Reconnaissance and Targeted Flora and Vegetation Survey, Wandering – Narrogin Road, Cuballing (~SLK 25.16 to 27.23). Shire of Cuballing.

Prepared for the Shire of Cuballing
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Executive Summary

Ecoedge was engaged by the Shire of Cuballing (the Shire) to undertake an out of season Reconnaissance and Targeted flora and vegetation survey of approximately 2.1 kilometres (km) of road reserve vegetation along both sides of the Wandering – Narrogin Road, approximately 2.1 km SE of the Cuballing Road intersection. The approximate area of surveyed vegetation was 1.85 ha.

The Shire is planning to widen this section of road for safety purposes and required the survey in order to inform project design and assist with associated approvals processes.

The flora and vegetation survey was undertaken on the 11 March 2019 in accordance with the Environmental Protection Authority (EPA) Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016).

Thirty one flora taxa (including six introduced species) were identified.

No Threatened flora, Priority flora or other flora of conservation significance were found.

None of the introduced species were Declared Pest Plants or could be regarded as serious environmental weeds.

One of the four vegetation units recognised in the Survey Area, vegetation unit B, meets the criteria for the Federally-listed critically endangered Threatened Ecological Community (TEC) 'Eucalypt Woodlands of the Western Australian Wheatbelt' and the State Priority 3 listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' ecological community. According to the Federally approved conservation advice for this TEC, any areas meeting the criteria for this TEC are critical to its survival. This means that any clearing of native vegetation within vegetation unit B may be regarded as having a potentially significant impact on the overall TEC warranting a referral to the Federal Department of the Environment and Energy.

One vegetation association is mapped for the Survey Area: Association 1023 'Medium woodland; York gum, wandoo and salmon gum'. The extent remaining of this association, at 10.85 % is significantly below the Commonwealth government's 30% retention threshold however is very well represented within the DBCA estate.

There are no Environmentally Sensitive Areas within or in close proximity to the Survey Area that will limit the proposed road upgrade. The closest is located approximately 1.1km NE of the Survey Area and is associated with a reserve forming part of the Montague State Forest.

Vegetation within the Survey Area does not form part a formally recognised ecological linkage or corridor, but does form part of a regionally valuable corridor of vegetation associated local ephemeral watercourses. Clearing within the Survey Area is unlikely to have a significant impact on the function of the overall corridor due to the generally linear and narrow clearing footprint in mostly degraded land along the road boundary of a larger parcel of intact bushland (14 Mile Brook NR). It will also not incur any significant interruption or substantial break in connectivity of the corridor.

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Statement of Limitations

Reliance on Data

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

Report for Benefit of Client

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

1 Introduction and Desktop Assessment

Ecoedge was engaged by the Shire of Cuballing (the Shire) in to undertake a Reconnaissance and Targeted flora and vegetation survey of approximately 2.1 kilometres (km) of road reserve vegetation along both sides of the Wandering – Narrogin Road, approximately 2.1 km southeast of the Cuballing Road intersection (the Survey Area) (**Figure 1** and **Figure 2**). The approximate area of surveyed vegetation was 1.85 ha.

At Wandering Narrogin Road, the condition of the vegetation within 5 m of the bitumen is generally degraded. Two Priority 4 taxa are known from a 5 km radius of this Survey Area. One side of the Wandering-Narrogin Road abuts the Fourteen Mile Brook Nature Reserve.

The Shire is planning to widen this section of road for safety purposes and required the survey in order to inform project design and assist with associated approvals processes.

An out of season flora and vegetation survey was undertaken on 11 March 2019 in accordance with the Environmental Protection Authority (EPA) Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016). The risk of an early autumn survey was considered acceptable by the Department of Water, Environment and Regulation (DWER) based on the overall degraded condition of the vegetation and a desktop assessment, indicating the likelihood of occurrence of known presence of Threatened and Priority flora within five kilometres of these areas, as minimal.

This report compiles findings of the field survey.

2 Scope and Objectives

The objective of the survey was to determine the conservation value of the native flora and vegetation, determine the presence of Threatened and Priority flora and vegetation communities, and assess any potential impacts to these of the proposed works.

The scope of work for the survey is detailed below.

<u>Desktop survey</u>

- Identify significant flora, vegetation/ecological communities' values and their potential sensitivity to impact;
- Identify broad pre-European vegetation type(s) (Beard various); and Mattiske & Havel (1998) or Heddle et al (1980) vegetation complexes for southwest and Swan Coastal Plain areas.

<u>Field survey</u>

- Verify/ground truth the desktop assessment findings through Targeted surveys within the appropriate survey timing for any threatened flora that may occur;
- Undertake vegetation community/type mapping to a scale appropriate for the bioregion;

- Assess the survey area's plant species diversity, structure and weed cover;
- Undertake vegetation condition mapping using EPA (2016) condition scale;
- Undertake a Targeted survey for rare and priority flora based on desktop likelihood of occurrence and habitat availability. When populations are identified, survey and map extent of populations to determine number and habitat area for each population. Provide shapefiles with point data indicating the number of plants identified at each point. If more than 100, the edges of the population boundary can be mapped. If the population extends outside the survey area, the extent of the population will be mapped if on public land (e.g. road reserve). All threatened flora to be mapped with a GPS; and
- Identify the location of any Weeds of National Significance or Declared Pests.

Report

- Provide environmental constraints mapping using GIS mapping software (e.g. ArcMap) for flora, fauna, ecological communities, watercourse, wetlands, ESAs etc.;
- Assess flora and vegetation biological aspects likely to require referral of the project to the EPA;
- Provide justification of decision as to whether referral to DotEE is likely to be required.

2.1 Biogeographic Region and Location

The Survey Area is situated within the Avon Wheatbelt P2 (AW2) sub-region of the Avon Wheatbelt biogeographic region as defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (Commonwealth of Australia, 2016). It occurs within the road reserve along both sides of the Wandering Narrogin Road, approximately 2.1 km SE of the Cuballing Road intersection and 7.5 km SW of the town of Cuballing. The northern part of Survey Area is, for the most part, adjacent to privately managed cleared agricultural land. The southern portion abuts the Fourteen Mile Brook Nature Conservation Reserve for approximately 1.27 km with the balance of the area adjacent to cleared agricultural land (**Figure 1** and **Figure 2**).

