. DBCA Species and Communities Branch dated 12 October 2018.
- Department of Biodiversity, Conservation and Attractions (2018b). *Naturemap, Western Australian Herbarium*. <http://naturemap.dpaw.wa.gov.au/default.aspx> accessed 12 October 2018.
- Department of Biodiversity, Conservation and Attractions (2018c). *The WA Herbarium Census of WA Plants Database (WACENSUS: 'Max')*.
- Department of Biodiversity, Conservation and Attractions (2018d). *Florabase, Western Australian Herbarium*. <http://florabase.dbca.wa.gov.au/>

Department of Environment and Conservation (DEC) (2013). *Definitions, categories and criteria for threatened and priority ecological communities*. Department of Environment and Conservation, Perth, Western Australia.

Department of the Environment and Energy (DotEE) (2018a). *Threatened ecological communities under the EPBC Act*. <http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl>

Department of the Environment and Energy (DotEE) (2018b). *Protected Matters Search Tool query*. Generated 26 September 2018.

Department of the Environment and Energy (DotEE) (2018c). *Categories of Threatened species under the EPBC Act*. <http://www.environment.gov.au/biodiversity/threatened/species.html>

Department of Environment Regulation (DER). (2016). *Environmentally Sensitive Areas GIS Mapping Dataset*. 2016 Version. Perth, Western Australia <https://www2.landgate.wa.gov.au/web/guest/57> (DER016).

Department of Environment, Water, Heritage and the Arts (DEWHA) (1999) *Environment Protection and Biodiversity Conservation Act 1999*. Department of Environment, Water, Heritage and the Arts. Canberra, Australian Capital Territory.

Department of Parks and Wildlife (2016). *Threatened ecological communities endorsed by the Minister for the Environment (October 2016)*. [https://www.dpaw.wa.gov.au/images/plants-animals/threatened-species/threatened ecological communities endorsed by the minister october 2016.pdf](https://www.dpaw.wa.gov.au/images/plants-animals/threatened-species/threatened%20ecological%20communities%20endorsed%20by%20the%20minister%20october%202016.pdf)

Department of Parks and Wildlife (DPaW) (2017). *Conservation Codes for Western Australian Flora and fauna*. [https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/conservation code definitions.pdf](https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/conservation_code_definitions.pdf)

Environment Australia (2001). *National objectives and targets for biodiversity conservation 2001–2005*. <http://www.environment.gov.au/resource/national-objectives-and-targets-biodiversity-conservation-2001%E2%80%932005>

Environmental Protection Authority of WA (EPA) (2009). *South West Regional Ecological Linkages*. *Environmental protection Bulletin No. 8*. EPA, Perth, Western Australia.

Environmental Protection Authority of WA (2016). *Technical Guidance Flora and Vegetation Surveys for Environmental Impact*. EPA, Perth, Western Australia. http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA

[/Technical/Guidance/FloraandVegetationsurvey Dec13.pdf](#) Accessed 29 September 2017

Government of Western Australia (1950). *Wildlife Conservation Act 1950*. Perth, Western Australia.

Government of Western Australia (1984). *Conservation and Land Management Act 1984*. Perth, Western Australia.

Government of Western Australia, 2000 *Bush Forever. Volume 2. Directory of Bush Forever Sites*. Government of Western Australia.

Government of Western Australia (2005). *Environmental Protection (Environmentally Sensitive Areas) Notice 2005 (Environmental Protection Act 1986)*. Government Gazette, No.55.

Government of Western Australia (2013). *Wildlife Conservation Act 1950. Government Gazette*, 29 November 2016. https://www.slp.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1080_home_page.html

Government of Western Australia (2017). *Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report)*. Current as of Feb 2018. Department of Biodiversity Conservation and Attractions. Perth, Western Australia. <https://catalogue.data.wa.gov.au/dataset/3d8c36a4-1863-4eee-9b7b-bcc33973987f/resource/b7bd60c2-bff6-4637-b213-ae4706412c7/download/vegetationstatisticsstatewide2017fullreport.zip>

Hedde, E.M., Lonrigan, O.W. and Havel, J.J. (1980) Vegetation of the Darling System. In: Atlas of Natural Resources, Darling System, Western Australia. Department of Conservation and Environment, Western Australia.

Molloy, S., Wood, J., Hall, S., Wallrodt, S. and Whisson, G. (2009) *South West Regional Ecological Linkages Technical Report*. Western Australian Local Government Association (WALGA) and Department of Environment and Conservation (DEC), Perth, Western Australia.

Government of Western Australia (2017). *2016 South West Vegetation Complex Statistics*. Current as of December 2016. WA Department of Parks and Wildlife, Perth

Lyons MN, Keighery GJ, Gibson N, Wardell-Johnson G. (2000). The vascular flora of the Warren Bioregion, south-west Western Australia. Composition, reservation status and endemism. *CALMScience* 3: 181-250.

- Mattiske, EM and Havel JJ. 1998. *Vegetation Mapping in the South West of Western Australia and Region Forest Agreement vegetation complexes. Map sheets for Pemberton, Collie, Pinjarra, Busselton-Margaret River, Mt Barker, and Perth, Western Australia. Scale 1:250,000.* Department of Conservation and Land Management, Perth, Western Australia.
- Tille, P.J. (1996). *Wellington – Blackwood Land Resources Survey, Land Resources Series No. 14.* Department of Agriculture. Perth, Western Australia
- Webb, A., Kinloch, J., Keighery, G. and Pitt, G. (2016). *The extension of vegetation complex mapping to landform boundaries within the Swan Coastal Plain landform and forested region of south west Western Australia.* Department of Parks and Wildlife. Perth, Western Australia.
- Wege, J.A. (2010). *Stylidium miscellany 1: Typifications and new taxa from south-west Western Australia. Nuytsia 20(1):79-108.*

Appendix 1. Categories of Threatened Ecological Communities under the EPBC Act (DotEE, 2017a).

