

**CA39 SEC 49A DRUMMOND STREET,
CRESWICK**

FLORA AND FAUNA ASSESSMENT

Department of Treasury and Finance



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1. EXECUTIVE SUMMARY

Brett Lane & Associates Pty Ltd (BL&A) undertook a flora and fauna assessment of a 2.267 hectare area of land at Creswick. It is understood that the land pertaining to the study area is to be sold, though at this stage, no specific development plan has been proposed. As such, this assessment presents the flora and fauna values at the study area and should be used to inform any proposed development.

Vegetation in the study area comprised large open areas which were dominated by introduced flora. Early Black Wattles (introduced) were the dominant tree species, having been planted commonly throughout the study area. A large plantation of Radiata Pines occurs to the north of the study area, a small section of which occurs within the study area, in the north-west corner. Small sections of the study area, which were further distinguished by a cover of native grassy species, met the definition of native vegetation. As such, three small patches of native vegetation, in the form of altered Heathy Dry Forest (EVC 20) occur within the study area.

No threatened flora, fauna or ecological communities were recorded in the study area. Two flora species listed as protected under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) were recorded in the study area:

- Desert Cassinia; and
- Star Cudweed.

Three listed fauna species were considered to have the potential to occur in the study area. However, it was considered that these species would be unlikely to be impacted by any future development at the site.

To further inform any future development within the study area, an impact assessment has been undertaken as part of this investigation, under the assumption that all existing vegetation and habitat occurring within the entire study area is to be removed. On this basis the resultant loss of native vegetation would equate to a total 'extent' of 0.318 hectares of native vegetation, which would be assessed under the low risk assessment pathway. A planning permit under Clause 52.17 and ESO1 are considered to be required for the removal of native vegetation in the study area. Any future proposal to remove all native vegetation in the study area would not trigger a referral to DELWP. An offset of 0.010 *general* biodiversity equivalence units would be required to compensate for the removal of native vegetation in the study area. Such an offset is likely to cost approximately \$2,000 based on recent offset transactions.

There are no implications under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the study area.

Whilst any future development of the study area is unlikely to result in a significant impact on any values listed as threatened under the FFG Act, a Protected Flora Permit would be required from DELWP to remove the two listed protected species from public land. Application forms for Protected Flora Permits can be obtained from DELWP offices or from their customer service centre.

There are no implications under the *Environment Effects Act 1978* (EE Act) for the study area.

The table below indicates the compliance of the information in this report with the application requirements of the planning scheme for the removal of native vegetation.

Application requirement		Response
Applications requirements for all risk pathway applications		
1.	The location of the site native vegetation is to be removed. This includes the address of the property	Three remnant patches from the area of land defined as Crown Allotment 39, Section 49A, west of Drummond Street, Creswick.
2.	A description of the native vegetation to be removed including: <ul style="list-style-type: none"> whether the native vegetation is a remnant patch, or scattered trees, in accordance with the definitions in section 2.2 of the <i>Biodiversity assessment guidelines</i>; the area of any remnant patches of native vegetation; and the number of any scattered trees. 	See Section 5.2 of this report.
3.	Maps or plans containing the following information: <ul style="list-style-type: none"> north point and property boundaries; all areas of native vegetation, clearly showing the native vegetation to be removed (including any area that the Country Fire Authority has recommended for removal or management for fire protection purposes); and all scattered trees to be removed. 	See Figure 1 of this report.
4.	Recent dated photograph of native vegetation to be removed.	See Appendix 5 of this report.
5.	The risk-based pathway of the application to remove native vegetation	Low risk based pathway. See Section 7.2.1 of this report.
6.	Where the purpose of removal, destruction or lopping of native vegetation is to create defensible space, a statement is required that explains why removal, destruction or lopping of native vegetation is necessary. The statement must have regard to other available bushfire risk mitigation measures. This requirement does not apply to the creation of defensible space in conjunction with an application under the Bushfire Management Overlay.	N/A
7.	A copy of any property vegetation plan that applies to the site.	N/A
8.	Details of any other native vegetation that was permitted to be removed on the same property with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before the application to remove native vegetation is lodged.	N/A
9.	The strategic biodiversity score of the native vegetation to be removed.	SBS of native vegetation recorded is 0.1. See Appendix 7 of this report.
10.	The offset requirements should a permit be granted to remove native vegetation.	A general offset of 0.01 general BEUs would be required. See Section 7.2.2 and Appendix 7 of this report.

2. INTRODUCTION

The Department of Treasury and Finance engaged Brett Lane & Associates Pty Ltd (BL&A) to conduct a flora and fauna assessment of a 2.267 hectare area of land in Creswick. The specific area investigated, referred to herein as the 'study area', and comprised the area of land defined as Crown Allotment 39, Section 49A, west of Drummond Street, Creswick. It is understood that the land pertaining to the study area is to be sold, though at this stage, no specific development plan has been proposed. As such, this assessment presents the flora and fauna values at the study area and should be used to inform any proposed development.

To further inform any future development within the study area, an impact assessment has been undertaken as part of this investigation, under the assumption that all existing vegetation and habitat occurring within the entire study area is to be removed.

This investigation was commissioned to provide information on the extent and condition of native vegetation in the study area according to Victoria's *Biodiversity assessment guidelines* (DEPI 2013), as well as any potential impacts on flora and fauna matters listed under the state *Flora and Fauna Guarantee Act 1988* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. This report outlines any implications under relevant national, state and local legislation and policy frameworks.

Specifically, the scope of the investigation included:

- A desktop investigation of the existing information on the flora, fauna and native vegetation of the study area and surrounds including:
 - Victorian Biodiversity Atlas administered by the Department of Environment, Land, Water and Planning (DELWP);
 - The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool; and
 - DELWP Native Vegetation Information Management system (NVIM).
- A site survey involving:
 - Characterisation and mapping of native vegetation on the site, as defined in Victoria's *Biodiversity assessment guidelines* (the 'Guidelines');
 - Assessment of native vegetation
 - Compilation of flora and fauna species lists for the site;
 - Assessment of the nature and quality of native fauna habitat; and
 - Assessment of the likelihood of occurrence of EPBC Act and *Flora and Fauna Guarantee Act 1988* (FFG Act) listed flora, fauna and communities on the site.

This investigation was undertaken by a team from BL&A, comprising Justin Sullivan (Senior Ecologist), Greg Cranston (Botanist), Verity Fyfe (Botanist) and Alan Brennan (Senior Ecologist & Project Manager).

3. PLANNING AND LEGISLATIVE CONSIDERATIONS

This investigation and report addresses the application on the site of relevant legislation and planning policies that protect biodiversity. Local, state and Commonwealth controls are summarised below.

3.1. Local planning provisions

The study area is located within the Hepburn local government area. It is currently zoned Public Park and Recreation Zone (PPRZ) in the Hepburn Planning Scheme.

Local planning provisions apply under the Victorian *Planning and Environment Act 1987*.

3.1.1. Overlays

The study area is subject to **Environmental Significance Overlay - Schedule 1 (ESO1)** of the Hepburn Planning Scheme, which is aimed at the protection of the water quality in the shires catchments.

Requirement for a permit: A permit is required to remove, destroy or lop vegetation in an area covered by ESO1 when the area of vegetation to be removed is greater than 1 hectare and/or occurs within 30 metres of a waterway. Removal of vegetation is exempt from permit under ESO1 when the vegetation to be removed occurs on Crown Land and by a person acting under and in accordance with an authorisation order made under sections 82 or 84 of the *Traditional Owner Settlement Act 2010*.

Decision guidelines: The impacts to water quality, erosion and other environmental factors would be considered as part of the decision guidelines where a permit under ESO1 is required.

3.2. State planning provisions

State planning provisions are established under the Victorian *Planning and Environment Act 1987*.

Under Clause 52.17 of all Victorian Planning Schemes a planning permit is required for the destruction, lopping or removal of native vegetation on land which has an area of 0.4 hectares or more (together with all contiguous land in single ownership). This includes the removal of dead trees with a DBH (diameter at breast height or 1.3 metres) of 40 centimetres or more and any individual scattered native plants.

Before issuing a planning permit, Responsible Authorities are obligated to refer to Clause 12.01 (Biodiversity) in the Planning Scheme. This refers in turn to the following online tool and document:

- The Native Vegetation Information Management system (NVIM) (DELWP 2017a) – a database administered by DELWP; and
- *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI 2013).

A planning permit under Clause 52.17 of the Hepburn Planning Scheme is considered to be required for the removal of native vegetation.

The application of the *Native Vegetation Information Management system* (NVIM) (DELWP 2017a) and *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (the 'Guidelines') (DEPI 2013) are explained further in Appendix 1.

Clause 66.02 of the planning scheme determines the role of DELWP in the assessment of native vegetation removal permit applications. If an application is referred, DELWP may make certain recommendations to the responsible authority in relation to the permit application. An application to remove native vegetation must be referred to DELWP in the following circumstances:

- Applications where the native vegetation to be removed is 0.5 hectares or more (this does not apply to removal of scattered trees only);
- All applications in the high risk-based pathway;
- Applications where a property vegetation plan applies to the site; and
- Applications on Crown land which is occupied or managed by the responsible authority.

3.3. EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts on these species require the approval of the Australian Minister for the Environment.

Implications under the EPBC Act for the current proposal are discussed in Section 7.3.

3.4. FFG Act

The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) lists threatened and protected species and ecological communities (DELWP 2015a, DELWP 2015b). Any removal of threatened flora species or communities (or protected flora) listed under the FFG Act from public land requires a Protected Flora Licence or Permit under the Act, obtained from DELWP.

Implications under the FFG Act for the current proposal are discussed in Section 7.4.

3.5. EE Act

One or a combination of a number of criteria may trigger a requirement for a Referral to the Victorian Minister for Planning who will determine if an EES is required according to the “Ministerial Guidelines for Assessment of Environmental Effects under the *Environment Effects Act 1978*” (DSE 2006).

Implications under the EE Act for the current proposal are discussed in Section 7.5.

4. EXISTING INFORMATION & METHODS

4.1. Existing information

Existing information used for this investigation is described below.

4.1.1. Native vegetation

Pre-1750 (pre-European settlement) vegetation mapping administered by DELWP was reviewed to determine the type of native vegetation likely to occur in the study area and surrounds. Information on Ecological Vegetation Classes (EVCs) was obtained from published EVC benchmarks. These sources included:

- Relevant EVC benchmarks for the Victorian Volcanic Plain bioregion¹ (DSE 2004a); and
- Biodiversity Interactive Maps (DELWP 2016a).

4.1.2. Listed matters

Existing flora and fauna species records and information about the potential occurrence of listed matters was obtained from an area termed the 'search region', defined here as an area with a radius of ten kilometres from the approximate centre point of the study area (coordinates: latitude 37° 25' 12" S and longitude 143° 53' 17" E).

A list of the flora and fauna species recorded in the search region was obtained from the Victorian Biodiversity Atlas (VBA), a database administered by DELWP (2017).

The 'Vegetation/ Modelled FFG Act Communities' layer in DELWP's Biodiversity Interactive Map (DELWP 2016a) was consulted to determine which ecological communities listed as threatened under the FFG Act were modelled to potentially occur in or near the study area.

The online *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (DotEE 2015) was consulted to determine whether nationally listed species or communities potentially occurred in the search region based on habitat modelling.

4.2. Field methods

The field assessment was conducted on the 21st March 2017. During this assessment, the study area was surveyed entirely on foot and areas supporting remnant native vegetation and/or fauna habitat were inspected in more detail on foot.