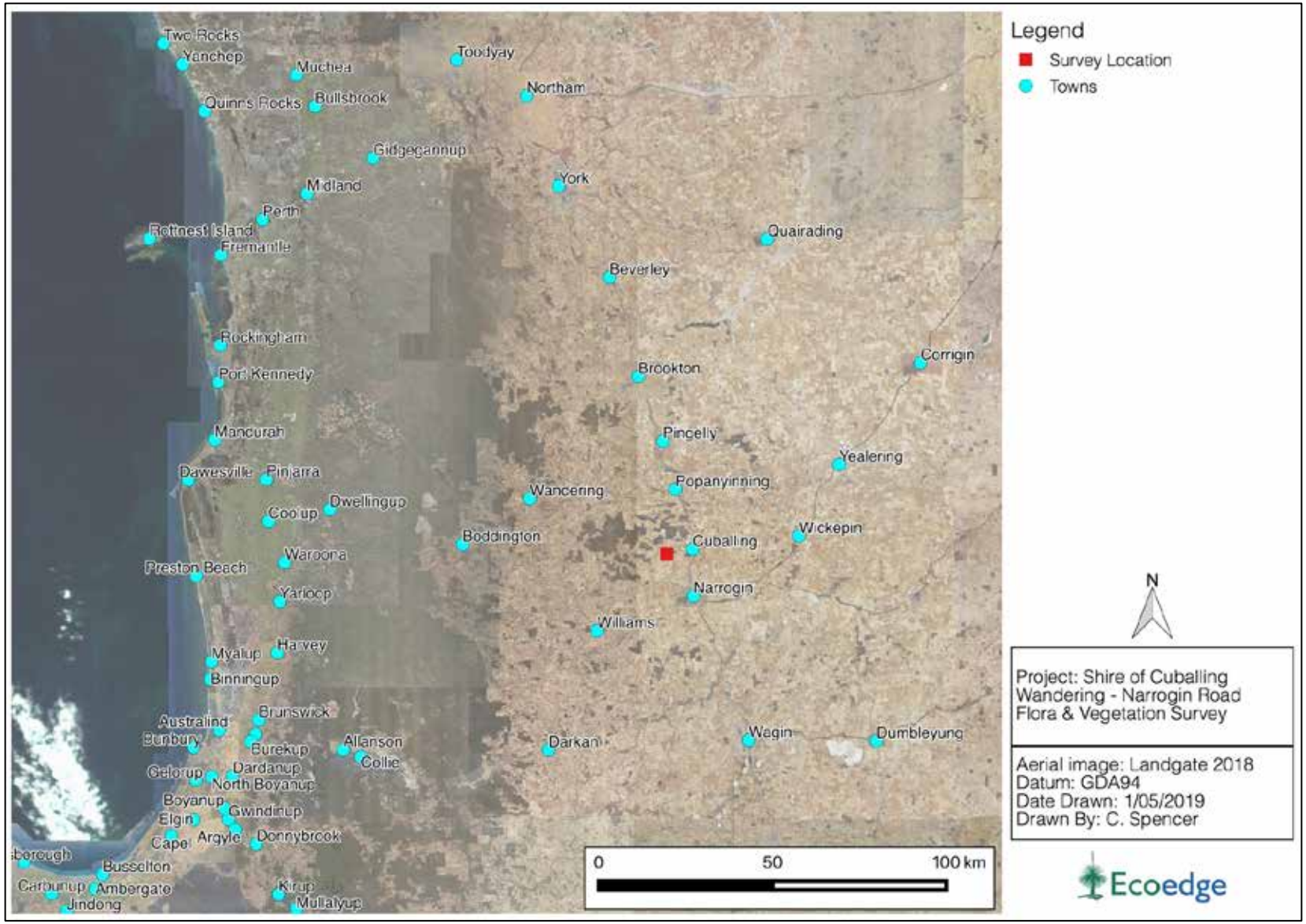

Figure 1.Aerial photograph showing the location of the Survey Area.

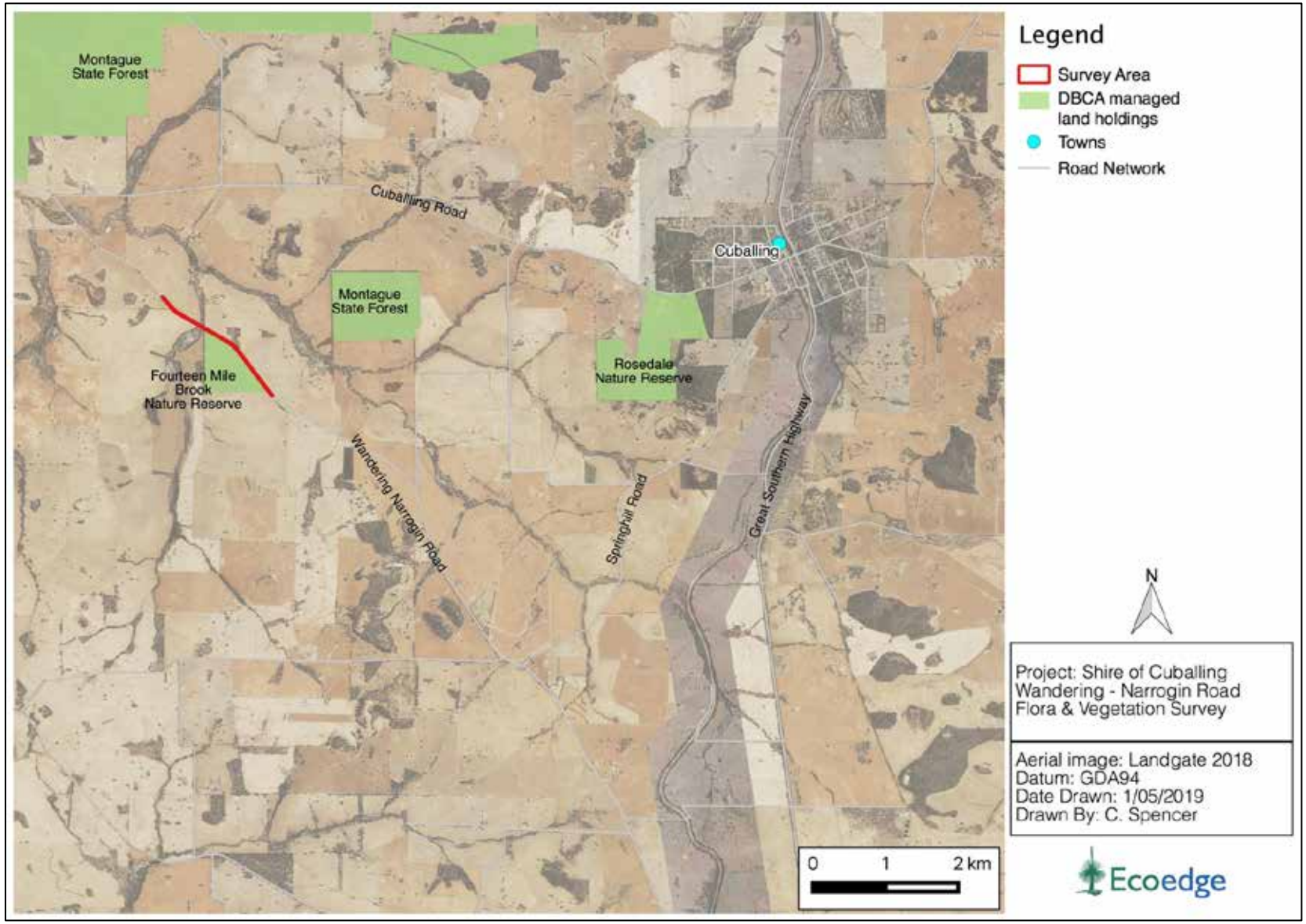

Figure 2.The Survey Area in context of surrounding land uses.

