



Melbourne Airport Taxiway Zulu and Northern Compound: Biodiversity Assessment

Final Report

Prepared for Australia Pacific Airports Melbourne Pty Ltd

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Contents

Summary	V
1. Introduction	7
1.2 Project background.....	7
1.3 Scope of assessment.....	7
1.4 Location of the study area.....	7
2. Methods	9
2.2 Literature and database review	9
2.3 Definitions of significance.....	9
2.3.1 Species and ecological communities.....	9
2.4 Likelihood of occurrence	9
2.5 Site investigation.....	10
2.5.1 Flora assessment.....	10
2.5.2 Fauna assessment.....	11
2.5.3 Permits	11
2.6 Qualifications.....	11
2.7 Legislation and policy	11
2.8 Mapping.....	12
3. Results.....	13
3.2 Vegetation & fauna habitat	13
3.2.1 Fauna Habitat	16
3.3 Significant species and ecological communities	16
3.3.1 EPBC Act and FFG Act listed species.....	16
3.3.2 DELWP Advisory list of rare and threatened species.....	17
3.3.3 Significant ecological communities.....	17
4. Biodiversity legislation and government policy.....	19
4.1 Commonwealth	19
4.1.1 Airports Act 1996	19
4.1.2 Environment Protection and Biodiversity Conservation Act 1999	19
4.2 State.....	20
4.2.1 Flora and Fauna Guarantee Act 1988 (FFG Act)	20
4.2.2 Catchment and Land Protection Act 1994 (CaLP Act).....	21
4.2.3 Planning and Environment Act 1987 (incl. Planning Schemes)	21
5. Victoria's biodiversity assessment guidelines.....	22
5.1 Site-based information.....	22
5.2 Landscape scale information.....	22

5.3 Proposed removal of native vegetation	23
5.3.1 Native vegetation	23
5.4 Determining the risk-based pathway	24
5.5 Offset requirements	24
6. Key ecological values and recommendations	25
References.....	26
Appendices	27
Appendix 1: Flora.....	28
Appendix 2: Fauna.....	34

List of Figures

Figure 1 Location of the study area - Melbourne Airport, Tullamarine, Victoria	8
Figure 2 Ecological features of the study area – Taxiway Zulu, Melbourne Airport, Victoria	18

List of Tables

Table 1 Criteria for determining significance of species & ecological communities	9
Table 2 Assessment of project in relation to the EPBC Act.....	20
Table 3 Habitat scores for patch vegetation within the study area.....	23
Table 4 Habitat hectare conversion for scattered remnant trees within the study area	24
Table 5 Key ecological values, implications of development and recommendations.....	25