Sites in the study area found to support native vegetation or with potential to support listed matters were mapped using a hand held tablet with inbuilt GPS (accurate to approximately five metres). Species and ecological communities listed as threatened under the EPBC Act or FFG Act were also mapped using the same method.

¹ A bioregion is defined as "a geographic region that captures the patterns of ecological characteristics in the landscape, providing a natural framework for recognising and responding to biodiversity values". In general bioregions reflect underlying environmental features of the landscape (DNRE 1997).

4.2.1. Native vegetation

Native vegetation is currently defined in the Victoria Planning Provisions as ‘plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses’. The *Biodiversity assessment guidelines* define native vegetation as belonging to two categories (DEPI 2013):

- Remnant patch; or
- Scattered trees.

The definitions of these categories are provided below, along with the prescribed DELWP methods to assess them.

Remnant patch

A remnant patch of native vegetation is either:

- An area of native vegetation where at least 25 per cent of the total perennial understorey plant cover is native; and/or
- Any area with three or more native canopy trees² where the canopy foliage cover³ is at least 20 per cent of the area.

Remnant patch condition is assessed using the habitat hectare method (Parkes *et al.* 2003; DSE 2004b) whereby components of native vegetation (e.g. tree canopy, understorey and ground cover) are assessed against an EVC benchmark. The score effectively measures the percentage resemblance of the vegetation to its original condition.

The NVIM system (DELWP 2015) provides modelled condition scores for native vegetation to be used in certain circumstances (see Appendix 1). All wetlands mapped on DELWP’s native vegetation layer are treated as a remnant patch (DEPI 2013).

The condition score assists in defining the biodiversity equivalence score of the native vegetation and the offset targets if removal of native vegetation is approved (see Appendix 1 for details of how scoring works).

Scattered trees

The *Biodiversity assessment guidelines* define scattered trees as a native canopy tree² that does not form part of a remnant patch of native vegetation.

Scattered trees are counted, the species identified and their DBH (diameter at breast height or 1.3 metres above ground) measured or estimated.

4.2.2. Flora species and habitats

Records of flora species were made in conjunction with sampling methods used to undertake habitat hectare assessments of native vegetation described above. Specimens requiring identification using laboratory techniques were collected.

² A canopy tree is a reproductively mature tree that is greater than 3 metres in height and is normally found in the upper layer of the relevant vegetation type.

³ Foliage cover is the proportion of the ground that is shaded by vegetation foliage when lit from directly above.

Species protected under the FFG Act were determined by crosschecking against the FFG Act Protected Flora List (DELWP 2016c).

The potential for habitats to support listed flora species was assessed based on the criteria outlined below:

- The presence of suitable habitat for flora species such as soil type, floristic associations and landscape context; and
- The level of disturbance of suitable habitats by anthropogenic disturbances and invasions by pest plants and animals.

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence of flora listed under the EPBC Act and/or FFG Act. That is, where insufficient evidence was available on the potential occurrence of a listed species, it is assumed that it could be in an area of suitable habitat.

4.2.3. Fauna species and habitats

The techniques below were used to detect fauna species utilising the study area.

- Incidental searches for mammal scats, tracks and signs (e.g. diggings, signs of feeding and nests/burrows).
- Turning over logs/rocks and other ground debris for reptiles, frogs and mammals.
- Bird observation during the day.
- General searches for reptiles and frogs; including identification of frog calls in seasonally wet areas.
- General searches for bird and/or bat habitat including potential roosting sites such as trees with hollows and underneath bark of trees.

Fauna habitats are described using habitat components that include old-growth trees, fallen timber, leaf litter and surface rock.

The study area's habitat connectivity (i.e. degree of isolation/fragmentation), including linkages to other habitats in the region, was determined using field observations, recent aerial photography and DELWP's Biodiversity Interactive Maps (DELWP 2016a).

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence of fauna listed under the EPBC Act and FFG Act. That is, where insufficient evidence was available on the potential occurrence of a listed species, it is assumed that it could be in an area of suitable habitat.

4.2.4. Threatened ecological communities

The likelihood of listed threatened ecological communities occurring in the study area was determined by checking general field observations against published descriptions of relevant listed ecological communities modelled to potentially occur in the study area.

Reviewed ecological community descriptions comprised identification criteria and condition thresholds from listing advice for EPBC Act communities as well as FFG Act listed community descriptions (SAC 2015).

4.3. Limitations of field assessment

The site assessment was carried out in autumn. The short duration and seasonal timing of field assessments can result in some species not being detected when they may occur at other times. Additionally, some flora species and life-forms may be undetectable at the time of the survey or unidentifiable due to a lack of flowers or fruit.

The timing of the survey and condition of vegetation was otherwise considered suitable to ascertain the extent and condition of native vegetation and fauna habitats.

5. ASSESSMENT RESULTS

5.1. Site description

The study area for this investigation (Figure 1) comprised 2.267 hectares of Crown land located at Creswick, 15 kilometres north of Ballarat. The shaped study area was triangular in shape and bounded by adjacent Crown allotments to the north and south, and Ballarat – Maryborough railway to the west. Lake Calembeen and the associated Calembeen Park occur to the north east.

The study area supported rocky soils over a flat to undulating landscape. An open earth drain occurred along the eastern and southern boundaries of the study area. The drain was characterised by a dense cover of introduced flora namely Blackberry and Paspalum, and held a small amount of water at the time of the survey.

Vegetation in the study area comprised large open areas which were dominated by introduced flora, namely Brown-top-bent, Blackberry and Gorse. Early Black Wattles, a tree species native to New South Wales and Queensland, were the dominant tree species, having been planted commonly throughout the study area. A large plantation of Radiata Pines occurs to the north of the study area, a small section of which occurs within the study area, in the north-west corner. Small sections of the study area were further distinguished by a cover of native grassy species, namely wallaby grass, Weeping Grass and spear grass. These areas, though small and heavily altered from their original state, were considered to meet the definition of native vegetation (See Section 5.2).

Fauna habitat within the study area comprised three main types; disturbed open areas, planted trees and a weedy open-earth drain (See Section 5.5). Fauna habitat in the study area was overall considered to be low. Planted trees, whilst potentially provided roosting habitat, supported no hollows. The ground layer of the study area was mostly disturbed and comprised introduced flora. No rocks or logs were observed in the study area, therefore there was very limited habitat for frogs, lizards and small mammals. The open earth drain provided potential dispersal habitat for frog species. However, was overgrown with high threat weeds.

The study area occurs just within the mapped boundary of the Victorian Volcanic Plain bioregion and falls within the North Central catchment.

5.2. Native vegetation

Pre-European EVC mapping (DELWP 2016a) indicated that the study area would have supported Heathy Dry Forest (EVC 20) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

The persistence of a native grassy layer suggested that a heavily disturbed form of Heathy Dry Forest (EVC 20) occurred in three small remnant patches within the study area (Figure 1). A general description of Heathy Dry Forest is provided within the EVC benchmark in Appendix 6.

Three small remnant patches (referred to herein as Habitat Zones A to C) comprising the abovementioned EVC were identified in the study area (

Table 1).

Table 1: Description of habitat zones in the study area

Habitat Zone	EVC	Description
A	Heathy Dry Forest (EVC 20)	Small area of native grassy cover along western boundary. Area comprised wallaby grass, spear grass amongst a high weed cover of Brown-top Bent, Gorse and Blackberry.
B		Small area of native grassy cover nearby western boundary. Area comprised wallaby grass, spear grass, Kangaroo Grass and Common Tussock Grass, amongst a high weed cover of Brown-top Bent, Gorse and Blackberry. Recruitment of native Blackwoods present.
C		Area of native grassy cover under planted Early Black Wattles. The area comprised wallaby grass and Weeping Grass. Weed cover was high and comprised mainly Brown-top Bent. Leaf litter was very high on account of the Early Black Wattles.

The habitat hectare assessment results for these habitat zones are provided in Table 2. More detailed habitat scoring results are presented in Appendix 2.

Table 2: Summary of habitat hectare assessment results

Habitat Zone	EVC	Area (ha)	Condition score (out of 100)
A	Heathy Dry Forest (EVC 20)	0.114	20
B		0.099	27
C		0.105	18
Total		0.318	



Figure 1: Study area and native vegetation

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- ▬ Study area
- ▨ Heathy Dry Forest (EVC 20)



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5.3. Scattered trees

No scattered trees were recorded in the study area.

5.4. Flora species

5.4.1. Species recorded

A total of 63 plant species were recorded during the field assessment. Of these, 18 (29%) were indigenous and 45 (71%) were introduced or non-indigenous native in origin (Appendix 3).

5.4.2. Listed species

VBA records (DELWP 2017) and the EPBC Protected Matters Search Tool (DotEE 2015) indicated that within the search region there were records of, or there occurred potential suitable habitat for, 11 species listed under the Commonwealth EPBC Act and 13 listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act), including nine listed under both Acts. No flora species listed as threatened on either the EPBC Act or FFG Act were recorded during the field survey.

The likelihood of occurrence in the study area of species listed under the EPBC Act and FFG Act is addressed in Table 3. Species considered ‘likely to occur’ are those that have a very high chance of being in the study area based on numerous records in the search region and suitable habitat in the study area. Species considered to have the ‘potential to occur’ are those where suitable habitat exists, but recent records are scarce.

This analysis indicates that no flora species listed as threatened on either the EPBC Act or FFG Act are likely to occur or have the potential to occur in the study area.

Two flora species listed as protected under the FFG Act were recorded in the study area:

- Desert Cassinia; and
- Star Cudweed.

Table 3: FFG Act and EPBC Act listed flora species and likelihood of occurrence

Common Name	Scientific name	EPBC-T	FFG-T	Habitat	Number of records	Date of last record	Likelihood of occurrence
Australian Anchor Plant	<i>Discaria pubescens</i>		L	Usually associated with basaltic substrate streams in cool elevated areas (Walsh 1999). Occurs in grassy open woodlands and forests in the east of Victoria (Hall & Parsons 1987) and stream and river valleys to the west of Melbourne (Lunt 1987).	5	10/12/1998	Limited native grass cover present. Habitat highly disturbed. Unlikely to occur.
Basalt Peppercreess	<i>Lepidium hyssopifolium</i>	EN	L	Known to establish on open, bare ground with limited competition from other plants. Previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Now generally found amongst exotic pasture grasses and beneath exotic trees.	1	1/12/1941	Limited native grass cover present. Habitat highly disturbed. Lack of recent records in the search region. Unlikely to occur.
Charming Spider-orchid	<i>Caladenia amoena</i>	EN	L	Typically found in grassy dry forest; Eucalyptus melliodora. (Box Ironbark) on sandy loams derived from sandstone and mudstone.	1	12/09/1932	No suitable habitat present - Unlikely to occur
Clover Glycine	<i>Glycine latrobeana</i>	VU	L	Found across south-eastern Australia in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer. In Victoria, populations occur in lowland grasslands, grassy woodlands and sometimes in grassy heath.	None	N/A	Limited native grass cover present. Habitat highly disturbed. Lack of any records in the search region. Unlikely to occur.
Fragrant Leek-orchid	<i>Prasophyllum suaveolens</i>	EN	L	Occurs in open, species rich native grassland dominated by Themeda triandra with perennial herbs and lilies on poorly drained red-brown soil derived from basalt (DSE 2003).	3	3/11/1934	Limited native grass cover present. Habitat highly disturbed. Lack of recent records in the search region. Unlikely to occur.
Large-fruit Yellow-gum	<i>Eucalyptus leucoxylon subsp. megalocarpa</i>		L	Undulating low hills of thin loam over limestone in coastal shrubland. Naturally restricted to far south-western Victoria, near the Glenelg River estuary south of Nelson, and south-eastern South Australia. Other occurrences comprise planted individuals (Nicolle 2006).	1	30/01/2016	No suitable habitat present. Not recorded in study area - Unlikely to occur
Matted Flax-lily	<i>Dianella amoena</i>	EN	L	Lowland grassland and grassy woodlands on well-drained to seasonally waterlogged fertile sandy loams to heavy cracking soils derived from sedimentary or volcanic Geology. It is widely distributed from eastern to south-western Victoria (Carter 2010).	None	N/A	Limited native grass cover present. Habitat highly disturbed. Lack of any records in the search region. Unlikely to occur.
Plump Swamp Wallaby-grass	<i>Amphibromus pithogastrus</i>		L	Currently confined to treeless grassland or sedgeland, includes, gilgai depressions in seasonally wet Kangaroo Grass (Themeda triandra) dominated grassland, a seasonal soak dominated by Common Bog-rush Schoenus apogon and in a stand of Sedge (Carex sp. aff. bichenoviana). Only known from Bathurst and Armidale (DSE 2004).	1	17/12/1991	No suitable habitat present - Unlikely to occur
River Swamp Wallaby-grass	<i>Amphibromus fluitans</i>	VU		River Swamp Wallaby-grass grows mostly in permanent swamps and also lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground; conditions that are caused by seasonally-fluctuating water levels.	1	9/12/1997	No suitable habitat present - Unlikely to occur