2.2 Geology

The Survey Area occurs within the Southern Zone of Rejuvenated Drainage (SZRD). The SZRD generally comprises an erosional surface of gently undulating rises to low hills with continuous stream channels that flow in most years. Colluvial process are active with soils formed in colluvium or in-situ from weathered rock (Sawkins, 2010). The SZRD has been divided into landscape systems and subsystems. Within the SZRD, the Survey Area is situated on soils of the Dryandra soil landscape System, and within that on the 257DyBk, 257DyNB and 257DyNO subsystems, as shown in Figure 3 (McArthur *etal.* 1977). These are are described in **Table 2.**

Table 1. Soil Mapping Units for the Survey Area (McArthur et al. 1977)

Zone	Landscape System	Soil Subsystem
257 - Southern Zone of Rejuvenated Drainage	257Dy - Dryandra System Gently undulating granitic terrain, in the central Zone of Rejuvenated Drainage, with deep sandy duplex, loamy duplex and brown loamy earth.	257DyBk - Biberkine Subsystem Valley floors & foot-slopes with gently undulating rises & low hills. Alluvium and colluvium over granite etc. Yellow brown sandy duplexes, wet and semi-wet soils & brown deep loamy duplexes. Wandoo-Flooded Gum with Jam-Sheoak-Teatree.
		257DyNB - Noombaling Subsystem Long gentle and undulating hillslopes and divides. Colluvium / weathered granite, gneiss and some dolerite. Yellow/brown and grey deep sandy duplexes, brown deep loamy duplexes, sandy gravels and shallow duplexes. Marri-Wandoo / Jam-Sheoak.
		257DyNO - Norrine Subsystem A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust.

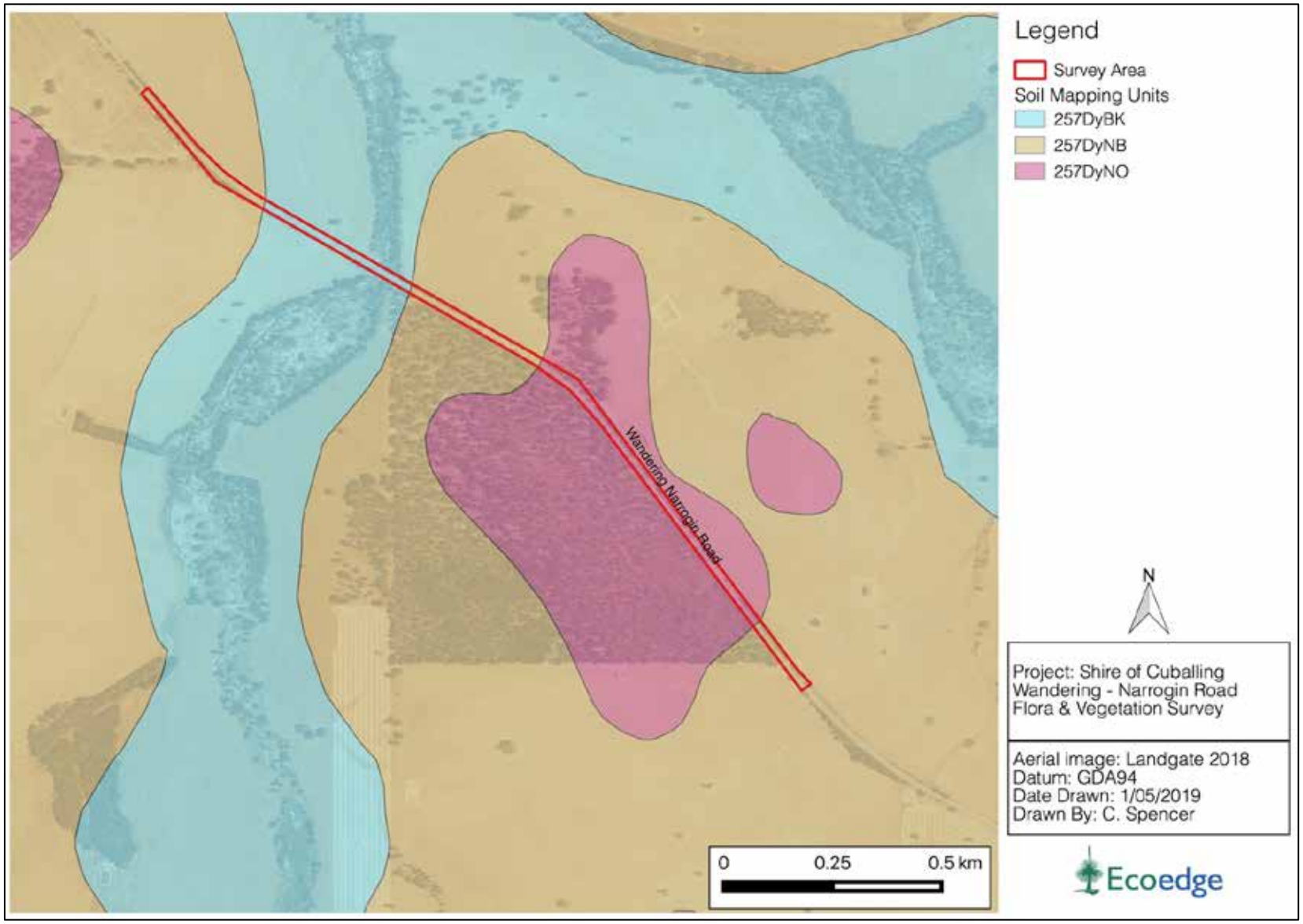

Figure 3. Soil subsystems mapped for the Survey Area (McArthur *et al.* 1977).

2.3 Vegetation Description according to pre-European Mapping Datasets

The Survey Area contains approximately 1.85 ha of remnant native vegetation.

2.3.1 Vegetation Associations

A systematic survey of native vegetation in Western Australia was undertaken by J. S. Beard (along with others) during the 1970s, which described vegetation systems in the south-west of Western Australia at a scale of 1:250,000. Beard's vegetation maps attempted to depict the vegetation as it might have been prior to European settlement in terms of type and extent (Beeston *et al.*, 2001). The Beard Vegetation Association dataset, also referred to as the pre-European native vegetation extent dataset, was digitised by Shepherd *et al.* (2002).

Beard vegetation associations have been described to a minimum standard of Level 3 "Broad Floristic Formation" for the National Vegetation Inventory System (NVIS) (state-wide to regional scale)[1]. One Beard vegetation association was mapped as occurring within the Survey Area: association 1023 'Medium woodland; York gum, wandoo and salmon gum' (Beard, 1980).

2.3.2 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 Comprehensive, Adequate and Representative (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 CAR reserve system for WA (Government of Western Australia, 2018). 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".

An assessment of Beard's vegetation association 1023 against the *Statewide Vegetation Statistics* for the Avon Wheatbelt biogeographic region is presented in **Table 2.** The extent remaining of association 1023 falls well below the 30% retention target.

[1] Beard's vegetation mapping units are referred to as 'associations' however these do not correspond to the NVIS Level 5 'Associations'. The NVIS system was developed long after Beard's work was completed, and while both classification systems use the same term, NVIS 'Associations' describe vegetation in more detail than do Beard's.

Table 2. Beard vegetation association 1023 assessed against the Statewide Vegetation Statistics (Government of Western Australia, 2018).

Beard Vegetation Association	% Remaining of pre-European extent (total)	% of pre-European extent in all DBCA managed land (total)
Association 1023 'Medium woodland; York gum, wandoo and salmon gum'	10.85%	10.45%

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

2.4 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).

Under Section 27 of the *Biodiversity Conservation Act 2016* (BC Act) the Western Australian Minister for Environment may list communities that are considered to be under significant threat as a Threatened ecological communities (TEC). These TECs can be listed under one of three conservation categories; critically endangered (CE), endangered (EN), vulnerable (V). The BC Act also provides for listing communities as collapsed ecological communities.