Category	Definition
Critically endangered	If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
Endangered	If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
Vulnerable	If, at that time, an ecological, community is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future (indicative timeframe being the next 50 years).

Appendix 2. Protected Matters Search Tool and NatureMap Reports for the Survey Area.



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.

Report created: 26/09/18 22:46:26

[Summary](#)

[Details](#)

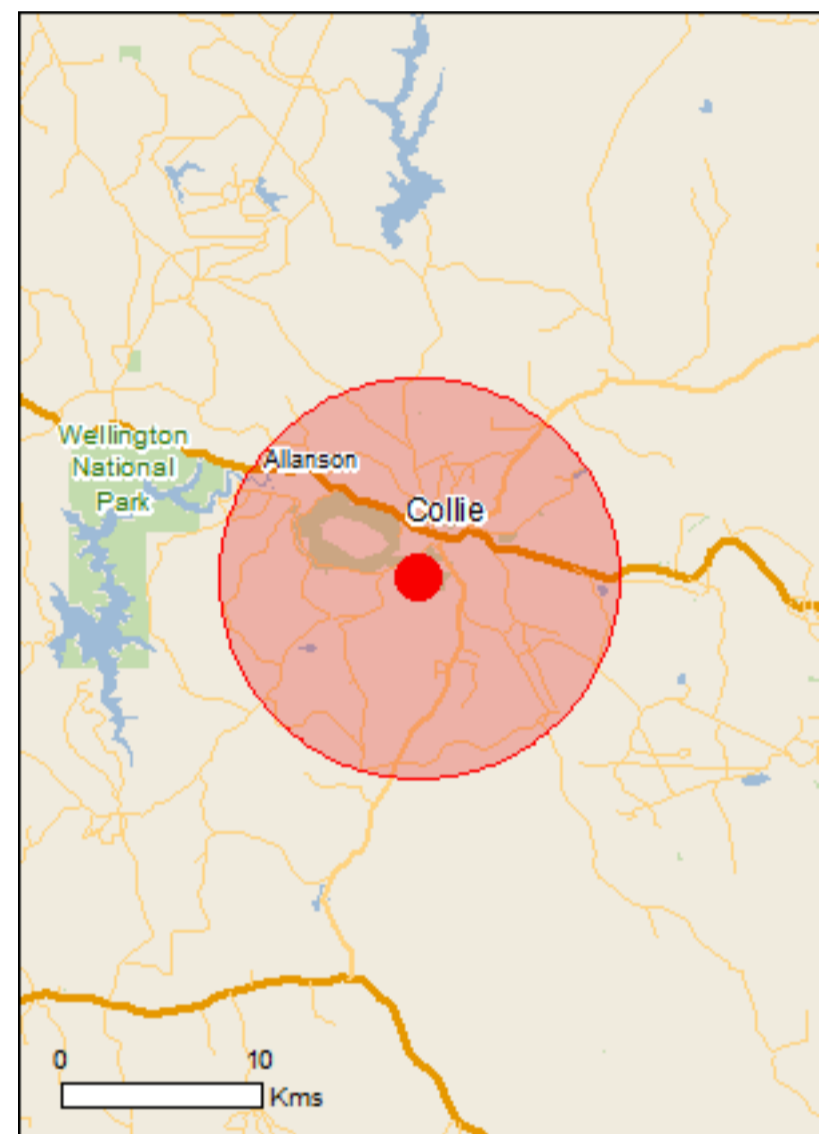
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

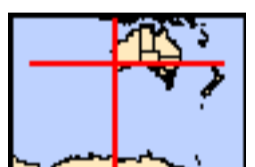
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	15
Listed Migratory Species:	8

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:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	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:	2
Regional Forest Agreements:	1
Invasive Species:	18
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may 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]	Endangered	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
Leipoa ocellata Malleefowl [934]	Vulnerable	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
Fish		
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroi Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat may occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area
Other		

Name	Status	Type of Presence
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area

Plants

Caladenia leucochila Collie Spider Orchid [88196]	Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	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 may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may 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

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

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		habitat may occur within area 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 may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may 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 may 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

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Westralia	WA
Wyvern Road	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 Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		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
Mammals		
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 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
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within

Name	Status	Type of Presence
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		area Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		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

-33.37788 116.14505

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.

Minninup Pool NatureMap Cons sig spp_10 km_260918

Created By Guest user on 26/09/2018

Kingdom Plantae
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 08' 43" E, 33° 22' 42" S
Buffer 10km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	3537 <i>Acacia semitrullata</i>		P4	
2.	11336 <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>		P3	
3.	44898 <i>Caladenia validinervia</i>		P1	
4.	11333 <i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>		P4	
5.	5474 <i>Calytrix pulchella</i>		P3	
6.	13634 <i>Drakaea confluens</i>		T	
7.	13512 <i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>		P4	
8.	14417 <i>Grevillea prominens</i>		P3	
9.	2082 <i>Grevillea ripicola</i> (<i>Collie Grevillea</i>)		P4	
10.	17622 <i>Hypolaena robusta</i>		P4	
11.	14631 <i>Juncus meianthus</i>		P3	
12.	41160 <i>Leucopogon extremus</i>		P2	
13.	33298 <i>Lomandra whicherensis</i>		P3	
14.	4183 <i>Pultenaea skinneri</i> (<i>Skinner's Pea</i>)		P4	
15.	19337 <i>Sphaerolobium benetectum</i>		P2	
16.	16937 <i>Synaphea decumbens</i>		P3	
17.	16769 <i>Synaphea hians</i>		P3	
18.	4538 <i>Tetradlea parvifolia</i>		P3	
19.	35519 <i>Thysanotus unicus</i>		P3	

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 wholly 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.

Appendix 3. Definitions of Threatened and Priority List flora under the WC Act (DBCA, 2017b).