Common Name	Scientific name	EPBC-T	FFG-T	Habitat	Number of records	Date of last record	Likelihood of occurrence
Small Milkwort	<i>Comesperma polygaloides</i>		L	Found in remnant native grasslands and grassy woodlands on heavy soils (Walsh 1999) on the Western Basalt Plains, dominated by Kangaroo Grass, Silver Tussock and, less commonly, wallaby grasses and spear grasses (DSE 1999)	1	1/09/1992	Limited native grass cover present. Habitat highly disturbed. Unlikely to occur.
Spiny Rice-flower	<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	CR	L	Occurs in grassland or open shrubland on basalt derived soils, usually comprising black or grey clays. Plants from more northerly populations occur on red clay complexes, while plants from southern populations occur on heavy grey-black clay loams. Topography is generally flat but populations may occur on slight rises or in slightly wettish depressions.	None	N/A	Limited native grass cover present. Habitat highly disturbed. Lack of any recent records in the search region. Unlikely to occur.
Spiral Sun-orchid	<i>Thelymitra matthewsii</i>	VU	L	Slightly elevated sites to 300m in well-drained soils (sandy loams to gravelly limestone soils) in light to dense forest; sometimes in coastal sandy flats (Weber & Entwisle 1994).	None	N/A	No suitable habitat present - Unlikely to occur
Stiff Groundsel	<i>Senecio behrianus</i>	EN	L	Heavy, winter wet and clayey soils (Walsh, 1999).	5	9/05/2007	No suitable habitat present - Unlikely to occur
Swamp Fireweed	<i>Senecio psilocarpus</i>	VU		Herb-rich winter-wet swamps on volcanic clays or peaty soils (Walsh 1999). Known from approximately 10 sites between Wallan, about 45 km north of Melbourne, and Honans Scrub in south-eastern South Australia (DSEWPC 2008).	None	N/A	No suitable habitat present - Unlikely to occur
White Sunray	<i>Leucochrysum albicans</i> var. <i>tricolor</i>	EN	L	Occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. Plants can be found in natural or semi-natural vegetation and grazed or ungrazed habitat. Bare ground is required for germination. The unpalatability of this species is likely to protect it in heavily grazed areas where patches of bare ground are likely to develop, favouring recruitment.	1	10/11/1928	Limited native grass cover present. Habitat highly disturbed. Lack of recent records in the search region. Unlikely to occur.

Notes: EPBC = threatened species status under EPBC Act: EX = presumed extinct in the wild; CR = critically endangered; EN = endangered; VU = vulnerable; **FFG** = threatened species status under the FFG Act: L = listed as threatened under the FFG Act.

5.5. Fauna habitats

The study area supported three main fauna habitat types.

- Disturbed open grassy areas;
- Planted trees; and
- Aquatic habitat.

Disturbed open grassy areas: This vegetation type comprised the majority of the southern half of the study area. Vegetation in this area mostly comprised introduced flora, namely Brown-top Bent, with recruiting Blackberry and Gorse shrubs throughout. Small sections of understorey in this habitat were distinguished by a low cover of native grass species, namely wallaby grass and Weeping Grass, but these areas were very restricted in size and not connected to other similar habitats. Small planted introduced trees, namely Early Black Wattle and fruit trees (*Prunus* spp.) occurred in this area, none of which contained hollows. No rocks or logs were observed in this area. This habitat type was considered low quality.

Planted trees: This vegetation type comprised two main planted trees, Early Black Wattles and Radiata Pines, both of which are introduced. This habitat type comprised dense foliage, though did not support any hollows. Leaf litter in this area was very high due to these two species exclusively, resulting in a reduced diversity in the understorey. No rocks or logs were observed in this area. This habitat type was considered low quality.

Aquatic habitat: This vegetation type comprised the open earth drain which runs along the eastern and southern boundaries of the study area. The drain does not directly connect with adjacent aquatic habitats in the region, i.e. Creswick Creek. The drain while containing a very small amount of water at the time of the survey, was overgrown with introduced flora, namely Blackberry and *Paspalum*, as well as some sections that contained Desert Cassinia, a native shrub that commonly grows along drains. As such this habitat was considered low quality.

5.6. Fauna species

5.6.1. Species recorded

During the field assessment 28 fauna species were recorded. This included 25 birds (one introduced), two mammals (both introduced) and one frog (Appendix 4).

5.6.2. Listed species

The review of existing information indicated that 35 fauna species listed under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) have previously been recorded within the search region or for which potential habitat occurs according to the EPBC Act Protected Matters Search Tool. This included 27 species listed under the Commonwealth EPBC Act and 24 listed under the state FFG Act, 16 of which were listed under both Acts.

The likelihood of occurrence of these species in the study area was assessed and the results are presented in Table 4.

This analysis of potential occurrence of listed fauna species excludes:

- Marine fauna given that the study area is inland

- Migratory oceanic bird species (such as albatrosses and petrels) and migratory shorebirds given that the study area is inland.

Species considered 'likely to occur' are those that have a very high chance of being in the study area given the existence of numerous records in the search region and suitable habitat in the study area. Using the precautionary approach, species considered to have the 'potential to occur' are those where suitable habitat exists, but recent records are scarce. This analysis indicates that two listed fauna species have the potential to occur. These species are:

- Growling Grass Frog (Vulnerable under EPBC Act, threatened under FFG Act);
- Powerful Owl (threatened under FFG Act); and
- White-throated Needletail (Migratory under EPBC Act).

The susceptibility of these species to impacts from development is discussed in Section 5.6.3.

Table 4: Listed fauna species from the search region and likelihood of occurrence in the study area

Common Name	Scientific name	EPBC-T	EPBC-M	FFG-T	Habitat	Number of records	Date of last record	Likelihood of occurrence
Birds								
Australasian Bittern	<i>Botaurus poiciloptilus</i>	EN		L	Terrestrial wetlands, including a range of wetland types but prefers permanent water bodies with tall dense vegetation, particularly those dominated by sedges, rush, reeds or cutting grass (Marchant and Higgins 1990).	None	N/A	No suitable habitat present - Unlikely to occur
Australian Bustard	<i>Ardeotis australis</i>			L	Inhabits mainly grasslands, low shrublands and lightly timbered open woodlands (Marchant and Higgins 1993).	3	1/05/1954	No suitable habitat present - Unlikely to occur
Australian Painted Snipe	<i>Rostratula australis</i>	EN		L	Generally inhabits shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca). Sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber.	1	19/01/2009	No suitable habitat present - Unlikely to occur
Black-faced Monarch	<i>Monarcha melanopsis</i>		M (Bonn Convention (A2H))		Rainforests, eucalypt woodlands, coastal scrub and damp gullies (Higgins et al. 2006).	None	N/A	No suitable habitat present - Unlikely to occur
Blue-billed Duck	<i>Oxyura australis</i>			L	Terrestrial wetlands and prefers deep permanent, well vegetated water bodies. V (Marchant and Higgins 1990).	3	19/01/2009	No suitable habitat present - Unlikely to occur
Brolga	<i>Grus rubicunda</i>			L	Wetlands that include permanent open water and deep freshwater marsh. Between 500 and 700 Brolgas are known to occur in southwestern Victoria (Marchant and Higgins 1993).	3	8/06/2004	No suitable habitat present - Unlikely to occur
Common Greenshank	<i>Tringa nebularia</i>		M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))		Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins and Davies 1996).	None	N/A	No suitable habitat present - Unlikely to occur
Curlew Sandpiper	<i>Calidris ferruginea</i>	CR	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))		Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins and Davies 1996).	None	N/A	No suitable habitat present - Unlikely to occur
Double-banded Plover	<i>Charadrius bicinctus</i>		M (Bonn Convention (A2H))		Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Marchant and Higgins 1993).	1	1/06/2011	No suitable habitat present - Unlikely to occur
Eastern Curlew	<i>Numenius madagascariensis</i>	CR	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))		Inhabits sheltered coasts, especially estuaries, embayment, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats, often with beds of sea grass (Higgins and Davies 1996).	None	N/A	No suitable habitat present - Unlikely to occur

Common Name	Scientific name	EPBC-T	EPBC-M	FFG-T	Habitat	Number of records	Date of last record	Likelihood of occurrence
Eastern Great Egret	<i>Ardea modesta</i>			L	Occurs in a variety of wetlands including: permanent water bodies on flood plains; shallows of deep permanent lakes, either open or vegetated with shrubs or trees; semi-permanent swamps with tall emergent vegetation (e.g. bulrush) and herb dominated seasonal swamps with abundant aquatic flora (Marchant and Higgins 1990).	12	27/02/2003	No suitable habitat present - Unlikely to occur
Fork-tailed Swift	<i>Apus pacificus</i>		M (JAMBA,CAMBA, ROKAMBA)		The species can occur in wet sclerophyll forest but mainly prefers open forest or plains. It is almost exclusively aerial and feeds up to hundreds on metres above the ground, but can feed among open forest canopy. The species breeds internationally and seldom roosts in trees and is unlikely to be impacted by the development (Higgins et al 2006b).	None	N/A	No suitable habitat present - Unlikely to occur
Grey Goshawk	<i>Accipiter novaehollandiae novaehollandiae</i>			L	Inhabit rainforests, open forests, swamp forests, woodlands and plantations; most abundant where forest or woodland provide cover for hunting from perches in Vic., most common in Otway ranges. (Marchant and Higgins 1993).	2	8/04/1991	No suitable habitat present - Unlikely to occur
Latham's Snipe	<i>Gallinago hardwickii</i>		M (JAMBA, CAMBA, ROKAMBA, Bonn A2H)		Occurs in wide variety of permanent and ephemeral wetlands; it prefers open freshwater wetlands with dense cover nearby, such as the edges of rivers and creeks, bogs, swamps, waterholes. The species is wide spread in southeast Australia and most of its population occurs in Vic. Except in the northwest of the state. (Naarding 1983; Higgins and Davies 1996).	44	19/01/2009	No suitable habitat present - Unlikely to occur
Painted Honeyeater	<i>Grantiella picta</i>	VU		L	Inhabits box-ironbark forests and woodlands and mainly feeds on the fruits of mistletoe. Strongly associated with mistletoe around the margins of open forests and woodlands. Occurs at few localities. Uncommon breeding migrant from further north, arriving in October and leaving in February. (Higgins et al. 2001; Tzaros 2005).	None	N/A	No suitable habitat present - Unlikely to occur
Plains-wanderer	<i>Pedionomus torquatus</i>	CR		L	This species inhabits native grasslands with sparse cover, preferring grasslands that include wallaby grass and spear grass species (Marchant and Higgins 1993).	None	N/A	No suitable habitat present - Unlikely to occur
Powerful Owl	<i>Ninox strenua</i>			L	Open and tall wet sclerophyll forests with sheltered gullies and old growth forest with dense understorey. They are also found in dry forests with box and ironbark eucalypts and River Red Gum. Large old trees with hollows are required by this species for nesting. In Victoria, the Powerful Owl is widespread, having been recorded from most of the state. However, throughout its range it is uncommon and occurs in low densities. (Higgins 1999; Soderquist et al. 2002).	1	21/03/1990	Potential roosting habitat in planted Early Black-Wattles that characterise the study area - Potential to occur