Possible TECs that do not meet survey criteria are added to the DBCA's Priority ecological community lists under Priorities 1, 2 or 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 Threatened and Priority ecological communities is specified in DBCA (2018c, 2019c). The conservation categories for these Threatened and Priority ecological communities are defined in **Appendix 1**.

Threatened ecological communities can also be listed under the Commonwealth *Environment and Biodiversity Conservation Act 1999* (EPBC Act) (Department of the Environment and Energy (DotEE), 2018a; 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 2** (DotEE, 2018b).

Under both the State (BC Act) and Federal Act (EPBC Act) ministerial authorisation is required where significant permanent modification to a TEC will occur.

A Protected Matters Search Tool report for communities listed under the EPBC Act occurring within a 5 km radius of the Survey Area was undertaken (DotEE, 2019a, **Appendix 3**), and the current DBCA TEC and PEC listings were consulted (DBCA, 2018c; DBCA ,2019c). Outcomes of these searches are presented in **Table 3.**

Noting that if an occurrence of a threatened ecological community is found during a survey conducted under the auspices of the *Environmental Protection Act 1986* (EP Act) it must be mandatorily reported to the Chief Executive Officer of the DBCA under Section 49 of the BC Act.

Table 3. TECs and PECs occurring within 5 km of the Survey Area (DBCA, 2018c, 2019c; DotEE, 2019a).

Community Name	Status (WA)	Status (EPBC Act)
'Eucalypt Woodlands of the Western Australian Wheatbelt'; a federally listed TEC consisting of numerous State-listed communities	Various	CE

Note: This table only includes formally recognised TECs that are known of and mapped by DBCA and are included in their database.

2.5 Threatened and Priority Flora

Species of flora and fauna are defined as having a Threatened or Priority conservation status where their extant populations are restricted geographically and or under threat of possible extinction. The Department of Biodiversity, Conservation and Attractions recognises these threats and consequently applies regulations towards population and species protection.

Threatened extant flora species are listed under Section 19 of the BC Act and are ranked according to their level of threat using the International Union for Conservation of Nature (IUCN) Red List categories and criteria of; critically endangered (CE), endangered (EN), vulnerable (VU). It is an offence to "take" or damage threatened flora without Ministerial approval. Section 5 of the Act defines "to take" as "… to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means".

Priority flora are under consideration for future declaration as "Threatened 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 are adequately known rare or threatened species that require regular monitoring.

Threatened flora lists are formally reviewed on an annual basis, whilst the priority flora list is subject to a less formal ongoing review. The current listing of Threatened and Priority flora was updated on the 5th December 2018 (DBCA, 2018d).

Categories of Threatened and Priority flora as defined by the BC Act are presented in **Appendix 4**, (DBCA, 2019a).

Threatened flora may also be protected under the Commonwealth EPBC Act and be listed in one of six categories; the definitions of these categories are summarised in **Appendix 5** (DotEE, 2018b).

Threatened or Priority flora occurring within 5 km of the Survey Area generated from a NatureMap search within 5 km of the Survey Area (DBCA, 2019b) are listed in **Table 4**. Taxa listed under the EPBC Act (based on results of the Protected Matters Search Tool query (DotEE, 2019a)) were also considered in the preparation of the table. Several of the species listed in **Table 4** could potentially occur within the Survey Area, based on an assessment of their preferred habitats.

Noting that if any threatened flora species are found during a survey conducted under the auspices of the EP Act that they must be mandatorily reported to the CEO of the DBCA under Section 43 of the BC Act.

Table 4.Threatened and Priority List flora known to occur within 5 km of the Survey Area (DBCA, 2019a, 2018d; DotEE, 2019a.)

Species	Cons Status*	Flowering	Description and Habitat	Likelihood
Acacia insolita subsp. *recurva*	T (EN)	Sep	Spindly shrub, 0.6-1.2 m high. Fl. yellow-cream. Lateritic ridges.	Moderate
Banksia oligantha	T (EN)	Oct-Nov	Non-lignotuberous shrub, to 3 m high. Fl. red & cream/orange-brown. Yellow or yellow-brown sand.	Moderate
Boronia capitata subsp. *capitata*	T (EN)	Aug - Dec or Feb	Slender shrub, 0.3-1.3 m high. Fl. pink. Sand, often over laterite. Sandplains.	Low/Moderate
Pultenaea pauciflora	T (VU)	Oct - Nov	Dense, much-branched shrub, to 0.8 m high. Fl. yellow. Sandy & clay lateritic soils. Undulating country.	Moderate
Verticordia fimbrilepis subsp. *fimbrilepis*	T (EN)	Oct-Dec, Jan	Shrub, 0.3-0.7 m high. Fl. pink-white. Gravelly sandy or clayey soils. Flats, road verges.	Low/Moderate
Banksia cynaroides	P4	Aug, Dec or Jan - Feb	Erect, rigid, lignotuberous shrub, 0.9-1.5 m high. Fl. yellow. Gravelly sand or clay loam over laterite.	Low
Hibbertia montana	P4	Jul-Oct	Erect, straggling or sprawling shrub, 0.1-0.7 m high. Fl. yellow. Loam over granite, lateritic soils, gravel. Granite rocks, lateritic ridges & boulders, hills.	Low

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

2.6 Ecological Corridors and Connectivity

The Survey Area occurs within a corridor of road side vegetation, in varying degrees of condition along the Wandering-Narrogin Road within a predominantly cleared agricultural landscape. The Survey Area vegetation abuts and is linked to the 14 Mile Brook Nature Reserve (14 Mile Brook NR) which is narrowly connected in the NW to a networked corridor of native vegetation associated with a NW – SE aligned ephemeral watercourse. This corridor provides for a loose connection with the larger parcels of vegetation associated with the Montague and Lol Gray State Forest Areas (part of the Dryandra Woodlands) and other smaller isolated parcels of vegetation.

Clearing within the Survey Area will unlikely have a significant impact on the function of the overall corridor for the following reasons. The clearing area will be generally narrow and along existing cleared boundaries in areas of mostly degraded vegetation and it will not incur any significant interruption or substantial break in connectivity of the corridor.

2.7 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.

There are no ESAs in close proximity to the Survey Area. The nearest is located approximately 1.1 km NE of the Survey Area and is associated with a reserve forming part of the Montague State Forest (**Table 3**).