Conservation code	Category
T	Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the <i>Wildlife Conservation Act 1950</i> . The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria (CR, EN, VU, EX). A species that is listed as Threatened and assessed as 'Critically Endangered' would therefore have its status written as T (CR).
P1	Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2	Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P3	Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
P4	Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Appendix 4. Categories of Threatened Species under the EPBC Act (DotEE, 2017c).

Category	Definition
Extinct (Ex)	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (ExW)	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) 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.
Critically Endangered (CE)	A native species is eligible to be included in the critically endangered category 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.
Endangered (EN)	A native species is eligible to be included in the endangered category at a particular time if, at that time (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable (VU)	A native species is eligible to be included in the vulnerable category at a particular time if, at that time (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation Dependent (CD)	A native species is eligible to be included in the conservation dependent category 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.

Appendix 5. Vegetation condition scale (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.

Appendix 6. List of vascular flora found within the Minninup Pools Survey Area.

FAMILY NAME	SPECIES NAME	NATURALISED	CONSV_CODE
Anarthriaceae	<i>Anarthria gracilis</i>		
Apiaceae	<i>Hydrocotyle alata</i>		
Apiaceae	<i>Xanthosia candida</i>		
Apiaceae	<i>Xanthosia huegelii</i>		
Asparagaceae	<i>Chamaescilla corymbosa</i>		
Asparagaceae	<i>Laxmannia squarrosa</i>		
Asparagaceae	<i>Lomandra ?brittanii</i>		
Asparagaceae	<i>Lomandra hermaphrodita</i>		
Asparagaceae	<i>Lomandra integra</i>		
Asparagaceae	<i>Lomandra preissii</i>		
Asparagaceae	<i>Lomandra purpurea</i>		
Asparagaceae	<i>Lomandra sericea</i>		
Asparagaceae	<i>Sowerbaea laxiflora</i>		
Asparagaceae	<i>Thysanotus patersonii</i>		
Asteraceae	<i>Cotula turbinata</i>	*	
Asteraceae	<i>Hypochaeris glabra</i>	*	
Asteraceae	<i>Lagenophora huegelii</i>		
Asteraceae	<i>Podolepis gracilis</i>		
Asteraceae	<i>Senecio diaschides</i>		
Asteraceae	<i>Siloxerus humifusus</i>		
Asteraceae	<i>Sonchus asper</i>		
Asteraceae	<i>Trichocline spathulata</i>		
Asteraceae	<i>Ursinia anthemoides</i>	*	
Casuarinaceae	<i>Allocasuarina humilis</i>		
Celastraceae	<i>Stackhousia monogyna</i>		
Centrolepidaceae	<i>Aphelia cyperoides</i>		
Centrolepidaceae	<i>Centrolepis aristata</i>		
Colchicaceae	<i>Burchardia congesta</i>		
Colchicaceae	<i>Burchardia multiflora</i>		
Cyperaceae	<i>Baumea preissii</i>		
Cyperaceae	<i>Baumea vaginalis</i>		
Cyperaceae	<i>Cyathochaeta avenacea</i>		
Cyperaceae	<i>Gahnia decomposita</i>		
Cyperaceae	<i>Isolepis cernua</i> var. <i>setiformis</i>		
Cyperaceae	<i>Lepidosperma costale</i>		
Cyperaceae	<i>Lepidosperma effusum</i>		
Cyperaceae	<i>Lepidosperma longitudinale</i>		
Cyperaceae	<i>Lepidosperma pubisquameum</i>		
Cyperaceae	<i>Lepidosperma squamatum</i>		
Cyperaceae	<i>Lepidosperma tenue</i>		
Cyperaceae	<i>Mesomelaena tetragona</i>		
Cyperaceae	<i>Schoenus curvifolius</i>		

FAMILY NAME	SPECIES NAME	NATURALISED	CONSV_CODE
Cyperaceae	<i>Schoenus efoliatus</i>		
Cyperaceae	<i>Schoenus grandiflorus</i>		
Cyperaceae	<i>Schoenus subbulbosus</i>		
Cyperaceae	<i>Tetraria octandra</i>		
Cyperaceae	<i>Tetraria</i> sp. Jarrah Forest (R. Davis 7391)		
Dasyopogonaceae	<i>Dasyopogon bromeliifolius</i>		
Dilleniaceae	<i>Hibbertia amplexicaulis</i>		
Dilleniaceae	<i>Hibbertia stellaris</i>		
Dilleniaceae	<i>Hibbertia vaginata</i>		
Droseraceae	<i>Drosera erythrorhiza</i>		
Droseraceae	<i>Drosera huegelii</i>		
Droseraceae	<i>Drosera pallida</i>		
Ericaceae	<i>Andersonia involucrata</i>		
Ericaceae	<i>Astroloma pallidum</i>		
Ericaceae	<i>Leucopogon australis</i>		
Ericaceae	<i>Leucopogon capitellatus</i>		
Ericaceae	<i>Leucopogon oxycedrus</i>		
Ericaceae	<i>Leucopogon propinquus</i>		
Fabaceae	<i>Acacia applanata</i>		
Fabaceae	<i>Acacia dealbata</i>	*	
Fabaceae	<i>Acacia decurrens</i>	*	
Fabaceae	<i>Acacia divergens</i>		
Fabaceae	<i>Acacia extensa</i>		
Fabaceae	<i>Acacia insolita</i>		
Fabaceae	<i>Acacia longifolia</i>	*	
Fabaceae	<i>Acacia nervosa</i>		
Fabaceae	<i>Acacia pulchella</i>		
Fabaceae	<i>Aotus gracillima</i>		
Fabaceae	<i>Bossiaea eriocarpa</i>		
Fabaceae	<i>Bossiaea linophylla</i>		
Fabaceae	<i>Bossiaea ornata</i>		
Fabaceae	<i>Chorizema cordatum</i>		
Fabaceae	<i>Daviesia cordata</i>		
Fabaceae	<i>Daviesia incrassata</i>		
Fabaceae	<i>Daviesia physodes</i>		
Fabaceae	<i>Gastrolobium capitatum</i>		
Fabaceae	<i>Gastrolobium ebracteolatum</i>		
Fabaceae	<i>Gompholobium capitatum</i>		
Fabaceae	<i>Gompholobium ovatum</i>		
Fabaceae	<i>Gompholobium tomentosum</i>		
Fabaceae	<i>Hovea chorizemifolia</i>		
Fabaceae	<i>Hovea trisperma</i>		
Fabaceae	<i>Isotropis cuneifolia</i>		