Common Name	Scientific name	EPBC-T	EPBC-M	FFG-T	Habitat	Number of records	Date of last record	Likelihood of occurrence
Regent Honeyeater	<i>Anthochaera phrygia</i>	CR	M (JAMBA)	L	Inhabits dry box-ironbark eucalypt forests near rivers and creeks on inland slopes of the Great Dividing Range. It could also occur in small remnant patches or in mature trees in farmland or partly cleared agricultural land (Higgins et al. 2001).	None	N/A	No suitable habitat present - Unlikely to occur
Rufous Fantail	<i>Rhipidura rufifrons</i>		M (Bonn Convention (A2H))		Primarily found in dense, moist habitats. Less often present in dry sclerophyll forests and woodlands (Higgins et al. 2006).	4	21/01/2004	Lack of suitable habitat present - Unlikely to occur
Satin Flycatcher	<i>Myiagra cyanoleuca</i>		M (Bonn Convention (A2H))		Tall forests and woodlands in wetter habitats but not in rainforest (Higgins et al. 2006)	12	1/02/2004	Lack of suitable habitat present - Unlikely to occur
Square-tailed Kite	<i>Lophoictinia isura</i>			L	It occurs mainly in open forests and woodlands and in Victoria utilises habitats with box-ironbark, peppermint, stringybark and River Red-gum eucalypt associations. The rarest and least seen bird in Victoria, mainly occur in the far east of the state, though occasionally recorded in central and western parts of the state (Marchant and Higgins 1993).	3	25/09/2005	Lack of suitable habitat present - Unlikely to occur
Swift Parrot	<i>Lathamus discolor</i>	CR		L	Prefers a narrow range of eucalypts in Victoria, including White Box, Red Ironbark and Yellow Gum as well as River Red Gum when this species supports abundant 'lerp'. Breeds in Tasmania and migrates to the mainland of Australia for the autumn, winter and early spring months. It lives mostly north of the Great Dividing Range, passing through two areas of Victoria on migration: the Port Phillip district and Gippsland (Emison et al. 1987; Higgins 1999; Kennedy and Tzaros 2005).	None	N/A	No suitable habitat present - Unlikely to occur
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>			L	Maritime habitats, terrestrial large wetlands and coastal lands of tropical and temperate Australia and offshore islands, ranging far inland only over large rivers and wetlands. The eagles usually breed on coast and offshore islands and inland beside large lakes or rivers, usually in tall trees in or near water, also in cliffs, rock pinnacles and escarpments (Marchant and Higgins 1993).	1	19/04/1991	No suitable habitat present - Unlikely to occur
White-throated Needletail	<i>Hirundapus caudacutus</i>		M (JAMBA, CAMBA, ROKAMBA)		Aerial, over all habitats, but probably more over wooded areas, including open forest and rainforest. Often over heathland and less often above treeless areas such as grassland and swamps or farmland (Higgins 1999).	21	5/01/2008	May occasionally forage over the study area, though would not make any direct use of habitat there - Potential to occur.
Yellow Wagtail	<i>Motacilla flava</i>		M (JAMBA, CAMBA, ROKAMBA)		Extremely uncommon migrant. Few sightings in Victoria. Mostly occurs in well-watered open grasslands on the fringes of wetlands. Roosts in mangroves and other dense vegetation (DotE 2015).	None	N/A	No suitable habitat present - Unlikely to occur
Mammals								

Common Name	Scientific name	EPBC-T	EPBC-M	FFG-T	Habitat	Number of records	Date of last record	Likelihood of occurrence
Greater Glider	<i>Petauroides volans</i>	VU		L	Forest habitats including peppermint, stringybark, ash and gum dominated (Menkhorst 1995).	None	N/A	No suitable habitat present - Unlikely to occur
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	VU		L	Brisbane, Newcastle, Sydney and Melbourne are occupied continuously. Elsewhere, during spring, they are uncommon south of Nowra and widespread in other areas of their range. Roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban.	None	N/A	No recent records in the search region and lack of suitable habitat - Unlikely to occur
Smoky Mouse	<i>Pseudomys fumeus</i>	EN		L	The Konoom occurs in a wide variety of habitats, from heath to dry sclerophyll forest, especially along ridgetops with a heath understorey, and occasionally adjacent wetter habitats such as fern gullies. A characteristic of many localities, except those in wet gullies, is a floristically diverse shrub layer with members of the plant families Epacridaceae, Fabaceae and Mimosaceae well represented.	None	N/A	No suitable habitat present - Unlikely to occur
Reptiles								
Striped Legless Lizard	<i>Delma impar</i>	VU		L	Grassland specialist. Known to occur in some areas dominated by introduced species and at sites with a history of grazing and pasture improvement (Coulson 1995; Dorrough 1995; Smith & Robertson 1999). shelter in grass tussocks, thick ground cover, soil cracks, under rocks, spider burrows, and underground debris such as timber (Smith & Robertson 1999). The majority of sites in Victoria and NSW occur on cracking clay soils with some surface rock which provide shelter for the species (Cogger et al. 1993; Coulson 1995).	2	1/01/1988	No suitable habitat present. Few records in the search region - Unlikely to occur
Frogs								
Growling Grass Frog	<i>Litoria raniformis</i>	VU		L	Permanent, still or slow flowing water with fringing and emergent vegetation in streams, swamps, lagoons and artificial wetlands such as farm dams and abandoned quarries (Clemann and Gillespie 2004).	22	1/06/2011	Low quality potential dispersal habitat. Several recent records in the Creswick region. Potential to occur.
Fish								
Australian Grayling	<i>Prototroctes maraena</i>	VU		L	Large and small coastal streams and rivers with cool, clear waters with a gravel substrate and altering pools and riffles (Cadwallader and Backhouse 1983).	None	N/A	No suitable habitat present - Unlikely to occur
Dwarf Galaxias	<i>Galaxiella pusilla</i>	VU		L	Barwon River to Mitchell River. Vegetated margins of still water, ditches, swamps and backwaters of creeks, both ephemeral and permanent (Allen et al. 2002).	None	N/A	No recent records in the search region and lack of suitable habitat - Unlikely to occur

Common Name	Scientific name	EPBC-T	EPBC-M	FFG-T	Habitat	Number of records	Date of last record	Likelihood of occurrence
Flat-headed Galaxias	<i>Galaxias rostratus</i>	CR		L	Still or gently flowing water on the margins of lakes, billabongs and streams. Usually swims in midwater over rock or sand bottoms, also in the vicinity of aquatic plants (Allen et al 2002).	None	N/A	No suitable habitat present - Unlikely to occur
Murray Cod	<i>Maccullochella peelii</i>	VU		L	Slow flowing turbid water of rivers and streams of low elevation; also fast flowing clear upland streams (Allen et al. 2002).	None	N/A	No suitable habitat present - Unlikely to occur
Invertebrates								
Golden Sun Moth	<i>Synemon plana</i>	CR		L	Areas that are, or have been native grasslands or grassy woodlands. It is known to inhabit degraded grasslands with introduced grasses being dominant, with a preference for the native wallaby grass being present (DEWHA 2009).	4	20/01/2011	Limited native grass cover present. Remaining grassy areas dominated by introduced Brown-top Bent with high cover of Blackberry and Gorse. Study area highly disturbed and in centre of township, hence disjunct from other areas of suitable habitat. Unlikely to occur.

Notes: EPBC-T = threatened species status under EPBC Act; EX = presumed extinct in the wild; CE = critically endangered; EN = endangered; VU = vulnerable; EPBC-M = migratory status under the EPBC Act; M = listed migratory taxa; Bonn Convention (A2H) - Convention on the Conservation of Migratory Species of Wild Animals – listed as a member of a family; Bonn Convention (A2S) - Convention on the Conservation of Migratory Species of Wild Animals - species listed explicitly; CAMBA - China- Australia Migratory Birds Agreement; JAMBA - Japan-Australia Migratory Birds Agreement; ROKAMBA - Republic of Korea Australia Migratory Birds Agreement; FFG = threatened species status under the FFG Act; L = listed as threatened under the FFG Act.

5.6.3. *Susceptibility of listed fauna to impacts*

The following analysis identifies the susceptibility to development of listed fauna species which may utilise the study area. This analysis includes consideration of the factors below.

- The mobility of the species
- The availability and extent of other suitable habitat in the region and the degree to which each species may rely on habitat in the study area

Birds

One listed non-migratory bird species is considered to have the potential to occur in the study area. The susceptibility of this species to possible impacts from any development in the study area is discussed below.

- **Powerful Owl** (FFG Act: threatened)

One record of Powerful Owl occurs in the search region; from 1990. While the study area does not support the preferred breeding habitat for this species, Powerful Owl may occasionally use the dense cover of the planted Early Black Wattles in the study area as roost trees. Considering that more suitable forested habitat for the species occurs more than one kilometre away to the south and east, it is unlikely that the species would regularly make use of the study area. Given the large amount of suitable roosting habitat available in the surrounding region, it is considered unlikely that Powerful Owl would be impacted by development in the study area.

Migratory Birds

One listed migratory bird species has the potential to occur in the study area. The susceptibility of this species to possible impacts from any development in the study area is discussed below.

- **White-throated Needletail** (EPBC Act: Migratory [JAMBA, CAMBA, ROKAMBA])

The White-throated Needletail is aerial and occurs mainly over forested regions, but also often over treeless areas such as grassland and farmland. 21 records exist for the species in the search region, the most recent being from 2008. As such, there is potential that the species may occasionally forage over the study area.

However, given the species is mainly aerial, it is considered that any proposed development at the study area would not impact on the species.

Mammals

No listed mammal species are considered to have the potential to occur in the study area. Therefore none would be impacted by the development of the study area.

Reptiles

No listed reptile species are considered to have the potential to occur in the study area. Therefore none would be impacted by the development of the study area.

Frogs

One listed frog species is considered to have the potential to occur in the study area. The susceptibility of this species to possible impacts from any development in the study area is discussed below.

- **Growling Grass Frog** (EPBC Act: Vulnerable ; FFG Act: threatened)

The Growling Grass Frog prefers sitting water with fringing vegetation. The only water based habitat within the study area is the open earth drain that occurs along the eastern boundary of the study area and continues to the south of the site. The drain while containing a very small amount of water at the time of the survey, was overgrown with introduced flora, namely Blackberry and Paspalum, as well as some sections that contained Desert Cassinia, a native shrub that commonly grows along drains. As such the habitat within the study area is considered of low quality potential dispersal habitat.

A total of 22 records of Growling Grass Frog occur within the search region, the majority that are from Creswick Sewage Ponds over 2 kilometres from the study area. Given the low quality dispersal habitat, and separation from other existing habitat for the species, it is considered that the Growling Grass Frog would rarely use the study area, and as such, is considered to not be impacted from any future development at the site.