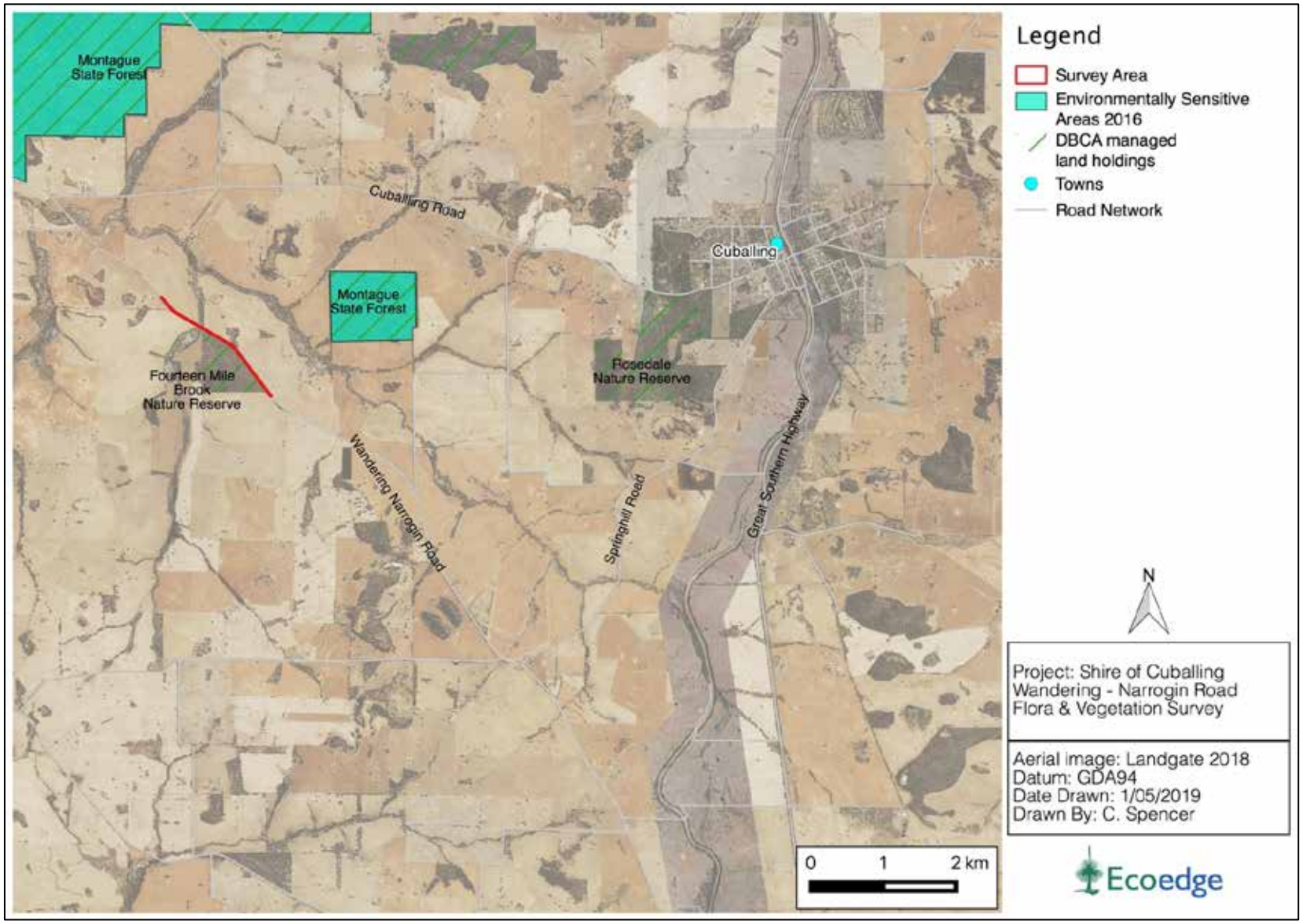

Figure 4.Environmentally Sensitive Areas in proximity to the Survey Area (DER, 2016).

3 Methods

3.1 Desktop Assessment

Prior to the field survey, a "desktop assessment" was carried out by downloading a NatureMap report listing all flora (including Threatened flora) occurring within 5 km of the Survey Area. A Protected Matters Search report was generated to provide information regarding Matters of National Environmental Significance (MNES) known or potentially occurring within 5 km of the Survey Area (DotEE, 2018b) (**Appendix 3**). 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.

3.2 Field Survey

The field survey was undertaken by Russell Smith (SL flora permit SL011843) on 11 March 2019. The Survey Area covers a total of approximately 4.6 ha. A comprehensive list was made of native and introduced flora and information on vegetation structure, dominant species and vegetation condition at regular intervals through the Survey Area. Because the survey was done outside of the main flowering season some annual or annually-regenerating taxa were not able to be identified.

Flora species that were not identified in the field were photographed for later identification. Taxonomy and conservation status of flora species was checked against DBCA databases (DBCA 2018b and 2018d).

The total area of remnant native vegetation in the Survey Area was approximately 1.85 ha.

Vegetation condition was assessed against the method of the EPA (2016) (**Appendix 6**).

3.3 Survey Limitations

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

Table 5. Limitations of the field survey 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	Minor	The survey was carried out in only one visit in March which is outside of the optimal survey time. However, the risk was considered to be acceptable because there was a low risk of missing rare species not able to be identified outside spring.
Climatic and seasonal effects	Minor	The survey area recorded about 70-80% of the average rainfall during the 2018 wet season (Apr-Nov). Herbaceous species germination may have been reduced.
Availability of contextual information	Minor	Some regional surveys have been carried out in the wheatbelt, and some contextual information is available.
Completeness of the survey	Negligible	All of the Survey Area vegetation was easily accessible.
Skill and knowledge of the botanists	No	The botanist has over 25 years' experience working in south west of WA.

4 Results

4.1 Flora

Thirty-one flora taxa were identified within the Survey Area, of which six species were introduced. No Threatened flora, Priority flora or other flora of conservation significance were found.

None of the introduced species were Declared Pest Plants or could be regarded as serious environmental weeds.

The list of vascular flora recorded during the field survey is included in **Appendix 7**.

4.2 Vegetation Units

Four vegetation units were identified within the Survey Area. They are described below and mapped in **Figure 10** to **Figure 12**. Only one of the vegetation units was in close to 'natural' state (with native species dominant in the understorey), this being unit B. Vegetation unit B satisfies the criteria to be considered an occurrence of the Federally-listed TEC 'Eucalypt Woodlands of the Western Australian Wheatbelt'; this is further discussed below.

Figure 5. Typical unit A vegetation

Vegetation unit A. Woodland/open woodland of *Eucalyptus wandoo* and *Allocasuarina huegeliana* over tall open shrubland of *Acacia acuminata* over grassland of **Avena fatua* and **Bromus diandrus* and open herbland of *Dianella revoluta*, **Dittrichia graveolens*, **Hypochaeris glabra* and **Solanum nigrum* on grey-brown sandy loam or gravel.

Figure 6. Typical unit B vegetation

Vegetation unit B. Woodland of *Eucalyptus wandoo* over tall open shrubland of *Banksia sessilis* over open shrubland including *Acacia pulchella*, *Allocasuarina humilis*, *Banksia armata*, *Calothamnus quadrifidus*, *Gastrolobium obovatum*, *G. spinosum*, *Leptospermum erubescens*, *Santalum murrayanum* over very open herbland including *Lomandra nutans* and scattered *Austrostipa hemipogon* grass on gravel.

Figure 7. Typical unit C vegetation

Vegetation unit C. Open sedgeland of **Juncus acutus* with open grassland of **Avena fatua* and **Bromus diandrus* on yellow-brown sandy loam.

Figure 8. Typical unit D vegetation

Vegetation unit D. Scattered trees of *Eucalyptus wandoo* and *Allocasuarina huegeliana* over mainly introduced annual species of herbs and on yellow-brown sandy loam.

The extent in hectares of each unit within the Survey Area is provided in **Table 6**.

Table 6. Area of each vegetation unit within the Survey Area.

Vegetation Unit	Area (ha)
A	1.34
B	0.16
C	0.03
D	0.32
Cleared	2.75
Total	**4.6**

4.3 Vegetation Condition

Over half (59.8%) of the Survey Area was mapped as cleared. Of the remaining approximately 1.85 ha of remnant vegetation almost one third was classed as 'Completely Degraded'. Vegetation unit B which is in a mostly degraded condition comprises mostly of canopies of trees in Fourteen-Mile Brook Nature Reserve overhanging part of the Survey Area.