FAMILY NAME	SPECIES NAME	NATURALISED	CONSV_CODE
Fabaceae	<i>Jacksonia furcellata</i>		
Fabaceae	<i>Kennedia coccinea</i>		
Fabaceae	<i>Kennedia prostrata</i>		
Fabaceae	<i>Sphaerolobium medium</i>		
Fabaceae	<i>Viminaria juncea</i>		
Gentianaceae	<i>Cicendia filiformis</i>	*	
Goodeniaceae	<i>Dampiera linearis</i>		
Goodeniaceae	<i>Dampiera pedunculata</i>		
Goodeniaceae	<i>Dampiera pedunculata</i>		
Goodeniaceae	<i>Lechenaultia biloba</i>		
Goodeniaceae	<i>Scaevola calliptera</i>		
Haemodoraceae	<i>Anigozanthos bicolor</i>		
Haemodoraceae	<i>Anigozanthos flavidus</i>		
Haemodoraceae	<i>Anigozanthos manglesii</i>		
Haemodoraceae	<i>Conostylis aculeata</i>		
Haemodoraceae	<i>Conostylis pusilla</i>		
Haemodoraceae	<i>Conostylis serrulata</i>		
Haemodoraceae	<i>Conostylis setigera</i>		
Haemodoraceae	<i>Haemodorum laxum</i>		
Haemodoraceae	<i>Haemodorum spicatum</i>		
Haemodoraceae	<i>Phlebocarya ciliata</i>		
Haemodoraceae	<i>Tribonanthes australis</i>		
Hemerocallidaceae	<i>Caesia micrantha</i>		
Iridaceae	<i>Freesia alba x leichtlinii</i>		
Iridaceae	<i>Ixia polystachya</i>	*	
Iridaceae	<i>Patersonia juncea</i>		
Iridaceae	<i>Patersonia occidentalis</i>		
Iridaceae	<i>Watsonia meriana var. bulbilifera</i>	*	
Juncaceae	<i>Juncus pallidus</i>		
Juncaginaceae	<i>Cycnogeton sp</i>		
Lamiaceae	<i>Hemiandra pungens</i>		
Lamiaceae	<i>Hemigenia incana</i>		
Lindsaeaceae	<i>Lindsaea linearis</i>		
Loganiaceae	<i>Phyllangium paradoxum</i>		
Loranthaceae	<i>Nuytsia floribunda</i>		
Myrtaceae	<i>Babingtonia camphorosmae</i>		
Myrtaceae	<i>Callistemon glaucus</i>		
Myrtaceae	<i>Calothamnus lateralis</i>		
Myrtaceae	<i>Corymbia calophylla</i>		
Myrtaceae	<i>Darwinia citriodora</i>		
Myrtaceae	<i>Darwinia oederoides</i>		
Myrtaceae	<i>Eucalyptus marginata</i>		
Myrtaceae	<i>Eucalyptus patens</i>		
Myrtaceae	<i>Eucalyptus rudis</i>		

FAMILY NAME	SPECIES NAME	NATURALISED	CONSV_CODE
Myrtaceae	<i>Hypocalymma angustifolium</i>		
Myrtaceae	<i>Kunzea recurva</i>		
Myrtaceae	<i>Melaleuca lateritia</i>		
Myrtaceae	<i>Melaleuca pauciflora</i>		
Myrtaceae	<i>Melaleuca preissiana</i>		
Myrtaceae	<i>Melaleuca viminea</i>		
Myrtaceae	<i>Pericalymma ellipticum</i>		
Myrtaceae	<i>Taxandria linearifolia</i>		
Orchidaceae	<i>Caladenia longicauda</i>		
Orchidaceae	<i>Caladenia macrostylis</i>		
Orchidaceae	<i>Caladenia nana</i>		
Orchidaceae	<i>Cyanicula sericea</i>		
Orchidaceae	<i>Diuris longifolia</i>		
Orchidaceae	<i>Elythranthera brunonis</i>		
Orchidaceae	<i>Pheladenia deformis</i>		
Orchidaceae	<i>Pterostylis recurva</i>		
Orchidaceae	<i>Thelymitra cornicina</i>		
Orchidaceae	<i>Thelymitra crinita</i>		
Papaveraceae	<i>Fumaria capreolata</i>	*	
Philydraceae	<i>Philydrella drummondii</i>		
Phyllanthaceae	<i>Poranthera huegelii</i>		
Pittosporaceae	<i>Billardiera heterophylla</i>		
Plantaginaceae	<i>Plantago lanceolata</i>	*	
Poaceae	<i>Amphipogon turbinatus</i>		
Poaceae	<i>Austrostipa campylachne</i>		
Poaceae	<i>Briza maxima</i>	*	
Poaceae	<i>Cynodon dactylon</i>	*	
Poaceae	<i>Eragrostis curvula</i>	*	
Proteaceae	<i>Adenanthos obovatus</i>		
Proteaceae	<i>Banksia dallanneyi</i>		
Proteaceae	<i>Banksia littoralis</i>		
Proteaceae	<i>Conospermum capitatum</i>		
Proteaceae	<i>Conospermum flexuosum</i>		
Proteaceae	<i>Grevillea quercifolia</i>		
Proteaceae	<i>Grevillea ripicola</i>		P4
Proteaceae	<i>Grevillea trifida</i>		
Proteaceae	<i>Hakea ceratophylla</i>		
Proteaceae	<i>Hakea lissocarpha</i>		
Proteaceae	<i>Hakea ruscifolia</i>		
Proteaceae	<i>Hakea varia</i>		
Proteaceae	<i>Persoonia longifolia</i>		
Proteaceae	<i>Stirlingia latifolia</i>		
Proteaceae	<i>Stirlingia simplex</i>		
Proteaceae	<i>Synaphea hians</i>		P3