Fish

No listed fish species are considered to have the potential to occur in the study area. Therefore none would be impacted by the development of the study area.

Invertebrates

No listed invertebrate species are considered to have the potential to occur in the study area. Therefore none would be impacted by the development of the study area.

5.7. Listed ecological communities

The EPBC Protected Matters Search Tool (DotEE 2015) indicated that within the search region there occurred potential suitable habitat for five ecological communities listed under the Commonwealth EPBC Act. This included:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Temperate Grassland of the Victorian Volcanic Plain
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Based on an assessment of native vegetation in the study area against published descriptions and condition thresholds for these communities, none were found not to occur in the study area.

6. IMPACTS OF PROPOSED DEVELOPMENT

6.1. Proposed development

At this stage, no specific development plan has been proposed for the study area. As such, this assessment presents the flora and fauna values at the study area and should be used to inform any proposed development.

To further inform any future development within the study area, the following impact assessment has been undertaken under the assumption that all existing vegetation and habitat occurring within the entire study area is to be removed. Namely, this includes:

- The loss of 0.318 hectares of native vegetation across three remnant patches of Heathy Dry Forest (EVC 20) – including the loss of all other vegetation and habitat within the study area.

6.2. Impacts of development

6.2.1. Native vegetation

Assuming all native vegetation in the study area were proposed to be removed, this would result in the loss of a total ‘extent’ of 0.318 hectares of native vegetation as determined using EnSym (Appendix 7). This comprised the loss of 0.318 hectares of native vegetation from three remnant patches of Heathy Dry Forest (EVC 20).

Photographs of native vegetation proposed for removal are provided in Appendix 5.

6.2.2. Modelled species important habitat

The removal of all native vegetation in the study area would not have a proportional impact on modelled habitat above the specific offset threshold for any rare or threatened species listed on DELWP’s advisory lists, according to the EnSym report.

6.2.3. Listed flora species

The analysis of the likelihood of occurrence of listed flora species presented in Section 5.4.2 identified that no listed flora species would be impacted by any future development in the study area.

6.2.4. Fauna habitat

Assuming the entire study area were developed, the loss of fauna habitat would largely be the loss of planted densely foliated Early Black Wattles, a small area of planted Radiata Pines, some small areas of native grassy cover and an area open earth drain which is choked out by introduced flora.

6.2.5. Listed fauna species

The analysis of susceptibility of listed fauna species to impacts presented in Section 5.6.3 identified that no listed fauna species would be impacted by any future development in the study area.

6.2.6. Threatened ecological communities

Given no listed ecological communities were recorded, any future development of the study area would not result in any impacts to listed threatened ecological communities.

7. IMPLICATIONS UNDER LEGISLATION AND POLICY

7.1. Summary of planning implications

A permit may be required under ESO1 for the removal of native vegetation and/or other planted vegetation within the study area. As the study area is Crown Land, the removal of vegetation would be exempt from permit under ESO1 assuming the vegetation was removed by a person acting under and in accordance with an authorisation order made under sections 82 or 84 of the *Traditional Owner Settlement Act 2010*. Where this is not the case, the removal of vegetation would be exempt from permit under ESO1 where the removal was less than 1 hectare (this includes non-native vegetation).

A planning permit under Clause 52.17 would be required for the removal of native vegetation in the study area, unless (given the study area is Crown Land):

- The removal of vegetation is for the management of Crown Land and is:
 - Undertaken by or on behalf, or with the written permission of the Secretary of the Department of Environment, Land, Water and Planning (as constituted under Part 2 of the Conservation, Forest and Lands Act 1987); OR
- The vegetation is to be removed, destroyed or lopped on Crown land and by a person acting under and in accordance with an authorisation order made under sections 82 or 84 of the *Traditional Owner Settlement Act 2010*.

As the above exemptions are considered unlikely, a planning permit under Clause 52.17 and ESO1 are considered to be required for the removal of native vegetation in the study area.

7.2. Implications under the Guidelines

7.2.1. Risk-based assessment pathway for the site

The risk-based assessment pathway is determined on the basis of 'extent risk' and 'location risk'. Assuming all native vegetation in the study area were proposed to be removed, this would result in the loss of a total 'extent' of 0.318 hectares of native vegetation, all of which is mapped as Location Risk A in NVIM.

Based on the details above and the criteria outlined in Section 3.2, the Guidelines stipulate that any proposal to remove all the native vegetation in the study area would be assessed under the low risk assessment pathway and that a general offset would apply to any approved native vegetation removal.

Any future proposal to remove all native vegetation in the study area would not trigger a referral to DELWP as it does not meet the criteria specified in Section 3.2.

7.2.2. Offset requirements

Offsets required to compensate for the removal of all native vegetation from the study area have been determined using EnSym (Appendix 7). A summary of the required offsets is provided below.

- 0.010 *general* biodiversity equivalence units with a minimum strategic biodiversity score of 0.080 within the North Central Catchment Management Authority area OR the Hepburn Shire Council Municipal District.

Under the Guidelines *all* offsets must be secured prior to the removal of native vegetation.

7.2.3. Offset strategy

A third party (offsite) offset would need to be identified through a native vegetation broker, in order to achieve any such offset requirement. Offsets must be protected using an appropriate on-title security agreement and managed for the first ten years of establishment to meet specific targets set out in an offset plan and maintained in perpetuity.

Such an offset is likely to cost approximately \$2,000 based on recent offset transactions.

7.3. EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* protects a number of threatened species and ecological communities that are considered to be of national conservation significance. Any significant impacts on these species require the approval of the Australian Minister for the Environment.

If there is a possibility of a significant impact on nationally threatened species or communities or listed migratory species, a Referral under the EPBC Act should be considered. The Minister will decide after 20 business days whether the project will be a ‘controlled action’ under the EPBC Act, in which case it cannot be undertaken without the approval of the Minister. This approval depends on a further assessment and approval process (lasting between three and nine months, depending on the level of assessment).

Based on the relevant guidelines, the future development of the study area is unlikely to result in a significant impact on any EPBC Act listed values. Therefore, there are no implications under the EPBC Act for the study area.

7.4. FFG Act

The Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) lists threatened and protected species and ecological communities (DELWP 2016b, DELWP 2016c). Any removal of threatened flora species or communities (or protected flora) listed under the FFG Act from public land requires a Protected Flora Permit under the Act, obtained from DELWP.

The future development of the study area is unlikely to result in a significant impact on any values listed as threatened under the FFG Act.

The following FFG Act values listed as protected are susceptible to impacts from the proposed development:

- Desert Cassinia (Asteraceae); and
- Star Cudweed (Asteraceae).

A Protected Flora Permit would be required from DELWP to remove the abovementioned listed protected species from public land. Application forms for Protected Flora Permits can be obtained from DELWP offices or from their customer service centre.

7.5. EE Act

The “Ministerial Guidelines for Assessment of Environmental Effects under the *Environment Effects Act 1978*” (DSE 2006), identifies criteria which trigger a Referral to

the State Minister for Planning. The criteria related to flora, fauna and native vegetation are outlined below.

One or more of the following would trigger a Referral:

- Potential clearing of 10 ha or more of native vegetation from an area that:
 - Is of an Ecological Vegetation Class identified as endangered by the Department of Sustainability and Environment (in accordance with Appendix 2 of Victoria's Native Vegetation Management Framework); or
 - Is, or is likely to be, of very high conservation significance (as defined in accordance with Appendix 3 of Victoria's Native Vegetation Management Framework); and
 - Is not authorised under an approved Forest Management Plan or Fire Protection Plan
- Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria
- Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'
- Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term

Two or more of the following would also trigger a Referral:

- Potential clearing of 10 ha or more of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan
- Matters listed under the Flora and Fauna Guarantee Act 1988:
 - Potential loss of a significant area of a listed ecological community; or
 - Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or
 - Potential loss of critical habitat; or
 - Potential significant effects on habitat values of a wetland supporting migratory bird species.

Based on these criteria, a Referral to the state Minister for Planning will not be required under the EE Act for the aspects covered by the current investigation.

7.6. CaLP Act

The *Catchment and Land Protection Act 1994* (CaLP Act) requires that land owners (or a third party to whom responsibilities have been legally transferred) must take all reasonable steps on their land to, amongst other objectives, prevent the growth and spread of regionally controlled weeds.

In accordance with the *Catchment and Land Protection Act 1994*, the noxious weed species listed below, which were recorded in the study area, must be controlled.

- Blackberry;

- Gorse; and
- Sweet Briar.

Precision control methods that minimise off-target kills (e.g. spot spraying) should be used in environmentally sensitive areas (e.g. within or near native vegetation, waterways, etc.).

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Appendix 1: Details of the Guidelines assessment process

Native Vegetation Information Management system (NVIM)

The online Native Vegetation Information Management system (NVIM) is an interactive mapping tool, which provides some of the information required to accompany a permit to remove native vegetation. It does not replace the application process.

The information provided by NVIM can include the following (described in more detail below):

- The *location risk* of the native vegetation;
- The *condition* of the native vegetation – used for the low-risk assessment pathway only;
- The *strategic biodiversity score* of the native vegetation proposed to be removed; and
- The *native vegetation offset* requirement – used for the low risk assessment pathway only.

Biodiversity assessment guidelines

Guidelines objective

As set out in *Permitted clearing of native vegetation – Biodiversity assessment guidelines* ('the Guidelines') the objective for permitted clearing of native vegetation in Victoria is 'No net loss in the contribution made by native vegetation to Victoria's biodiversity'. The key strategies for ensuring this outcome when considering an application to remove native vegetation are:

- Avoiding the removal of native vegetation that makes a significant contribution to Victoria's biodiversity;
- Minimising impacts on Victoria's biodiversity from the removal of native vegetation; and
- Where native vegetation is permitted to be removed, ensuring it is offset in a manner that makes an equivalent contribution to Victoria's biodiversity made by the native vegetation to be removed.

Note: if native vegetation does not meet the definition of either a remnant patch or scattered trees, the Guidelines are not required to be applied.

Risk-based assessment pathways

The first step in determining the type of assessment required for any site in Victoria is to determine the risk to biodiversity associated with the proposed native vegetation removal and therefore the risk-based assessment pathway for the proposed native vegetation removal. There are three risk-based pathways for assessing an application to remove native vegetation, below.

- Low risk
- Moderate risk
- High risk

This risk-based assessment pathway is determined by two factors, outlined below.

Extent risk – the area in hectares proposed to be removed or the number of scattered trees. *Note:* extent risk also includes any native vegetation clearing for which permission has been granted in the last five years.

Location risk – the likelihood that removing native vegetation in a location will have an impact on the persistence of a rare or threatened species classified into three categories: Location A, Location B and Location C.

The risk-based pathway for assessing an application to remove native vegetation is determined by the following matrices for remnant patches and scattered trees:

Extent (remnant patches)	Location A	Location B	Location C
< 0.5 hectares	Low	Low	High
≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
≥ 1 hectare	Moderate	High	High
Extent (scattered trees)	Location A	Location B	Location C
< 15 scattered trees	Low	Moderate	High
≥ 15 scattered trees	Moderate	High	High

All native vegetation within any subdivision plot of less than 0.4 hectares is deemed to be lost; For applications with combined removal of both remnant patch and scattered trees, the extent of the scattered trees is converted to an area by assigning a standard area of 0.070 hectares per tree – the total extent is then used to determine the risk-based pathway.

The presence of any Location B or Location C risk categories within an area of proposed native vegetation removal means this whole area of removal is considered to belong to that category for the purpose of determining the risk-based assessment pathway.