Summary

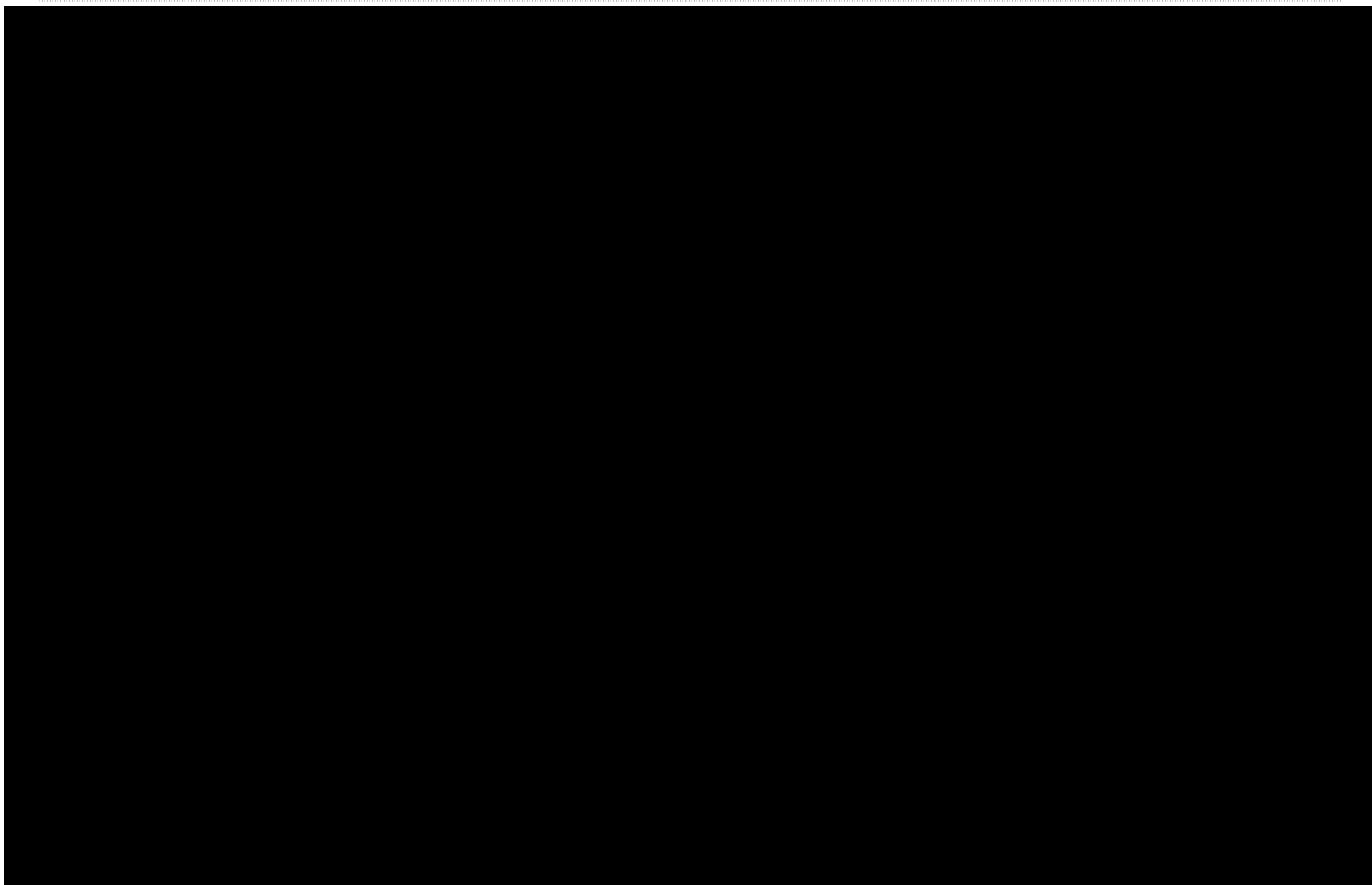
Biosis Pty Ltd was commissioned by Australia Pacific Airports Melbourne (APAM) to undertake a biodiversity assessment of land proposed for the development of Taxiway Zulu within Melbourne Airport.

Ecological values

Key ecological values identified within the study area are as follows:

- Approximately 18.2 ha of native grassland vegetation corresponding to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened community Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP).
- 18.25 ha of native grassland vegetation corresponding to the *Flora and Fauna Guarantee Act 1988* (FFG Act) listed Western (Basalt) Plain Grassland Community, of which 18.21 ha accords with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) community.
- 18 scattered Grey Box *Eucalyptus microcarpa* trees.

Government legislation and policy



1. Introduction

1.2 Project background

Biosis Pty Ltd was commissioned by Australia Pacific Airports Melbourne (APAM) to undertake a biodiversity assessment of land proposed for the development of Taxiway Zulu within Melbourne Airport (Figure 1).

APAM intend to undertake the project in a manner that is consistent with the principles of Ecologically Sustainable Development (ESD) and that considers relevant Commonwealth and State legislation and policy. This report presents the results of the biodiversity assessment.

1.3 Scope of assessment

The objectives of this investigation are to:

- Describe the vascular flora (ferns, conifers, flowering plants) and vertebrate fauna (mammals, birds, reptiles and frogs).
- Map native vegetation and other habitat features.
- Review the implications of relevant biodiversity legislation and policy.
- Identify potential implications of the proposed development and provide recommendations to assist with development design.