FAMILY NAME	SPECIES NAME	NATURALISED	CONSV_CODE
Proteaceae	<i>Xylomelum occidentale</i>		
Restionaceae	<i>Chordifex</i> sp.		
Restionaceae	<i>Desmocladius fasciculatus</i>		
Restionaceae	<i>Desmocladius flexuosus</i>		
Restionaceae	<i>Leptocarpus ?crassipes</i>		
Restionaceae	<i>Hypolaena exsulca</i>		
Restionaceae	<i>Leptocarpus roycei</i>		
Restionaceae	<i>Tyrbastes glaucescens</i>		
Rhamnaceae	<i>Cryptandra arbutiflora</i>		
Rhamnaceae	<i>Trymalium ledifolium</i>		
Rubiaceae	<i>Opercularia apiciflora</i>		
Rubiaceae	<i>Opercularia hispidula</i>		
Rutaceae	<i>Boronia ramosa</i>		
Rutaceae	<i>Boronia spathulata</i>		
Rutaceae	<i>Philotheca spicata</i>		
Sterculiaceae	<i>Thomasia grandiflora</i>		
Stylidiaceae	<i>Levenhookia pusilla</i>		
Stylidiaceae	<i>Stylidium amoenum</i>		
Stylidiaceae	<i>Stylidium brunonianum</i>		
Stylidiaceae	<i>Stylidium piliferum</i>		
Stylidiaceae	<i>Stylidium scandens</i>		
Thymelaeaceae	<i>Pimelea angustifolia</i>		
Thymelaeaceae	<i>Pimelea ciliata</i>		
Tremandraceae	<i>Tetrateca hirsuta</i>		
Xanthorrhoeaceae	<i>Xanthorrhoea brunonis</i>		
Xanthorrhoeaceae	<i>Xanthorrhoea gracilis</i>		
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>		
Zamiaceae	<i>Macrozamia riedlei</i>		

Appendix 7. Completed Threatened and Priority Flora Reporting Form for the Minninup Pools Survey.



Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dbca.wa.gov.au> under Standard Report Forms

TAXON: GREVILLEA RIPICOLA TPFL Pop. No: _____
 OBSERVATION DATE: 9/10/18 CONSERVATION STATUS: P4 New population
 OBSERVER/S: RUSSELL SMITH PHONE: _____
 ROLE: BOTANIST ORGANISATION: ECOLOGUE

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):
RES. # 34343 COLLIE 270-800 M W OF MINNINGUP POOL - ALONG THE NORTH BANK OF THE COLLIE RIVER Reserve No: _____

DBC DISTRICT: _____ LGA: COLLIE Land manager present:
 DATUM: _____ COORDINATES: (If UTM coords provided, Zone is also required) METHOD USED:
 DecDegrees DegMinSec UTM GPS Differential GPS Map
 GDA94 / MGA94 Lat / Northing: 6306543 No. satellites: _____ Map used: _____
 AGD84 / AMG84 Long / Easting: 419358 Boundary polygon captured: Map scale: _____
 WGS84 ZONE: 50
 Unknown
 LAND TENURE:
 Nature reserve Timber reserve Private property Rail reserve Shire road reserve
 National park State forest Pastoral lease MRWA road reserve Other Crown reserve
 Conservation park Water reserve UCL SLK/Pole _____ to _____ Specify other: _____

AREA ASSESSMENT: Edge survey Partial survey Full survey Area observed (m²): _____
 EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____
 POP'N COUNT ACCURACY: Actual Extrapolation Estimate Count method: _____
 (Refer to field manual for list)
 WHAT COUNTED: Plants Clumps Clonal stems
 TOTAL POP'N STRUCTURE:

	Mature:	Juveniles:	Seedlings:	Totals:
Alive	<u>60</u>			<u>60</u>
Dead				

 Area of pop (m²): _____
 Note: Pls record count as numbers (not percentages) for database.
 QUADRATS PRESENT: No. _____ Size _____ Data attached Total area of quadrats (m²): _____
 Summary Quad. Totals: Alive _____
 REPRODUCTIVE STATE: Clonal Vegetative Flowerbud Flower
 Immature fruit Fruit Dehisced fruit Percentage in flower: _____ %

CONDITION OF PLANTS: Healthy Moderate Poor Senescent
 COMMENT: _____

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
•			
•			
•			

Please return completed form to Species And Communities Branch DBCA, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to Flora Administrative Officer, Species and Communities Branch.

Record entered by: _____

Sheet No: _____

Record Entered in Database



Threatened and Priority Flora Report Form

HABITAT INFORMATION:

LANDFORM:	ROCK TYPE:	LOOSE ROCK:	SOIL TYPE:	SOIL COLOUR:	DRAINAGE:
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input checked="" type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input checked="" type="checkbox"/>	Brown <input checked="" type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input checked="" type="checkbox"/>	Loam <input checked="" type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input checked="" type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input checked="" type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					
	Specific Landform Element: (Refer to field manual for additional values)				

CONDITION OF SOIL: Dry Moist Waterlogged Inundated

VEGETATION CLASSIFICATION:

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);
 2. Open shrubland (Hibbertia sp., Acacia spp.);
 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. JARRAH - MARRI OPEN FOREST ALSO EUC.
 2. PATENS
 3. _____
 4. _____

ASSOCIATED SPECIES: _____
 Other (non-dominant) spp _____

Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine Excellent Very good Good Degraded Completely degraded

COMMENT: _____

FIRE HISTORY: Last Fire: Season/Month: _____ Year: _____ Fire Intensity: High Medium Low No signs of fire