Strategic biodiversity score

The strategic biodiversity score generated by NVIM acts as a measure of the site's importance for Victoria's biodiversity relative to other locations across the landscape. It is calculated based on a weighted average of scores across an area of native vegetation proposed for removal on a site.

Habitat importance

Habitat importance mapping produced by DELWP is based on one or a combination of habitat importance models, habitat distribution models or site record data. It identifies the following:

- *Habitat importance for dispersed species* – based on habitat distribution models and assigned a habitat importance score ranging from 0 to 1; and
- *Highly localised habitats* – considered to be equally important for a particular species and assigned a habitat importance score of 1.

Habitat importance mapping is used to determine the type of offset required under the moderate and high risk assessment pathways.

Biodiversity equivalence

Biodiversity equivalence scores are used to quantify losses in the contribution to Victoria's biodiversity from removing native vegetation and gains in this contribution from a native vegetation offset.

There are two types of biodiversity equivalence scores depending on whether or not the site makes a contribution to the habitat of a Victorian rare or threatened species.

- A *general* biodiversity equivalence score is a measure of the contribution native vegetation on a site makes to Victoria's biodiversity overall and applies when no habitat importance scores are applicable according to the equation:

$$\text{General biodiversity equivalence score} = \text{habitat hectares} \times \text{strategic biodiversity score}$$

- A *specific* biodiversity equivalence score is a measure of the contribution that native vegetation on a site makes to the habitat of a particular rare or threatened species – calculated for each such species for which the site provides important habitat (using habitat importance scores provided by DELWP) according to the equation:

$$\text{Specific biodiversity equivalence score} = \text{habitat hectares} \times \text{habitat importance score}$$

Offset requirements

A native vegetation offset is required for the approved removal of native vegetation. Offsets conform to one of two types and each type incorporates a risk factor to address the risk of offset failing:

- A *general* offset applies if the removal of native vegetation impacts Victoria's overall biodiversity and has an offset risk factor of 1.5 applied according to the equation:

$$\text{General risk-adjusted offset requirement} = \text{general biodiversity equivalence score (clearing site)} \times 1.5$$

- A *specific* offset applies if the native vegetation makes a significant impact to habitat for a rare or threatened species determined by a *specific-general offset test*. It applies to each species impacted and has an offset risk factor of 2 applied according to the equation:

$$\text{Specific risk-adjusted offset requirement} = \text{specific biodiversity equivalence score (clearing site)} \times 2$$

Note: if native vegetation does not meet the definition of either a remnant patch or scattered trees an offset is not required.

Summary of the Guidelines assessment process

Decision guidelines	Offset requirements
Low-risk assessment pathway	
<p>An application for removal cannot be refused on biodiversity grounds (unless it is not in accordance with any property vegetation plan that applies to the site).</p> <p><i>Note: this guideline also applies to native vegetation that does not meet the definition of either a remnant patch or scattered trees.</i></p>	<p>General offset applies:</p> <ul style="list-style-type: none"> General offset = general biodiversity equivalence score (clearing site) x 1.5 Offset must be located in the same CMA^ or Local Government Area as the removal Offset must have a strategic biodiversity score at least 80% of the native vegetation removed <p>Offsets must be secured before the removal of native vegetation.</p>
Moderate-risk assessment pathway	
<p>The responsible authority will consider:</p> <ul style="list-style-type: none"> The strategic biodiversity score and habitat importance score of the native vegetation proposed to be removed Any property vegetation plan that applies to the site Whether reasonable steps have been taken to ensure that impacts of the proposed removal of native vegetation on biodiversity have been minimised with regard to the contribution to biodiversity made by the native vegetation to be removed and the native vegetation to be retained Whether an offset has been identified that meets the requirements The need to remove native vegetation to create defensible space to reduce the risk of bushfire 	<p>If the proportional impact on modelled habitat for a rare or threatened species is above a predetermined threshold, a specific offset applies for that species:</p> <ul style="list-style-type: none"> Specific offset = specific biodiversity equivalence score (clearing site) x 2 Offset must be located in the same species habitat anywhere in Victoria as determined by DELWP habitat importance mapping <p>General offsets apply where the specific offset threshold is not exceeded.</p> <p>Offsets must be secured before the removal of native vegetation.</p>

High-risk assessment pathway	
<p>In addition to the considerations for the moderate pathway the responsible authority will determine whether the native vegetation to be removed makes a significant contribution to Victoria's biodiversity. This includes considering:</p> <ul style="list-style-type: none"> ▪ Impacts on important habitat for rare or threatened species, particularly highly localised habitat ▪ Proportional impacts on remaining habitat for rare or threatened species ▪ If the removal of the native vegetation will contribute to a cumulative impact that is a significant threat to the persistence of a rare or threatened species ▪ The availability of, and potential for, gain from offsets 	As for the moderate pathway

* Habitat hectares = condition score (out of 1) x extent (hectares)

^ Catchment Management Authority

Note: All applications must provide information about the vegetation to be removed such as location and address of the property, description of the vegetation, maps and recent dated photographs.

Appendix 2: Detailed habitat hectare assessment results

Habitat Zone			A	B	C
Bioregion			VVP	VVP	VVP
EVC Number			20	20	20
Total area of Habitat Zone (ha)			0.114	0.099	0.105
Site Condition	Large Old Trees	/10	0	0	0
	Tree Canopy Cover	/5	0	0	0
	Lack of Weeds	/15	4	4	4
	Understorey	/25	5	15	5
	Recruitment	/10	5	1	5
	Organic Matter	/5	4	5	2
	Logs	/5	0	0	0
Landscape Context	Patch Size	/10	1	1	1
	Neighbourhood	/10	0	0	0
	Distance to Core	/5	1	1	1
Total Condition Score		/100	20	27	18
Condition score out of 1			0.20	0.27	0.18
Habitat Hectares in Habitat Zone			0.023	0.027	0.019

Appendix 3: Flora species recorded in the study area and listed species known (or with the potential) to occur in the search region

Origin	Common name	Scientific name	EPBC-T	FFG-T	FFG-P	CaLP Act	Recorded
*	Agapanthus	<i>Agapanthus praecox subsp. orientalis</i>					X
*	Annual Veldt-grass	<i>Ehrharta longiflora</i>					X
	Australian Anchor Plant	<i>Discaria pubescens</i>		L	p		
	Basalt Peppercress	<i>Lepidium hyssopifolium</i>	EN	L	p		
	Bidgee-widgee	<i>Acaena novae-zelandiae</i>					X
*	Black Nightshade	<i>Solanum nigrum s.l.</i>					X
*	Blackberry	<i>Rubus fruticosus spp. agg.</i>				C	X
	Blackwood	<i>Acacia melanoxylon</i>					X
*	Boneseeds	<i>Euryops chrysanthemoides</i>					X
*	Brown-top Bent	<i>Agrostis capillaris</i>					X
*	Cat's Ear	<i>Hypochaeris spp.</i>					X
	Charming Spider-orchid	<i>Caladenia amoena</i>	EN	L	p		
	Clover Glycine	<i>Glycine latrobeana</i>	VU	L	p		
*	Common Centaury	<i>Centaureum erythraea</i>					X
	Common Raspwort	<i>Gonocarpus tetragynus</i>					X
	Common Tussock-grass	<i>Poa labillardierei var. labillardierei</i>					X
*	Couch	<i>Cynodon dactylon var. dactylon</i>					X
*	Curled Dock	<i>Rumex crispus</i>					X
	Desert Cassinia	<i>Cassinia arcuata s.s.</i>			p		X
*	Dove's Foot	<i>Geranium molle</i>					X
*	Drain Flat-sedge	<i>Cyperus eragrostis</i>					X
*	Early Black-wattle	<i>Acacia decurrens</i>					X
*	English Broom	<i>Cytisus scoparius</i>				R	X
	Fragrant Leek-orchid	<i>Prasophyllum suaveolens</i>	EN	L	p		

Origin	Common name	Scientific name	EPBC-T	FFG-T	FFG-P	CaLP Act	Recorded
*	Gorse	<i>Ulex europaeus</i>				C	X
*	Great Brome	<i>Bromus diandrus</i>					X
*	Green Dragon', Arum Lily	<i>Zantedeschia aethiopica</i> 'Green Dragon'					X
	Grey Tussock-grass	<i>Poa sieberiana</i> var. <i>sieberiana</i>					X
*	Hair Grass	<i>Aira</i> spp.					X
*	Hawthorn	<i>Crataegus monogyna</i>				R	X
	Hedge Wattle	<i>Acacia paradoxa</i>					X
	Hop Goodenia	<i>Goodenia ovata</i>					X
	Kangaroo Grass	<i>Themeda triandra</i>					X
*	Large Quaking-grass	<i>Briza maxima</i>					X
#	Large-fruit Yellow-gum	<i>Eucalyptus leucoxylon</i> subsp. <i>megalocarpa</i>		L	p		
	Lesser-Common Joyweed group	<i>Alternanthera denticulata-nodiflora</i> group					X
	Matted Flax-lily	<i>Dianella amoena</i>	EN	L	p		
*	Montpellier Broom	<i>Genista monspessulana</i>				R	X
*	Paspalum	<i>Paspalum dilatatum</i>					X
	Plump Swamp Wallaby-grass	<i>Amphibromus pithogastrus</i>		L	p		
*	Prairie Grass	<i>Bromus catharticus</i>					X
*	Prostrate Knotweed	<i>Polygonum aviculare</i> s.l.					X
*	Prunus	<i>Prunus</i> spp.					X
*	Radiata Pine	<i>Pinus radiata</i>					X
*	Ribwort	<i>Plantago lanceolata</i>					X
	River Swamp Wallaby-grass	<i>Amphibromus fluitans</i>	VU				
	Rush	<i>Juncus</i> spp.					X
	Small Milkwort	<i>Comesperma polygaloides</i>		L	p		
	Spear Grass	<i>Austrostipa</i> spp.					X

Origin	Common name	Scientific name	EPBC-T	FFG-T	FFG-P	CaLP Act	Recorded
*	Spear Thistle	<i>Cirsium vulgare</i>				R	X
	Spiny Rice-flower	<i>Pimelea spinescens subsp. spinescens</i>	CR	L	p		
	Spiral Sun-orchid	<i>Thelymitra matthewsii</i>	VU	L	p		
*	Squirrel-tail Fescue	<i>Vulpia bromoides</i>					X
	Star Cudweed	<i>Euchiton involucratus s.s.</i>			p		X
	Stiff Groundsel	<i>Senecio behrianus</i>	EN	L	p		
	Swamp Fireweed	<i>Senecio psilocarpus</i>	VU		p		
*	Sweet Briar	<i>Rosa rubiginosa</i>				C	X
*	Toowoomba Canary-grass	<i>Phalaris aquatica</i>					X
	Variable Willow-herb	<i>Epilobium billardierianum</i>					X
	Wallaby Grass	<i>Rytidosperma spp.</i>					X
	Wattle Mat-rush	<i>Lomandra filiformis</i>					X
	Weeping Grass	<i>Microlaena stipoides var. stipoides</i>					X
	White Sunray	<i>Leucochrysum albicans var. tricolor</i>	EN	L	p		
*	Wild Oat	<i>Avena fatua</i>					X
	Wire-leaf Mistletoe	<i>Amyema preissii</i>					X
*	Yorkshire Fog	<i>Holcus lanatus</i>					X

Notes: X = recorded in the study area; * = introduced to Victoria; # = Victorian native taxa occurring outside their natural range; EPBC = threatened species status under EPBC Act: EX = presumed extinct in the wild; CR = critically endangered; EN = endangered; VU = vulnerable; FFG-T = threatened species status under the FFG Act: L = listed as threatened under the FFG Act; FFG-P = protected species status under the FFG Act: p = listed as protected; CaLP Act = declared noxious weeds status under the CaLP Act; C = Regionally Controlled Weeds (Land owners have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally controlled weeds on their land); R = Restricted Weeds (Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited).