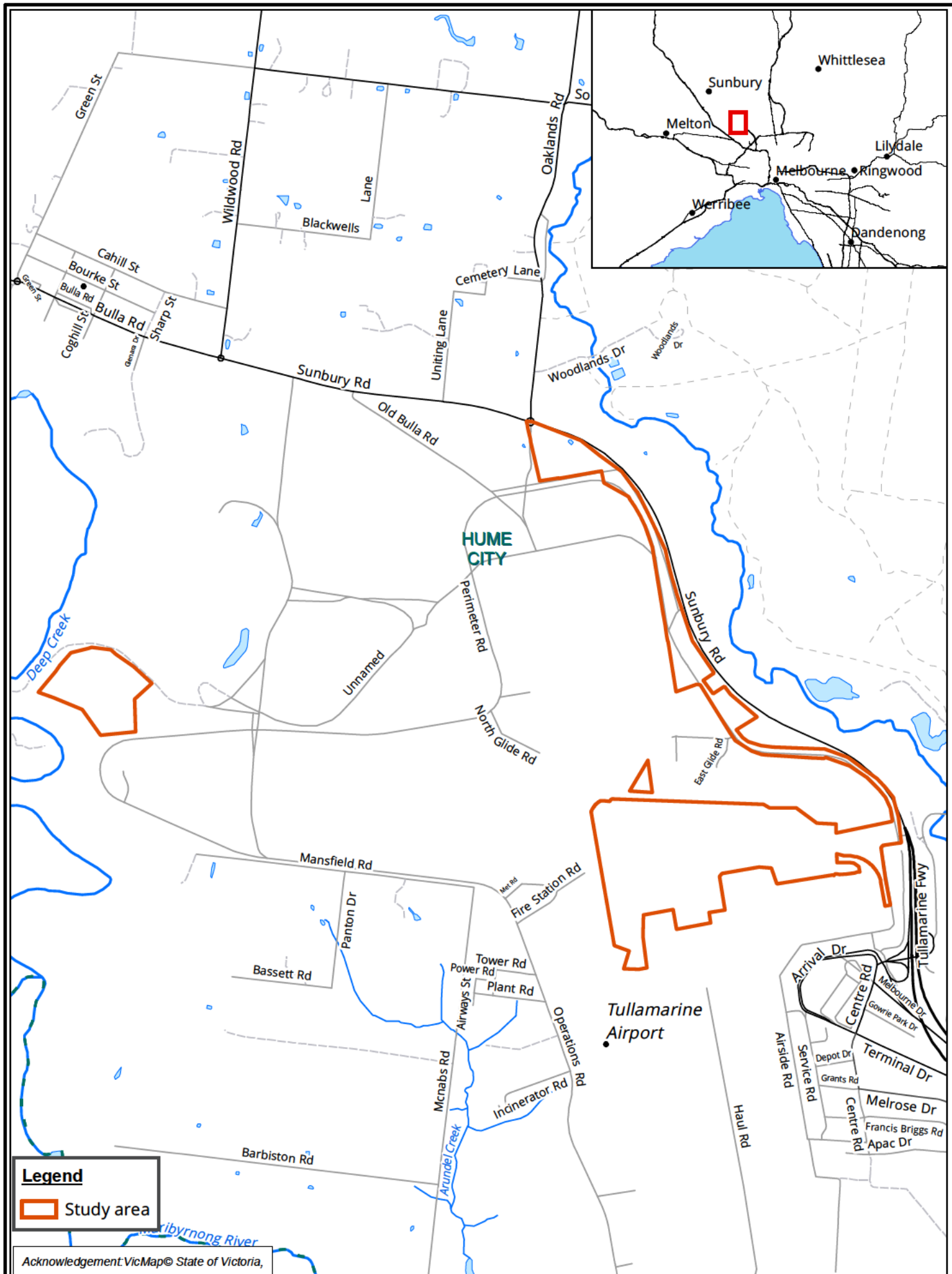
1.4 Location of the study area

The study area is located approximately 20 km north-west of the Melbourne CBD (Figure 1).