FENCING: Not required Present Replace / repair Required Length req'd: _____

ROADSIDE MARKERS: Not required Present Replace / reposition Required Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

DRF PERMIT/ LICENCE No: Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: _____ WA Herb. Regional Herb. District Herb. Other: _____

ATTACHED: Map Mudmap Photo GIS data Field notes Other: _____

COPY SENT TO: Regional Office District Office Other: _____

Submitter of Record: RUSSELL SMITH Role: BOTANIST Signed: [Signature] Date: 26/11/18



Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dbca.wa.gov.au> under Standard Report Forms

TAXON:	<u>GREVILLEA RIPICOLA</u>	TPFL Pop. No:	
OBSERVATION DATE:	<u>9/10/18</u>	CONSERVATION STATUS:	<u>P4</u> New population <input type="checkbox"/>
OBSERVER/S:	<u>RUSSELL SMITH</u>	PHONE:	<u>0447809124</u>
ROLE:	ORGANISATION:		

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):
RESERVE # 34343, COLLIE, 840M ESE of MINNINGUP POOL

DBC DISTRICT:	LGA:	Land manager present:	<input type="checkbox"/>
DATUM:	COORDINATES: (If UTM coords provided, Zone is also required)	METHOD USED:	
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>	GPS <input checked="" type="checkbox"/>	Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	Lat / Northing: <u>6306170</u>	No. satellites: _____	Map used: _____
WGS84 <input type="checkbox"/>	Long / Easting: <u>420560</u>	Boundary polygon captured: <input type="checkbox"/>	Map scale: _____
Unknown <input type="checkbox"/>	ZONE: <u>50</u>		
LAND TENURE:			
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input type="checkbox"/> Shire road reserve <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>	MRWA road reserve <input type="checkbox"/> Other Crown reserve <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/> SLK/Pole _____ to _____	Specify other: _____

AREA ASSESSMENT:	Edge survey <input type="checkbox"/>	Partial survey <input type="checkbox"/>	Full survey <input checked="" type="checkbox"/>	Area observed (m ²):	<u>3000</u>
EFFORT:	Time spent surveying (minutes):	<u>300</u>	No. of minutes spent / 100 m ² :	_____	
POP'N COUNT ACCURACY:	Actual <input type="checkbox"/>	Extrapolation <input type="checkbox"/>	Estimate <input checked="" type="checkbox"/>	Count method:	_____
(Refer to field manual for list)					
WHAT COUNTED:	Plants <input type="checkbox"/>	Clumps <input type="checkbox"/>	Clonal stems <input type="checkbox"/>		
TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:	
Alive	<u>50+</u>			<u>50+</u>	Area of pop (m ²): <u>200</u>
Dead					Note: Pls record count as numbers (not percentages) for database.
QUADRATS PRESENT:	No. _____	Size _____	Data attached <input type="checkbox"/>	Total area of quadrats (m ²):	_____
Summary Quad. Totals: Alive					
REPRODUCTIVE STATE:	Clonal <input type="checkbox"/>	Vegetative <input type="checkbox"/>	Flowerbud <input type="checkbox"/>	Flower <input checked="" type="checkbox"/>	
	Immature fruit <input type="checkbox"/>	Fruit <input type="checkbox"/>	Dehisced fruit <input type="checkbox"/>	Percentage in flower: _____ %	

CONDITION OF PLANTS: Healthy Moderate Poor Senescent

COMMENT: _____

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• _____	_____	_____	_____
• _____	_____	_____	_____
• _____	_____	_____	_____



Threatened and Priority Flora Report Form

HABITAT INFORMATION:

LANDFORM:	ROCK TYPE:	LOOSE ROCK:	SOIL TYPE:	SOIL COLOUR:	DRAINAGE:
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface: eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input checked="" type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input checked="" type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>		Loam <input type="checkbox"/>	Yellow <input checked="" type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input checked="" type="checkbox"/>	0-10% <input checked="" type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input checked="" type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	30-50% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____	50-100% <input type="checkbox"/>	Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>	Specific Landform Element: _____				
Wetland <input type="checkbox"/>	(Refer to field manual for additional values)				
CONDITION OF SOIL:	Dry <input type="checkbox"/>	Moist <input type="checkbox"/>	Waterlogged <input type="checkbox"/>	Inundated <input type="checkbox"/>	

VEGETATION CLASSIFICATION :

1. JARRAH - MARRI OPEN FOREST

Eg. 1. Banksia woodland (B. attenuata, B. ilicifolia);
2. Open shrubland (Hibbertia sp., Acacia spp.);
3. Isolated clumps of sedges (Mesomelaena tetragona)

2.
3.
4.

ASSOCIATED SPECIES:

Other (non-dominant) spp _____

Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine Excellent Very good Good Degraded Completely degraded

COMMENT:

FIRE HISTORY: Last Fire: Season/Month: _____ Year: _____ Fire Intensity: High Medium Low No signs of fire

FENCING: Not required Present Replace / repair Required Length req'd: _____

ROADSIDE MARKERS: Not required Present Replace / reposition Required Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

THE POP^N EXTENDS ALONG THE NORTH BANK OF THE COLLIE RIVER FOR 500M

DRF PERMIT/ LICENCE No: Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: _____ WA Herb. Regional Herb. District Herb. Other: _____

ATTACHED: Map Mudmap Photo GIS data Field notes Other: _____

COPY SENT TO: Regional Office District Office Other: _____

Submitter of Record: RUSSELL SMITH Role: BOTANIST Signed: [Signature] Date: 26/11/18

Please return completed form to **Species And Communities Branch DBCA,**

Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to Flora Administrative Officer, Species and Communities Branch.