Appendix 4: Terrestrial vertebrate fauna species recorded and listed species that have the potential to occur in the study area

Origin	Common name	Scientific name	EPBC-T	EPBC-M	FFG-T	Recorded
	Australasian Bittern	<i>Botaurus poiciloptilus</i>	EN		L	
	Australian Bustard	<i>Ardeotis australis</i>			L	
	Australian Grayling	<i>Prototroctes maraena</i>	VU		L	
	Australian Magpie	<i>Gymnorhina tibicen</i>				X
	Australian Painted Snipe	<i>Rostratula australis</i>	EN		L	
	Black-faced Monarch	<i>Monarcha melanopsis</i>		M (Bonn Convention (A2H))		
	Blue-billed Duck	<i>Oxyura australis</i>			L	
	Brolga	<i>Grus rubicunda</i>			L	
	Brown Thornbill	<i>Acanthiza pusilla</i>				X
*	Common Blackbird	<i>Turdus merula</i>				X
	Common Bronzewing	<i>Phaps chalcoptera</i>				X
	Common Froglet	<i>Crinia signifera</i>				X
	Common Greenshank	<i>Tringa nebularia</i>		M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))		
	Crimson Rosella	<i>Platycercus elegans</i>				X
	Curlew Sandpiper	<i>Calidris ferruginea</i>	CR	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))		
	Double-banded Plover	<i>Charadrius bicinctus</i>		M (Bonn Convention (A2H))		
	Dwarf Galaxias	<i>Galaxiella pusilla</i>	VU		L	
	Eastern Curlew	<i>Numenius madagascariensis</i>	CR	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))		
	Eastern Great Egret	<i>Ardea modesta</i>			L	
*	European Rabbit	<i>Oryctolagus cuniculus</i>				X

Origin	Common name	Scientific name	EPBC-T	EPBC-M	FFG-T	Recorded
	Flat-headed Galaxias	<i>Galaxias rostratus</i>	CR		L	
	Fork-tailed Swift	<i>Apus pacificus</i>		M (JAMBA,CAMBA, ROKAMBA)		
	Galah	<i>Eolophus roseicapilla</i>				X
	Golden Sun Moth	<i>Synemon plana</i>	CR		L	
	Greater Glider	<i>Petauroides volans</i>	VU		L	
	Grey Fantail	<i>Rhipidura albiscarpa</i>				X
	Grey Goshawk	<i>Accipiter novaehollandiae novaehollandiae</i>			L	
	Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	VU		L	
	Growling Grass Frog	<i>Litoria raniformis</i>	VU		L	
	Latham's Snipe	<i>Gallinago hardwickii</i>		M (JAMBA, CAMBA, ROKAMBA, Bonn A2H)		
	Laughing Kookaburra	<i>Dacelo novaeguineae</i>				X
	Little Eagle	<i>Hieraaetus morphnoides</i>				X
	Little Raven	<i>Corvus mellori</i>				X
	Long-billed Corella	<i>Cacatua tenuirostris</i>				X
	Masked Lapwing	<i>Vanellus miles</i>				X
	Murray Cod	<i>Maccullochella peelii</i>	VU		L	
	Painted Honeyeater	<i>Grantiella picta</i>	VU		L	
	Pied Currawong	<i>Strepera graculina</i>				X
	Plains-wanderer	<i>Pedionomus torquatus</i>	CR		L	
	Powerful Owl	<i>Ninox strenua</i>			L	
	Rainbow Lorikeet	<i>Trichoglossus haematodus</i>				X
*	Red Fox	<i>Vulpes vulpes</i>				X
	Red Wattlebird	<i>Anthochaera carunculata</i>				X
	Regent Honeyeater	<i>Anthochaera phrygia</i>	CR	M (JAMBA)	L	

Origin	Common name	Scientific name	EPBC-T	EPBC-M	FFG-T	Recorded
	Rufous Fantail	<i>Rhipidura rufifrons</i>		M (Bonn Convention (A2H))		
	Satin Flycatcher	<i>Myiagra cyanoleuca</i>		M (Bonn Convention (A2H))		
	Silvereye	<i>Zosterops lateralis</i>				X
	Smoky Mouse	<i>Pseudomys fumeus</i>	EN		L	
	Square-tailed Kite	<i>Lophoictinia isura</i>			L	
	Striated Thornbill	<i>Acanthiza lineata</i>				X
	Striped Legless Lizard	<i>Delma impar</i>	VU		L	
	Swift Parrot	<i>Lathamus discolor</i>	CR		L	
	Wedge-tailed Eagle	<i>Aquila audax</i>				X
	Welcome Swallow	<i>Petrochelidon neoxena</i>				X
	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>			L	
	White-browed Scrubwren	<i>Sericornis frontalis</i>				X
	White-throated Needletail	<i>Hirundapus caudacutus</i>		M (JAMBA, CAMBA, ROKAMBA)		
	Yellow Wagtail	<i>Motacilla flava</i>		M (JAMBA, CAMBA, ROKAMBA)		
	Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>				X

Notes: X = recorded in the study area; **EPBC-T** = threatened species status under EPBC Act; EX = presumed extinct in the wild; CE = critically endangered; EN = endangered; VU = vulnerable; **EPBC-M** = migratory status under the EPBC Act; M = listed migratory taxa; Bonn Convention (A2H) - Convention on the Conservation of Migratory Species of Wild Animals – listed as a member of a family; Bonn Convention (A2S) - Convention on the Conservation of Migratory Species of Wild Animals - species listed explicitly; CAMBA - China- Australia Migratory Birds Agreement; JAMBA - Japan-Australia Migratory Birds Agreement; ROKAMBA - Republic of Korea Australia Migratory Birds Agreement; **FFG** = threatened species status under the FFG Act; L = listed as threatened under the FFG Act.

Appendix 5: Photographs of vegetation within the study area



Native vegetation: Native ground layer of wallaby grass and Weeping Grass in foreground.
Planted Early Black Wattles in background.



Non-native vegetation: Planted Early Black Wattle (*Acacia decurrens*) surrounded by introduced ground storey flora, namely Brown-top Bent and Gorse



Non-native vegetation: Planted Radiata Pine in north west corner of study area



Non-native vegetation: Blackberry and Paspalum in open earth drain along south eastern boundary

Appendix 6: EVC benchmarks

- Healthy Dry Forest (EVC 20) Benchmark in the Victorian Volcanic Plain bioregion

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Victorian Volcanic Plain bioregion

EVC 20: Heathy Dry Forest

Description:

Grows on shallow, rocky skeletal soils on a variety of geologies and on a range of landforms from gently undulating hills to exposed aspects on ridge tops and steep slopes at a range of elevations. The overstorey is a low, open eucalypt forest, poor in form to 20 m tall with an open crown cover. The understorey is dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas. Graminoids are frequently present in the ground layer, but do not provide much cover.

Large trees:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	60 cm	20 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
30%	<i>Eucalyptus goniocalyx</i> s.l.	Bundy
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark
	<i>Eucalyptus dives</i>	Broad-leaved Peppermint
	<i>Eucalyptus radiata</i> s.l.	Narrow-leaf Peppermint

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree		5%	IT
Medium Shrub	2	15%	MS
Small Shrub	3	20%	SS
Large Herb	1	1%	LH
Medium Herb	2	5%	MH
Small or Prostrate Herb	2	5%	SH
Large Tufted Graminoid	1	1%	LTG
Medium to Small Tufted Graminoid	4	20%	MTG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C
Total understorey projective foliage cover		75%	

LF Code

Species typical of at least part of EVC range

Common Name

MS	<i>Monotoca scoparia</i>	Prickly Broom-heath
MS	<i>Acacia pycnantha</i>	Golden Wattle
MS	<i>Acacia paradoxa</i>	Hedge Wattle
SS	<i>Phyllanthus hirtellus</i>	Thyme Spurge
SS	<i>Hovea heterophylla</i>	Common Hovea
SS	<i>Leucopogon virgatus</i>	Common Beard-heath
SS	<i>Tetratheca labillardierei</i>	Glandular Pink-bells
PS	<i>Bossiaea prostrata</i>	Creeping Bossiaea
LH	<i>Senecio tenuiflorus</i>	Slender Fireweed
MH	<i>Gonocarpus tetragynus</i>	Common Raspwort
MH	<i>Wahlenbergia gracilis</i> s.l.	Sprawling Bluebell
SH	<i>Opercularia varia</i>	Variable Stinkweed
SH	<i>Goodenia lanata</i>	Trailing Goodenia
MTG	<i>Joycea pallida</i>	Silvertop Wallaby-grass
MTG	<i>Lomandra filiformis</i>	Wattle Mat-rush
MTG	<i>Stylidium graminifolium</i> s.l.	Grass Trigger-plant
MTG	<i>Poa sieberiana</i>	Grey Tussock-grass
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass

EVC 20: Heathy Dry Forest - Victorian Volcanic Plain bioregion

Recruitment:

Episodic/Fire. Desirable period between disturbances is 20 years.

Organic Litter:

20 % cover

Logs:

20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Cicendia quadrangularis</i>	Square Cicendia	high	low
MH	<i>Trifolium campestre</i> var. <i>campestre</i>	Hop Clover	high	low
MH	<i>Trifolium dubium</i>	Suckling Clover	high	low
MH	<i>Trifolium subterraneum</i>	Subterranean Clover	high	low
SH	<i>Trifolium glomeratum</i>	Cluster Clover	high	low
LNG	<i>Avena fatua</i>	Wild Oat	high	low
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MNG	<i>Aira elegantissima</i>	Delicate Hair-grass	high	low
MNG	<i>Juncus capitatus</i>	Capitate Rush	high	low
MNG	<i>Aira caryophylla</i>	Silvery Hair-grass	high	low
TTG	<i>Cyperus tenellus</i>	Tiny Flat-sedge	high	low

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Appendix 7: EnSym report

Testing Clearing proposal

This report provides offset requirements for proposed clearing. It **DOES NOT represent a Biodiversity Impact and Offset Requirements report** required to support applications for permits to remove native vegetation under clause 52.16 or 52.17 of planning schemes in Victoria. It can be used for internal testing of different clearing proposals. Final clearing shapefiles must be submitted to DELWP for processing.

Date of issue: 22/03/2017

Time of issue: 2:27 pm

Ref: Scenario Testing

Project ID	17049_Creswick_removal_170322
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Summary of marked native vegetation

Risk-based pathway	Low
Total extent	0.318 ha
Remnant patches	0.318 ha
Scattered trees	0 trees
Location risk	A

Strategic biodiversity score of all marked native vegetation	0.100
--	-------

Offset requirements if a permit is granted

If the marked vegetation was cleared the following offsets would be applicable.

Offset type	General offset
General offset amount (general biodiversity equivalence units)	0.010 general units
General offset attributes	
Vicinity	North Central Catchment Management Authority (CMA) or Hepburn Shire Council
Minimum strategic biodiversity score	0.080 ¹

NB: values presented in tables throughout this document may not add to totals due to rounding

¹ Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

Testing Clearing proposal

Next steps

This proposal to remove native vegetation must meet the application requirements of the low risk-based pathway and it will be assessed under the low risk-based pathway.