The study area is within the:

- Victorian Volcanic Plains Bioregion
- Maribyrnong River Basin
- Management area of Melbourne Water.

The land is owned by the Government of Australia (Commonwealth land) leased to Australia Pacific Airports Melbourne. It is therefore not included within any Victorian municipality but is otherwise surrounded by land within the municipalities of Hume City Council and Brimbank City Council.



2. Methods

2.2 Literature and database review

In order to provide a context for the study site, information about flora and fauna from within 5 km of the study area (the 'local area') was obtained from relevant public databases. Records from the following databases were collated and reviewed:

- Flora Information System which includes records from the Victorian Biodiversity Atlas 'VBA_FLORA25, FLORA100 & FLORA Restricted' August 2012 © The State of Victoria, Department of Environment, Land, Water and Planning (DELWP). The contribution of the Royal Botanical Gardens Melbourne to the database is acknowledged.
- Victorian Biodiversity Atlas 'VBA_FAUNA25, FAUNA100 & FAUNA Restricted' August 2012 © The State of Victoria
- DELWP Biodiversity Interactive Map (BIM)
- BirdLife Australia, the New Atlas of Australian Birds 1998-2012 (BA)
- Protected Matters Search Tool of the Australian Government Department of Environment and Energy (DEE) for matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

2.3 Definitions of significance

2.3.1 Species and ecological communities

The significance of a species or community is determined by its listing as rare or threatened under Commonwealth or State legislation / policy. The sources used to categorise significance of species and communities in this report are summarised below in Table 1.

Table 1 Criteria for determining significance of species & ecological communities

Significance	
National	Listed as critically endangered, endangered or vulnerable under the EPBC Act.
State	Listed as critically endangered, endangered, vulnerable or rare in Victoria on a DELWP Advisory List (DSE 2009; DSE 2013; DEPI 2014a) Listed as threatened under the FFG Act

2.4 Likelihood of occurrence

Likelihood of occurrence indicates the potential for a threatened species or ecological community to occur regularly within the study area. Determination is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low, medium, high or recorded. The rationale for the rank assigned is provided for each species in Appendix 1 (flora) and Appendix 2 (fauna). Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Where DELWP Advisory list species are recorded in the study area this is noted in Appendix 1 (flora) and Appendix 2 (fauna).

Only those species listed under the EPBC Act or listed as threatened under the FFG Act (hereafter referred to as 'listed species') are assessed to determine their likelihood of occurrence. The habitat value for species listed on the DELWP Advisory Lists is calculated by the Habitat Importance Modelling produced by DELWP (DEPI 2013a). Species which have at least medium likelihood of occurrence are given further consideration in this report. The need for targeted survey for these species is also considered.

2.5 Site investigation

2.5.1 Flora assessment

The flora assessment was undertaken over three days on 23 and 30 May and 19 August 2014. Two lists of flora species were collected (T25478 & T25514). Planted species were not recorded unless they were naturalised.

Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses' (Clause 72).

Victoria's Permitted clearing of native vegetation: Biodiversity assessment guidelines classify native vegetation into two categories (DEPI 2013b):

- A **remnant patch** of native vegetation (measured in hectares) is either:
 - *An area of native vegetation, with or without trees, where at least 25 per cent of the total perennial understorey cover is native plants.*
 - *An area with three or more indigenous canopy trees where the tree canopy cover is at least 20 per cent.*

Remnant patch vegetation is classified into ecological vegetation classes (EVCs). An EVC contains one or more floristic (plant) communities, and represents a grouping of broadly similar environments. Definitions of EVCs and benchmarks (condition against which vegetation quality at a site can be compared) are determined by DELWP.

- A **scattered tree** is defined as (extent measured by number of trees):
 - *An indigenous canopy tree that does not form part of a remnant patch of native vegetation.*

A canopy tree is a mature tree that is greater than three metres in height and is usually found in the upper layer of a vegetation type. Ecological vegetation class descriptions provide a list of the typical canopy species. A condition score and extent is applied to each scattered tree based on information provided by DELWP's NVIM.

Species nomenclature for flora follows the current (2013) Flora Information System (FIS).