Record entered by:

Sheet No.:

Record Entered in Database



Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dcpaw.wa.gov.au> under Standard Report Forms

TAXON: SYNAPHEA HIANS **TPFL Pop. No:** _____
OBSERVATION DATE: 9/10/18 **CONSERVATION STATUS:** P3 New population
OBSERVERS/: RUSSELL SMITH **PHONE:** 0447 809124
ROLE: _____ **ORGANISATION:** ECOLOG

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):
RESERVE N^o 34343, 670 M ESE OF MINNINUP POOL

Reserve No: _____
DBC DISTRICT: _____ **LGA:** _____ **Land manager present:**

DATUM: GDA94 / MGA94 AGD84 / AMG84 WGS84 Unknown
COORDINATES: (If UTM coords provided, Zone is also required)
 DecDegrees DegMinSec UTM **Lat / Northing:** 6306678
Long / Easting: 420861
ZONE: 50
METHOD USED: GPS Differential GPS Map
 No. satellites: _____ Map used: _____
 Boundary polygon captured: Map scale: _____

LAND TENURE:
 Nature reserve Timber reserve Private property Rail reserve Shire road reserve
 National park State forest Pastoral lease MRWA road reserve Other Crown reserve
 Conservation park Water reserve UCL SLK/Pole _____ to _____ Specify other: _____

AREA ASSESSMENT: Edge survey Partial survey Full survey Area observed (m²): _____
EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____
POP'N COUNT ACCURACY: Actual Extrapolation Estimate Count method: _____
 (Refer to field manual for list)
WHAT COUNTED: Plants Clumps Clonal stems
TOTAL POP'N STRUCTURE:

	Mature:	Juveniles:	Seedlings:	Totals:	Area of pop (m ²):
Alive	<u>3</u>			<u>3</u>	_____
Dead					_____

Note: Pls record count as numbers (not percentages) for database.
QUADRATS PRESENT: No. _____ Size _____ Data attached Total area of quadrats (m²): _____
Summary Quad. Totals: Alive

REPRODUCTIVE STATE:	Clonal <input type="checkbox"/>	Vegetative <input type="checkbox"/>	Flowerbud <input type="checkbox"/>	Flower <input type="checkbox"/>
	Immature fruit <input type="checkbox"/>	Fruit <input type="checkbox"/>	Dehisced fruit <input type="checkbox"/>	Percentage in flower: _____ %

CONDITION OF PLANTS: Healthy Moderate Poor Senescent
COMMENT: _____

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
•	_____	_____	_____
•	_____	_____	_____
•	_____	_____	_____



Threatened and Priority Flora Report Form

HABITAT INFORMATION:

LANDFORM:	ROCK TYPE:	LOOSE ROCK:	SOIL TYPE:	SOIL COLOUR:	DRAINAGE:
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input checked="" type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input checked="" type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input checked="" type="checkbox"/>	10-30% <input checked="" type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input checked="" type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input checked="" type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input type="checkbox"/>	
Flat <input checked="" type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>					
Closed depression <input type="checkbox"/>					
Wetland <input type="checkbox"/>					

Specific Landform Element: _____
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry Moist Waterlogged Inundated

VEGETATION CLASSIFICATION :

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);
2. Open shrubland (Hibbertia sp., Acacia spp.);
3. Isolated clumps of sedges (Mesomelaena tetragona)

1. JARRAH - MARRI OPEN FOREST

ASSOCIATED SPECIES:

Other (non-dominant) spp _____

Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine Excellent Very good Good Degraded Completely degraded

COMMENT:

FIRE HISTORY: Last Fire: Season/Month: _____ Year: _____ Fire Intensity: High Medium Low No signs of fire

FENCING: Not required Present Replace / repair Required Length req'd: _____

ROADSIDE MARKERS: Not required Present Replace / reposition Required Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

DRF PERMIT/ LICENCE No: Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licencing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: _____ WA Herb. Regional Herb. District Herb. Other: _____

ATTACHED: Map Mudmap Photo GIS data Field notes Other: _____

COPY SENT TO: Regional Office District Office Other: _____

Submitter of Record: RUSSELL SMITH Role: BOTANIST Signed: [Signature] Date: 26/11/18

Please return completed form to **Species And Communities Branch DBCA**,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au



Threatened and Priority Flora Report Form

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at <http://dpcw.wa.gov.au> under Standard Report Forms

TAXON: SYNAPHEA HIRNS TPFL Pop. No: _____
 OBSERVATION DATE: 9/10/2018 CONSERVATION STATUS: P3 New population
 OBSERVERS: RUSSELL SMITH PHONE: 0447809129
 ROLE: _____ ORGANISATION: ECOLOGIE

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):
RES # 34343, COLLIE, 1030 M DIRECTLY EAST OF MINNINUP POOL

Reserve No: _____

DBCA DISTRICT: _____ LGA: _____ Land manager present:
 DATUM: _____ COORDINATES: (If UTM coords provided, Zone is also required) METHOD USED:
 DecDegrees DegMinSec UTM GPS Differential GPS Map
 GDA94 / MGA94 Lat / Northing: 6306287 No. satellites: _____ Map used: _____
 AGD84 / AMG84 Long / Easting: ~~420860~~ 420421 Boundary polygon captured: Map scale: _____
 WGS84 ZONE: 50

LAND TENURE:
 Nature reserve Timber reserve Private property Rail reserve Shire road reserve
 National park State forest Pastoral lease MRWA road reserve Other Crown reserve
 Conservation park Water reserve UCL SLK/Pole _____ to _____ Specify other: _____

AREA ASSESSMENT: Edge survey Partial survey Full survey Area observed (m²): 2
 EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____
 POP'N COUNT ACCURACY: Actual Extrapolation Estimate Count method: _____
 (Refer to field manual for list)

WHAT COUNTED: Plants Clumps Clonal stems

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:	Area of pop (m ²):
Alive	<u>3</u>			<u>3</u>	_____
Dead					_____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. _____ Size _____ Data attached Total area of quadrats (m²): _____
 Summary Quad. Totals: Alive _____

REPRODUCTIVE STATE: Clonal Vegetative Flowerbud Flower
 Immature fruit Fruit Dehisced fruit Percentage in flower: 100 %