Vegetation condition is mapped in **Figure 13** to **Figure 15** and the extent of vegetation within each condition class is shown **Table 7.**

Table 7. Summary of vegetation condition classes within the Survey Area.

Vegetation Condition	Area (Ha)	%
Good	0.02	0.4
Degraded	0.16	3.5
Completely Degraded	1.67	36.3
Cleared	2.75	59.8
Total	**4.6**	**100.0**

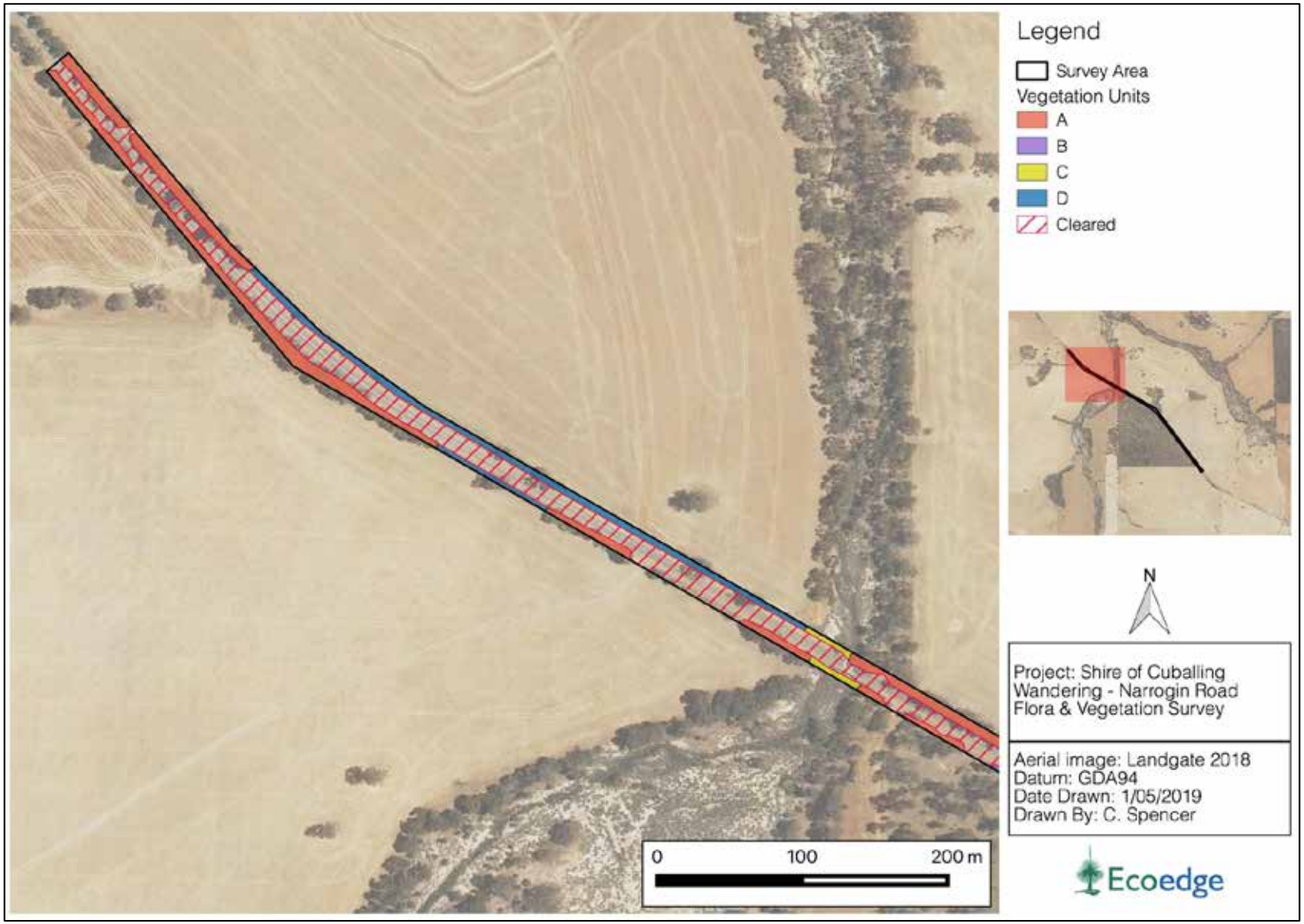

Figure 9.Vegetation units mapped within the Survey Area.

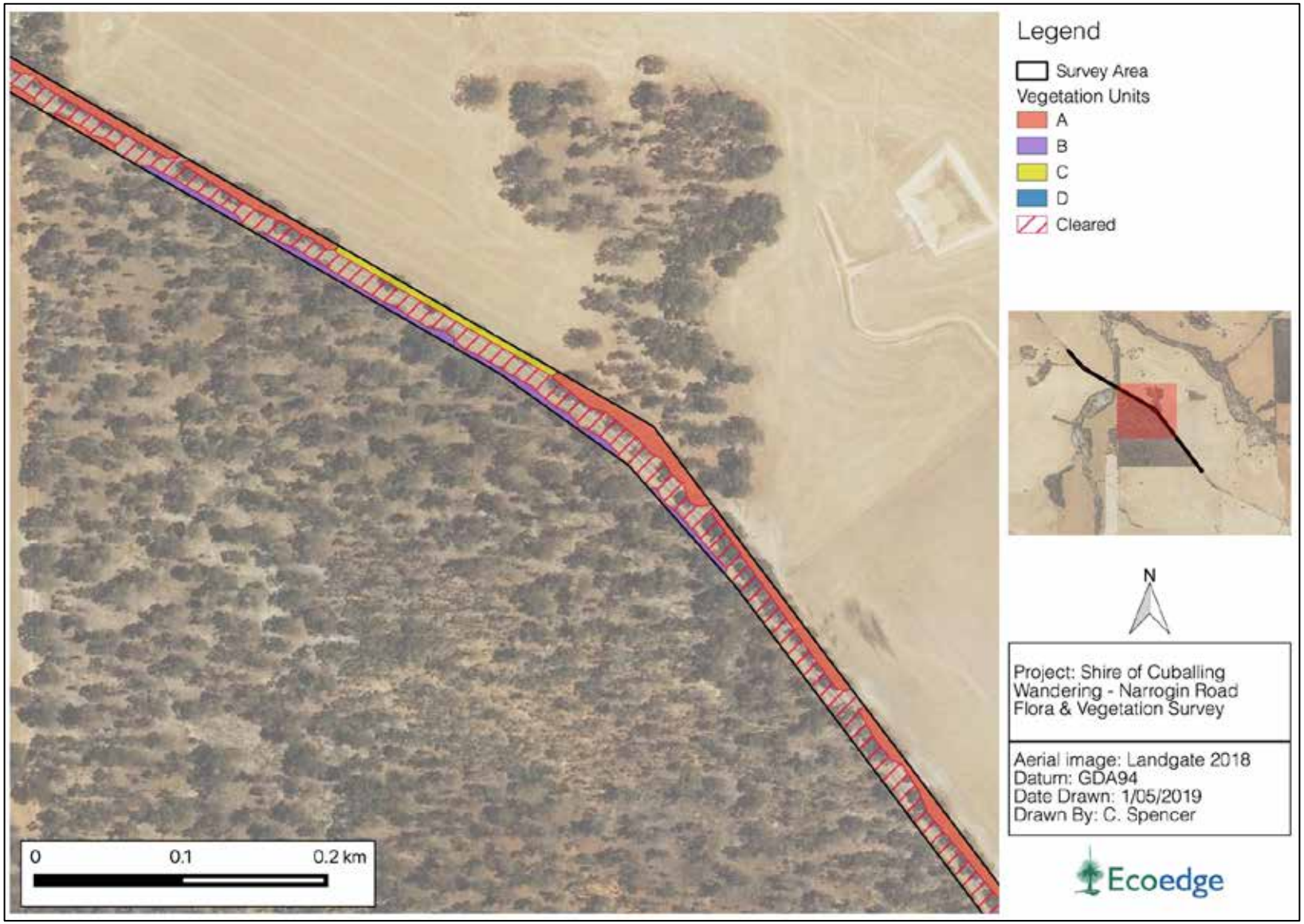

Figure 10.Vegetation units mapped within the Survey Area.