Where a remnant patch of EVC was identified within the study area, an assessment in relation to the Biodiversity Assessment Guidelines according to the standard Habitat Hectare method provided by DSE (2004) was undertaken.

The definitions of any relevant EPBC Act listed vegetation communities are also applied to any patches of native vegetation identified (i.e. DSEWPac 2011).

2.5.2 Fauna assessment

No formal fauna assessment was conducted beyond a habitat level assessment.

2.5.3 Permits

Biosis undertakes flora and fauna assessments under the following permits and approvals:

- Research Permit/Management Authorisation and Permit to Take Protected Flora & Protected Fish issued by DELWP under the *Wildlife Act 1975*, *Flora and Fauna Guarantee Act 1988* and *National Parks Act 1975* (Permit number 10007569).

2.6 Qualifications

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as low abundance, patchy distribution, species dormancy, seasonal conditions, and migration and breeding behaviours. In many cases these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

The current flora and fauna assessment was conducted in autumn and winter, which are not optimal times for survey. Many species are sterile or dormant during this period which may make them harder to identify and cause some species to be missed.

The study area is also subject to a regular mowing regime and this made the determination of the extent and condition of native vegetation more difficult. While regular examinations were made of sterile grasses to determine if the dominant ground cover was indigenous or exotic there may be some inaccuracy in delineating the extent of native vegetation.

Overall a precautionary approach was taken to delineate the extent of native vegetation and it is considered more likely that the extent of native vegetation was overestimated rather than underestimated.

2.7 Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- Matters listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), associated policy statements, significant impact guidelines, listing advice and key threatening processes
- Threatened taxa, communities and threatening processes listed under Section 10 of the *Flora & Fauna Guarantee Act 1988* (FFG Act); associated action statements and listing advice
- Permitted clearing of native vegetation: Biodiversity assessment guidelines (the Guidelines; DEPI 2013)
- Noxious weeds and pest animals lists under the *Catchment and Land Protection Act 1994* (CaLP Act).

2.8 Mapping

Mapping was conducted using hand-held (uncorrected) GPS units (WGS84) and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files which contain our flora and fauna spatial data are available to incorporate into design concept plans. However this mapping may not be sufficiently precise for detailed design purposes.

3. Results

The ecological features of the study area are described below and mapped in Figure 2.

Lists of significant species recorded or predicted to occur within 5 km of the study area are provided in Appendix 1 (flora) and Appendix 2 (fauna). An assessment of the likelihood of these species to occur in the study area is also included.

Flora species recorded during the site assessment (36 indigenous and 47 weeds) are listed in Appendix 1.

3.2 Vegetation & fauna habitat

The study area is a highly modified and managed environment which has undergone significant development and disturbance. Broader areas of grass dominated vegetation occur between the established airport infrastructure which includes runways, taxiways, high intensity approach lighting (HIAL), management roads and various buildings and other structures.

Despite this level of disturbance much of the site remains dominated by indigenous grasses such as Wallaby Grasses *Rytidosperma* spp. and Kneed Spear-grass *Austrostipa bigeniculata* (Plates 1 and 2). Other common grass species include Silky Blue-grass *Dichanthium sericeum*, Windmill Grass *Chloris truncata*, Red-leg Grass *Bothriochloa macra* (Plate 3) and Rigid Panic *Walwhalleya proluta*. Other herbaceous species (forbs) are relatively uncommon and include Tufted Bluebell *Wahlenbergia communis*, Grassland Wood-sorrel *Oxalis perennans*, Kidney-weed *Dichondra repens*, Common Woodruff *Asperula conferta*, Berry Saltbush *Atriplex semibaccata*, Grassland Crane's-bill *Geranium retrorsum*, Sheep's Burr *Acaena echinata* (Plate 4) and Varied Raspwort *Haloragis heterophylla*.