CONDITION OF PLANTS: Healthy Moderate Poor Senescent

COMMENT: _____

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• _____	_____	_____	_____
• _____	_____	_____	_____
• _____	_____	_____	_____



Threatened and Priority Flora Report Form

HABITAT INFORMATION:

LANDFORM:

- Crest
- Hill
- Ridge
- Outcrop
- Slope
- Flat
- Open depression
- Drainage line
- Closed depression
- Wetland

ROCK TYPE:

- Granite
- Dolerite
- Laterite
- Ironstone
- Limestone
- Quartz

Specify other: _____

Specific Landform Element:
(Refer to field manual for additional values)

LOOSE ROCK:

(on soil surface; eg gravel, quartz fields)

- 0-10%
- 10-30%
- 30-50%
- 50-100%

SOIL TYPE:

- Sand
- Sandy loam
- Loam
- Clay loam
- Light clay
- Peat

Specify other: _____

SOIL COLOUR:

- Red
- Brown
- Yellow
- White
- Grey
- Black

Specify other: _____

DRAINAGE:

- Well drained
- Seasonally inundated
- Permanently inundated
- Tidal

CONDITION OF SOIL:

- Dry
- Moist
- Waterlogged
- Inundated

VEGETATION CLASSIFICATION :

- Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);
- 2. Open shrubland (Hibbertia sp., Acacia spp.);
- 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. JARRAH - MARRI FOREST

ASSOCIATED SPECIES:

Other (non-dominant) spp _____

Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 Australian Soil and Land Survey Field Handbook guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT:

- Pristine
- Excellent
- Very good
- Good
- Degraded
- Completely degraded

COMMENT:**FIRE HISTORY:**

Last Fire: Season/Month: _____ Year: _____ Fire Intensity: High Medium Low No signs of fire

FENCING:

Not required Present Replace / repair Required Length req'd: _____

ROADSIDE MARKERS:

Not required Present Replace / reposition Required Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

DRF PERMIT/ LICENCE No:

Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licensing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

SPECIMEN:

Collectors No: _____ WA Herb. Regional Herb. District Herb. Other: _____

ATTACHED:

Map Mudmap Photo GIS data Field notes Other: _____

COPY SENT TO:

Regional Office District Office Other: _____

Submitter of Record: RUSSELL SMITH Role: BOTANIST Signed: _____ Date: 26/11/18

Please return completed form to **Species And Communities Branch DBCA**,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer**, Species and Communities Branch.

Appendix 7. Photographs of Vegetation units mapped within the Minninup Pools Survey Area.

Vegetation Unit A



Open forest of *Eucalyptus marginata*, *Corymbia calophylla* (and occasionally *Allocasuarina fraseriana*, or *E. patens*), with the small trees *Persoonia longifolia* and *Xylomelum occidentale* over shrubland dominated by *Acacia extensa*, *A. pulchella*, (*Grevillea ripicola*), *Hypocalymma angustifolium*, *Kennedia coccinea*, *Macrozamia riedlei*, and *Xanthorrhoea brunonis* or *X. preissii* on sandy loam.

Vegetation Unit B



Open forest to woodland of *Eucalyptus marginata*, with in places the small trees *Banksia littoralis*, *Melaleuca preissiana* and *Nuytsia floribunda*) over shrubland dominated by *Acacia extensa*, *A. pulchella*, *Dasyopogon bromeliifolius* and *Xanthorrhoea brunonis* over *Cyathochaeta avenacea* and *Lepidosperma squamatum* sedges on greyish sandy clay loams.

Vegetation Unit C



Open forest to woodland of *Eucalyptus marginata*, (*Allocasuarina fraseriana*) over *Banksia grandis* small trees over shrubland of *Acacia extensa*, *Adenanthos obovatus*, *Bossiaea eriocarpa*, *Gompholobium tomentosum*, *Macrozamia riedlei* and *Xanthorrhoea preissii* with scattered *Lepidosperma squamatum* sedges on sandy loam.

Vegetation Unit D



Open forest of *Eucalyptus marginata* (and occasionally *E. patens*) over *Xylomelum occidentale* low trees over shrubland of *Acacia extensa*, *Banksia dallanneyi*, *Bossiaea ornata*, (*Grevillea ripicola*), *Hakea lissocarpha*, *Hibbertia hypericoides*, *Hypocalymma angustifolium*, *Leucopogon propinquus*, *Macrozamia riedlei* and *Xanthorrhoea preissii* on lateritic gravel.

Vegetation Unit E



Open to very open woodland to closed or open shrubland of *Banksia littoralis* or *Melaleuca preissiana* (occasionally small *Eucalyptus patens*) over *Aotus gracillima*, *Astartea scoparia*, *Gastrolobium capitatum*, *Hakea ceratophylla*, *Hibbertia stellaris*, *Melaleuca lateritia* over sedgeland which may include *Cyathochaeta avenacea*, *Leptocarpus roycei*, and *Mesomelaena tetragona*.

Vegetation Unit F



Tall closed shrubland/sedgeland of *Acacia divergens*, *Aotus gracillima*, *Astartea scoparia*, *Callistemon glaucus*, *Taxandria linearifolia* and *Cyathochaeta avenacea*, *Gahnia decomposita* on clay loam.

Vegetation Unit G



Open forest of *Corymbia calophylla*, *Eucalyptus patens* and *E. rudis* with scattered *Banksia littoralis* and *Melaleuca preissiana* over a variable tall shrubland/shrubland that may include *Acacia extensa*, *A. pulchella*, *Astartea scoparia*, *Grevillea ripicola*, *Hakea lissocarpa*, *Hypocalymma angustifolium*, *Melaleuca viminea*, *Taxandria linearifolia* and *Xanthorrhoea brunonis* on loam.

Vegetation Unit H



Open forest of *Eucalyptus rudis* over tall shrubland of **Acacia longifolia*, *A. extensa*, *A. pulchella*, *Taxandria linearifolia* over *Lepidosperma effusum* and **Watsonia meriana* on loam.