Figure 11.Vegetation units mapped within the Survey Area.

Figure 12.Vegetation condition mapped within the Survey Area.

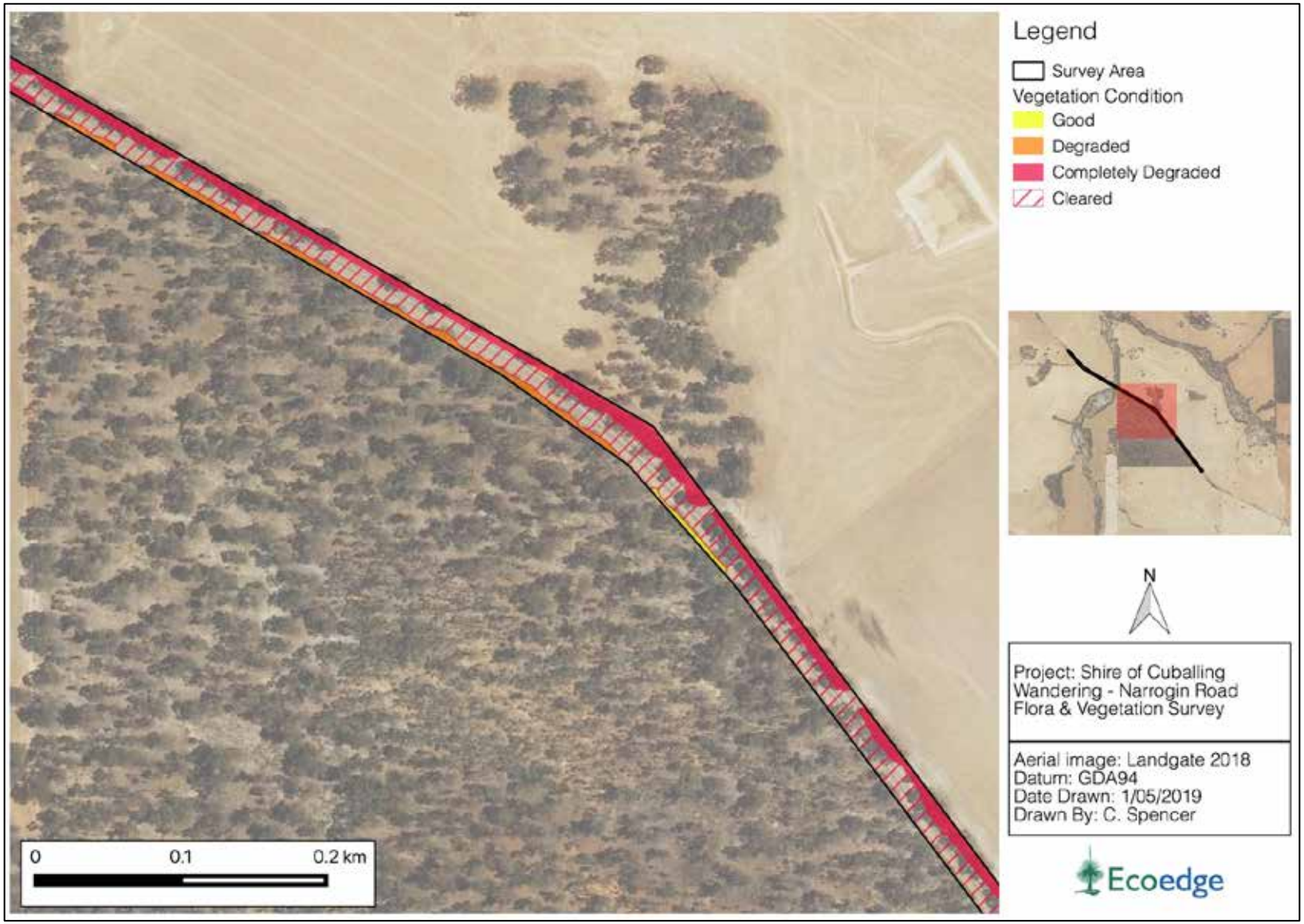

Figure 13.Vegetation condition mapped within the Survey Area.

Figure 14.Vegetation condition mapped within the Survey Area.

4.4 Priority and Threatened Ecological Communities

Vegetation unit B, which is dominated by *Eucalyptus wandoo*, meets the key diagnostic traits (minimum vegetation condition and area criteria) for the Critically Endangered Federally-listed TEC "Eucalypt Woodlands of the Western Australian Wheatbelt" (DotEE, 2015). **Table 8** shows how the Survey Area meets the key diagnostic criteria and **Table 9** shows how it meets the condition and area thresholds.

Table 8.Comparison of Veg Unit B with Eucalypt Woodlands of the Western Australian Wheatbelt TEC key diagnostic characteristics criteria (DotEE, 2015).

Condition Category	Comment
It occurs in one of the appropriate IBRA regions.	Yes, it occurs in the Avon Wheatbelt IBRA region
The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10% (crowns measured as if they are opaque).	Yes, criteria met.
The key species of the tree canopy are species of *Eucalyptus* (typically with a single trunk).	Yes, it contains *Eucalyptus wandoo.*
A native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs.	Yes, criteria met, however mostly in degraded condition.

Table 9.Comparison of Veg Unit B with Eucalypt Woodlands of the Western Australian Wheatbelt TEC condition and area criteria adapted from DotEE, 2015.

Condition Category	Mature trees	Minimum Patch Sizes (non-road side)	Comment
'Pristine, Excellent, Very Good'	Mature trees may be present or absent	>2 ha	Yes, whilst the unit only comprises 0.16 ha of mostly degraded vegetation it directly forms part of a larger patch of vegetation in excess of forty hectares in at least 'Very Good' condition which occurs to the west and south-west of the Survey Area in the 14 Mile Brook NR.
'Good'	Mature trees are present with at least 5 trees per 0.5 ha.	>2 ha	N/A
'Good'	Mature trees either absent or less than 5 trees per 0.5 ha are present.	>5 ha	N/A
'Degraded to Good'	Mature trees are present with at least 5 trees per 0.5 ha.	>5 ha	N/A

Vegetation unit B also meets the criteria of the State-listed Priority Three ecological community "Eucalypt Woodlands of the Western Australian Wheatbelt". This TEC is similar to the "Wandoo and Jam" Wheatbelt community (Harvey and Keighery, 2012).