Plate 1: Native grasses such as Wallaby-grass and Spear-grass dominate the study area



Plate 2: Close up of ground cover dominated by indigenous grasses which have relatively open (as shown) to dense cover



Plate 3: Native grasses (Red-leg Grass) have colonised the disturbed margins of the road network



Plate 4: These modified native grasslands support scattered indigenous herbs (Sheep's Burr)

Common grassy weeds in this environment include Chilean Needle Grass *Nassella neesiana*, Rat-tail Grass *Sporobolus africanus*, Serrated Tussock *Nassella trichotoma* (Plate 5), Paspalum *Paspalum dilatatum*, Cocksfoot *Dactylis glomerata* and Couch *Cynodon dactylon*.



Plate 5: Small patch of introduced Serrated Tussock

Common herbaceous weeds included Ribwort *Plantago lanceolata*, Onion Grass *Romulea rosea*, Soursob *Oxalis pes-caprae*, Buck's-horn Plantain *Plantago coronopus* and Narrow-leaf Clover *Trifolium*

angustifolium. Less common weeds include Spear Thistle *Cirsium vulgare*, Artichoke Thistle *Cynara cardunculus*, Sweet Briar *Rosa rubiginosa* and Galenia *Galenia pubescens*. Broad-leaf weeds rarely provide more than 10-20% cover and where they do it is only over a limited area. These species generally have a cover of less than 5% (Plate 2).

The northern section of the study area also contains 18 scattered Grey Box *Eucalyptus microcarpa* trees (Plate 6). At the time of assessment, these trees did not meet the requirements to be assessed as a patch of native vegetation and do not meet the extent criteria to qualify as an area of EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia ecological community.



Plate 6: Scattered Grey Box trees

3.2.1 Fauna Habitat

The study area is highly modified and while it does support vegetation largely dominated by indigenous grasses, ongoing management and uses of this habitat make the site of limited value for native fauna.

A number of common bird species are present but habitat modifications and management actions conducted by the airport (i.e. regular mowing, insect and bird management) for safety reasons have reduced the habitat suitability of this area for a wide range of species.

3.3 Significant species and ecological communities

3.3.1 EPBC Act and FFG Act listed species

Lists of significant species recorded or predicted to occur within 5 km of the study area are provided in Appendix 1 (flora) and Appendix 2 (fauna). An assessment of the likelihood of these species to occur in the study area is included.

No EPBC or FFG Act listed threatened species are considered to have greater than medium likelihood of occurrence within the study area.

3.3.2 DELWP Advisory list of rare and threatened species

One species listed by DSE (2005) as rare in Victoria, Pale-flower Crane's-bill *Geranium* sp. 3, was recorded within the study area. Another species, Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis*, is listed as Poorly Known, although surveys by Biosis over the last nine years to the west of Melbourne suggest this subspecies is more abundant than previously considered.