If you wish to remove the marked native vegetation you must submit the related shapefiles to the Department of Environment, Land, Water and Planning (DELWP) for processing, by email to nativevegetation.support@delwp.vic.gov.au. DELWP will provide a Biodiversity impact and offset requirements report that is required to meet the permit application requirements.

Biodiversity impact of removal of native vegetation

Habitat hectares

Habitat hectares are calculated for each habitat zone within your proposal using the extent and condition scores in the GIS data you provided.

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
1-1-A	0.200	0.114	0.023
2-1-B	0.270	0.099	0.027
3-1-C	0.180	0.105	0.019
TOTAL			0.068

Clearing site biodiversity equivalence score(s)

The general biodiversity equivalence score for the habitat zone(s) is calculated by multiplying the habitat hectares by the strategic biodiversity score.

Habitat zone	Habitat hectares	Strategic biodiversity score	General biodiversity equivalence score (GBES)
1-1-A	0.023	0.100	0.002
2-1-B	0.027	0.100	0.003
3-1-C	0.019	0.100	0.002

Testing Clearing proposal

Offset requirements

If a permit is granted to remove the marked native vegetation the permit condition will include the requirement to obtain a native vegetation offset.

To calculate the required offset amount required the biodiversity equivalence scores are aggregated to the proposal level and multiplied by the relevant risk multiplier.

Offsets also have required attributes:

- General offsets must be located in the same Catchment Management Authority (CMA) boundary or Local Municipal District (local council) as the clearing and must have a minimum strategic biodiversity score of 80 per cent of the clearing.²

The offset requirements for your proposal are as follows:

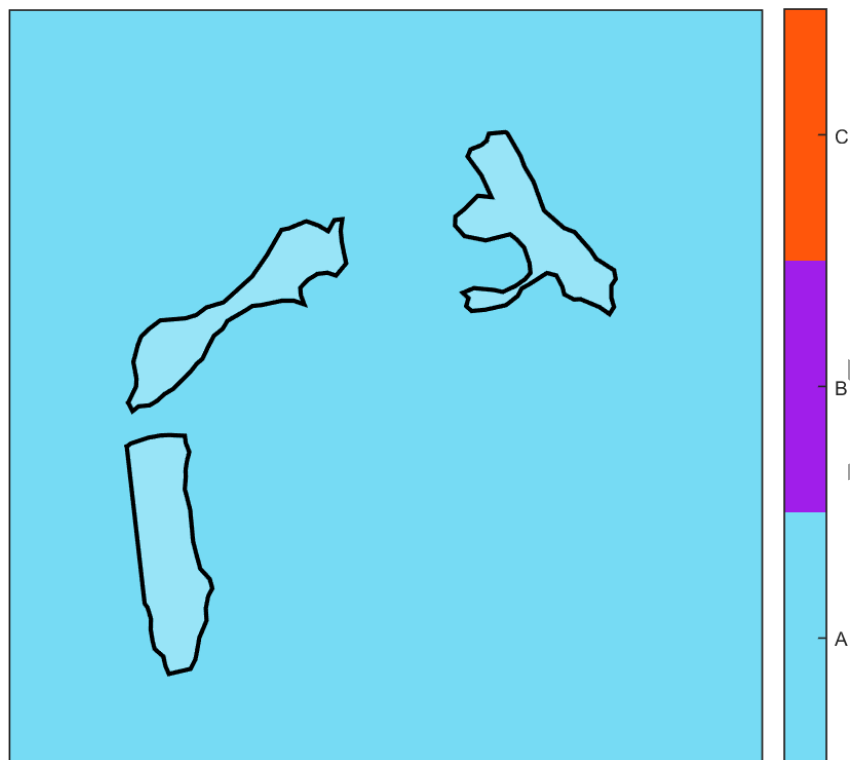
Offset type	Clearing site biodiversity equivalence score	Risk multiplier	Offset requirements	
			Offset amount (biodiversity equivalence units)	Offset attributes
General	0.007 GBES	1.5	0.010 general units	Offset must be within North Central CMA or Hepburn Shire Council Offset must have a minimum strategic biodiversity score of 0.080

² Strategic biodiversity score is a weighted average across habitat zones where a general offset is required

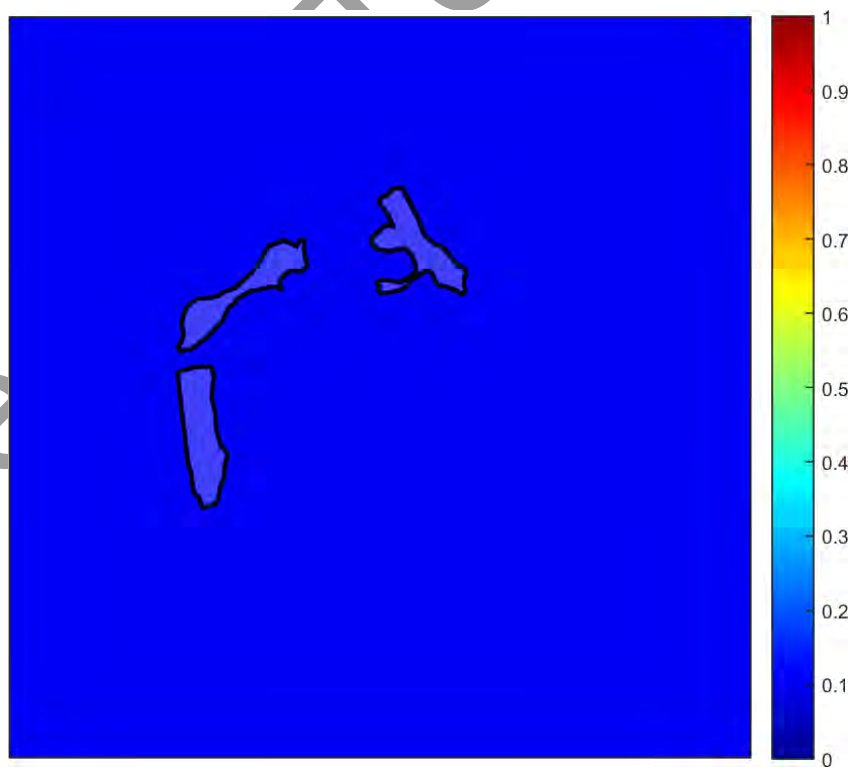
Testing Clearing proposal

Images of marked native vegetation

1. Native vegetation location risk map



2. Strategic biodiversity score map



Testing Clearing proposal

Glossary

Condition score This is the site-assessed condition score for the native vegetation. Each habitat zone in the clearing proposal is assigned a condition score according to the habitat hectare assessment method. This information has been provided by or on behalf of the applicant in the GIS file.

Dispersed habitat A dispersed species habitat is a habitat for a rare or threatened species whose habitat is spread over a relatively broad geographic area greater than 2,000 hectares.

General biodiversity equivalence score The general biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to Victoria's biodiversity. The general biodiversity equivalence score is calculated as follows:

$$\text{General biodiversity equivalence score} = \text{habitat hectares} \times \text{strategic biodiversity score}$$

General offset amount This is calculated by multiplying the general biodiversity equivalence score of the native vegetation to be removed by the risk factor for general offsets. This number is expressed in general biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.

$$\text{Risk adjusted general biodiversity equivalence score} = \text{general biodiversity equivalence score clearing} \times 1.5$$

General offset attributes General offset must be located in the same Catchment Management Authority boundary or Municipal District (local council) as the clearing site. They must also have a strategic biodiversity score that is at least 80 per cent of the score of the clearing site.

Habitat hectares Habitat hectares is a site-based measure that combines extent and condition of native vegetation. The habitat hectares of native vegetation is equal to the current condition of the vegetation (condition score) multiplied by the extent of native vegetation. Habitat hectares can be calculated for a remnant patch or for scattered trees or a combination of these two vegetation types. This value is calculated for each habitat zone using the following formula:

$$\text{Habitat hectares} = \text{total extent (hectares)} \times \text{condition score}$$

Habitat importance score The habitat importance score is a measure of the importance of the habitat located on a site for a particular rare or threatened species. The habitat importance score for a species is a weighted average value calculated from the habitat importance map for that species. The habitat importance score is calculated for each habitat zone where the habitat importance map indicates that species habitat occurs.

Habitat zone Habitat zone is a discrete contiguous area of native vegetation that:

- is of a single Ecological Vegetation Class
- has the same measured condition.

Testing Clearing proposal

Highly localised habitat	<p>A highly localised habitat is habitat for a rare or threatened species that is spread across a very restricted area (less than 2,000 hectares). This can also be applied to a similarly limited sub-habitat that is disproportionately important for a wide-ranging rare or threatened species. Highly localised habitats have the highest habitat importance score (1) for all locations where they are present.</p>
Minimum strategic biodiversity score	<p>The minimum strategic biodiversity score is an attribute for a general offset.</p> <p>The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed. Where a specific and general offset is required, the minimum strategic biodiversity score relates only to the habitat zones that require the general offset.</p>
Offset risk factor	<p>There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity.</p> <p>To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.</p> <p style="text-align: center;"><i>Risk factor for general offsets = 1.5</i></p> <p style="text-align: center;"><i>Risk factor for specific offset = 2</i></p>
Offset type	<p>The specific-general offset test determines the offset type required.</p> <p>When the specific-general offset test determines that the native vegetation removal will have an impact on one or more rare or threatened species habitat above the set threshold of 0.005 per cent, a specific offset is required. This test is done at the permit application level.</p> <p>A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have an impact on any habitat for any rare or threatened species above the set threshold of 0.005 per cent. All habitat zones that do not require a specific offset will require a general offset.</p>
Proportional impact on species	<p>This is the outcome of the specific-general offset test. The specific-general offset test is calculated across the entire proposal for each species on the native vegetation permitted clearing species list. If the proportional impact on a species is above the set threshold of 0.005 per cent then a specific offset is required for that species.</p>
Specific offset amount	<p>The specific offset amount is calculated by multiplying the specific biodiversity equivalence score of the native vegetation to be removed by the risk factor for specific offsets. This number is expressed in specific biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.</p> <p style="text-align: center;"><i>Risk adjusted specific biodiversity equivalence score</i> <i>= specific biodiversity equivalence score clearing × 2</i></p>

Testing Clearing proposal

Specific offset attributes Specific offsets must be located in the modelled habitat for the species that has triggered the specific offset requirement.

Specific biodiversity equivalence score The specific biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to the habitat of the relevant rare or threatened species. It is calculated for each habitat zone where one or more species habitats require a specific offset as a result of the specific-general offset test as follows:

$$\text{Specific biodiversity equivalence score} = \text{habitat hectares} \times \text{habitat importance score}$$

Strategic biodiversity score This is the weighted average strategic biodiversity score of the marked native vegetation. The strategic biodiversity score has been calculated from the *Strategic biodiversity map* for each habitat zone.

The strategic biodiversity score of native vegetation is a measure of the native vegetation's importance for Victoria's biodiversity, relative to other locations across the landscape. The *Strategic biodiversity map* is a modelled layer that prioritises locations on the basis of rarity and level of depletion of the types of vegetation, species habitats, and condition and connectivity of native vegetation.

Total extent (hectares) for calculating habitat hectares This is the total area of the marked native vegetation in hectares.

The total extent of native vegetation is an input to calculating the habitat hectares of a site and in calculating the general biodiversity equivalence score. Where the marked native vegetation includes scattered trees, each tree is converted to hectares using a standard area calculation of 0.071 hectares per tree. This information has been provided by or on behalf of the applicant in the GIS file.

Vicinity The vicinity is an attribute for a general offset.

The offset site must be located within the same Catchment Management Authority boundary or Local Municipal District as the native vegetation to be removed.