This long and narrow unit (c.a. 500 m x 3.5 m) is in predominantly degraded condition, comprises mainly of overhanging canopy, from trees within the adjacent reserve, plus a few small regrowth trees and shrubs in the road reserve.

An assessment of this TEC occurrence, against seven significant impact criteria for critically endangered TECs, indicates one potential minor impact to the overall community (**Table 10**). Item one refers to a minor reduction to its overall extent. The exact extent of this impact could not be determined at time of the survey as the proposed clearing boundaries were not demarcated.

Completed Threatened Ecological Community Occurrence Forms are provided at **Appendix 8** In accordance with Section 49 of the BC Act.

Table 10. Comparison of vegetation Unit B against the critically endangered TEC significant impact criteria, adapted from DoTE, 2013.

Item	Significant impact criteria	Comment
1	Reduce the extent of an ecological community	Potential minor impacts to the already degraded edge of a larger intact occurrence of the TEC in 14 Mile Brook NR.
2	Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	No
3	Adversely affect habitat critical to the survival of an ecological community	No
4	Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No
5	Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No
6	Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: – assisting invasive species, that are harmful to the listed ecological community, to become established, or – causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	Possible Processes/machinery used to clear vegetation may introduce invasive weeds which may have an adverse impact on the adjacent 14 Mile Brook NR. Which is a Very Good condition occurrence of the TEC.
7	Interfere with the recovery of an ecological community.	No

5 Discussion and conclusions

An out-of-season survey of approximately 1.85 ha of remnant vegetation along part of Wandering-Narrogin Road resulted in 31 flora taxa (including 6 introduced species) being identified.

No Declared Threatened flora, Priority flora or other flora of conservation significance were found.

None of the introduced species were Declared Pest Plants or could be regarded as serious environmental weeds.

One of the four vegetation units recognised in the Survey Area, vegetation unit B, meets the criteria for the Federally-listed TEC 'Eucalypt Woodlands of the Western Australian Wheatbelt' and the State Priority 3 listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' ecological community. This unit is 0.16 ha in size and is almost all in a degraded condition comprising mostly as overhanging foliage from the immediately adjacent Fourteen-Mile-Brook Nature Reserve (NR) which is outside the Survey Area.

It is understood that the TEC vegetation within the adjacent 14 Mile Brook NR will not be subject to clearing. However, some of the understory, shrubs and small saplings, in the occurrence of the TEC within the road reserve, may be impacted by the proposal. Thereby the extent of the overall TEC will be reduced. The area of impact could not be determined at the time, as the footprint was not demarcated in the field. It is estimated that the scale of impact will likely be less than 0.16 ha.

According to the Federally approved conservation advice for this TEC, any areas meeting the 'Eucalypt Woodlands of the Western Australian Wheatbelt' criteria, are critical to the survival of the TEC (DotEE, 2015). This is because this ecological community occurs in a landscape that has been very heavily cleared and modified, and now exists as mostly very small and highly fragmented patches. This means that any clearing of native vegetation within vegetation unit B may be regarded as having a potentially significant impact on the overall TEC.

One vegetation association is mapped for the Survey Area: Association 1023 'Medium woodland; York gum, wandoo and salmon gum' (Beard, 1980). The surveyed community provides a reasonable match for this Association. The extent remaining of this association (at 10.85 %) is significantly below the Commonwealth government's 30% retention threshold however is very well represented within the DBCA estate with most of its current extent managed by the DBCA.

There are no ESAs within or in close proximity to the Survey Area that will limit the proposed road upgrade. The closest is located approximately 1.1km NE of the Survey Area and is associated with a reserve forming part of the Montague State Forest.

Vegetation within the Survey Area does not form part of a formally recognised ecological linkage, however it is part of vegetation that is narrowly connected to a networked corridor of native vegetation associated with a NW – SE aligned ephemeral watercourse. This watercourse-based-vegetated corridor is valuable because it provides some of the only connections between bushland patches within an otherwise cleared agricultural landscape. Clearing within the Survey Area is unlikely to have a significant impact on the function of the overall corridor due to the generally linear and narrow clearing footprint in mostly degraded land along the road boundary of a larger parcel of intact bushland (14 Mile Brook NR). It will also not incur any significant interruption or substantial break in connectivity of the corridor.

6 Recommendations

- Clearing of vegetation unit B, which is regarded as an occurrence of the Federally-listed TEC "Eucalypt Woodlands of the Western Australian Wheatbelt" and state listed P3 "Eucalypt Woodlands of the Western Australian Wheatbelt ecological community, is avoided or minimised, if possible.
- Measures are implemented to prevent the introduction of potentially invasive weed species during proposed clearing activities, especially in the area adjacent to the 14 Mile Brook NR.

7 Requirement for a Referral

The presence of a State listed PEC and Federally listed TEC means that the proposed development area has a high conservation status which need to be taken into account in the seeking of approval to clear the vegetation.

7.1 State Government

Under the *Environmental Protection Act 1986* (EP Act), approval to clear vegetation, in the form of a clearing permit, must be sought from the state Department of Water and Environment Regulation (DWER). Under the EP Act it is an offence to clear native vegetation unless the clearing is done in accordance with a clearing permit, or an exemption applies. Under this legislation, clearing is not generally permitted where the biodiversity values, land conservation and water protection roles of native vegetation would be significantly adversely impacted. DWER is responsible for administering the native vegetation clearing provisions.

This proposal should be referred to DWER to determine the obligations, conditions and necessary permit requirements, in respect of native vegetation removal and for any other advice they may have on the proposed clearing/revegetation for this project.

7.2 Federal Government

Matters of National Environmental Significance (MNES) are protected under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*. Under this Act the Federal Minister for the Environment must approve Actions which will have a significant impact on these matters. According to the EPBC Act Significant impact guidelines, proposals that are likely to have a significant impact on a MNES should be referred to the DoTEE for a decision on whether approval is required under the Act, (DotE, 2013). Referrals are also recommended where uncertainty exists regarding the significance of impact.

In accordance with the Federally approved conservation advice, the occurrence of the Eucalypt Woodlands of the Western Australian Wheatbelt TEC (vegetation unit B) within the Survey Area, is critical to the overall survival of the TEC (DotEE, 2015). Any clearing of this occurrence is therefore likely to be regarded as having a significant impact to a MNES and warrants referral to the DotEE.

It should be noted, that environmental offsets may be required. Currently the requirement is that offset vegetation be 'like-for-like' wherever possible, meaning that the Shire would be required to secure vegetation comprising of the TEC present within the proposed clearing area, to offset the loss of the proposed clearing. Depending on the value of the vegetation within the proposed clearing area, as habitat for listed fauna species, these values may also need to be offset.

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Appendix 1. Categories of DBCA Threatened and Priority Ecological Communities (DEC, 2013).

Appendix 2. Categories of Threatened Ecological Communities under the EPBC Act (DotEE, 2018c).

Appendix 3. Protected Matters Search Tool and NatureMap reports.

Appendix 4. Categories of Threatened and Priority List flora (DBCA, 2019a).

Appendix 5. Categories of Threatened Flora Species under the EPBC Act (DotEE, 2018b).

Appendix 6. Vegetation Condition Scale (EPA, 2016).

Appendix 7. List of Vascular Flora found within the Survey Area.

Appendix 8. Completed Threatened Ecological Community Occurrence Form