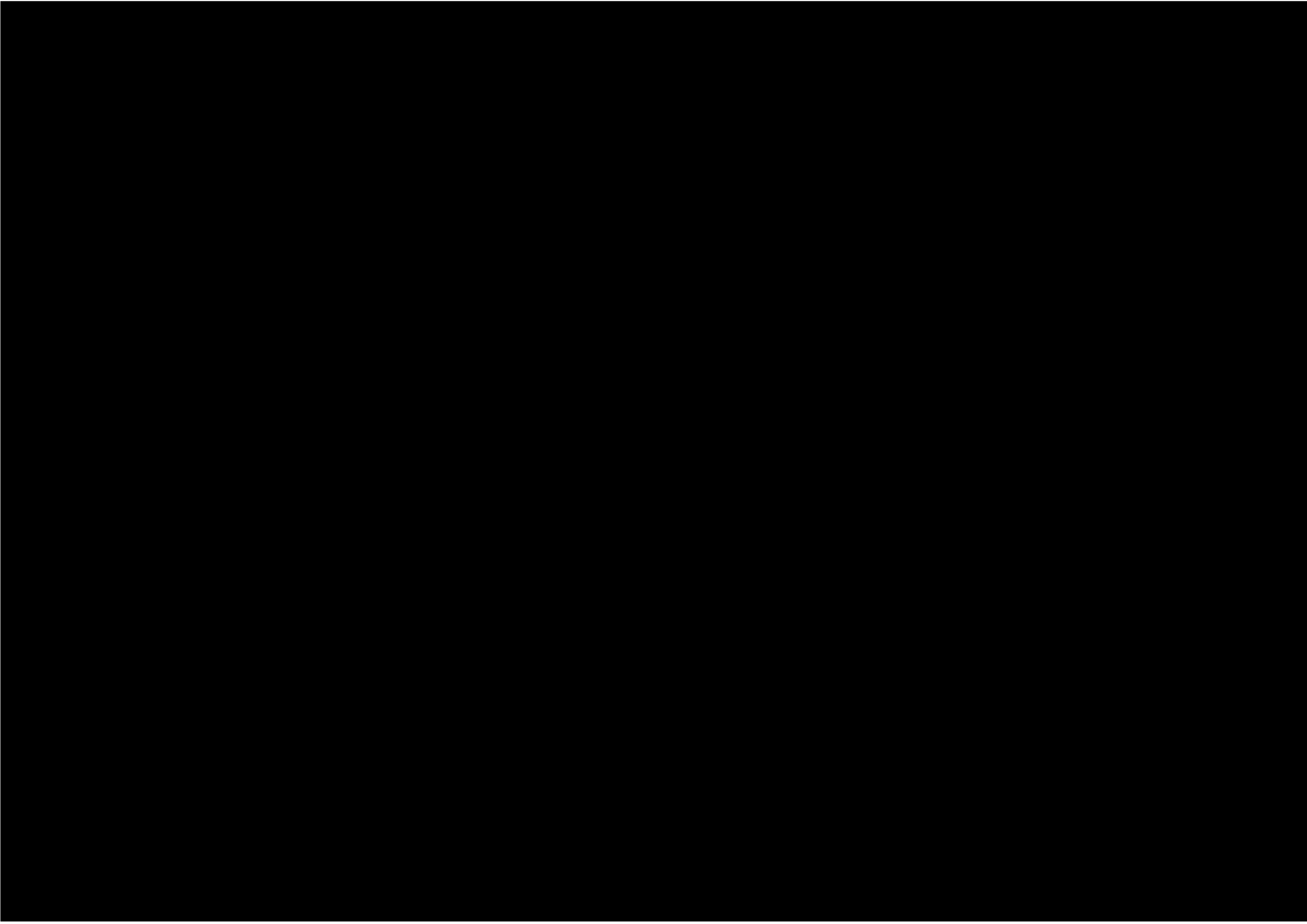
As part of the Guidelines, DELWP has produced models for Victoria indicating the extent of habitat for most state-listed rare or threatened species. These models are called 'habitat importance models' and they assign a 'habitat importance score' to a location based on the importance of that location in the landscape as habitat for a particular rare or threatened species, in relation to other suitable habitat for that species (DEPI 2013b).

Under the Guidelines, these models form the basis for determining the impact of potential native vegetation clearing on rare and threatened species. The models only apply where a clearing proposal is considered on the moderate or high risk-based application pathways (See Section 5). Also, as the site is Commonwealth land, the Guidelines do not apply to this project.

3.3.3 Significant ecological communities

The patches of Plains Grassland identified during this assessment (Figure 2) are all dominated by native grasses of the genera *Austrostipa* and *Rytidosperma* (previously *Austrodanthonia*). Weedy perennial grasses, account for less than 50% of the perennial tussock cover of these patches while non-grassy weeds accounted for less than 30% of the total vegetation cover at the time of assessment. These patches of vegetation therefore satisfy the definition of the critically endangered EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP).

Native vegetation on site also corresponds to the FFG Act listed threatened community Western (Basalt) Plain Grassland.



4. Biodiversity legislation and government policy

This section provides an assessment of the project in relation to key biodiversity legislation and government policy. This section does not describe the legislation and policy in detail and guidance provided here does not constitute legal advice.

4.1 Commonwealth

4.1.1 Airports Act 1996

The *Airports Act* and associated *Airport (Environment Protection) Regulations 1997* requires federally leased airports to develop and implement Master Plans and Airport Environment Strategies.

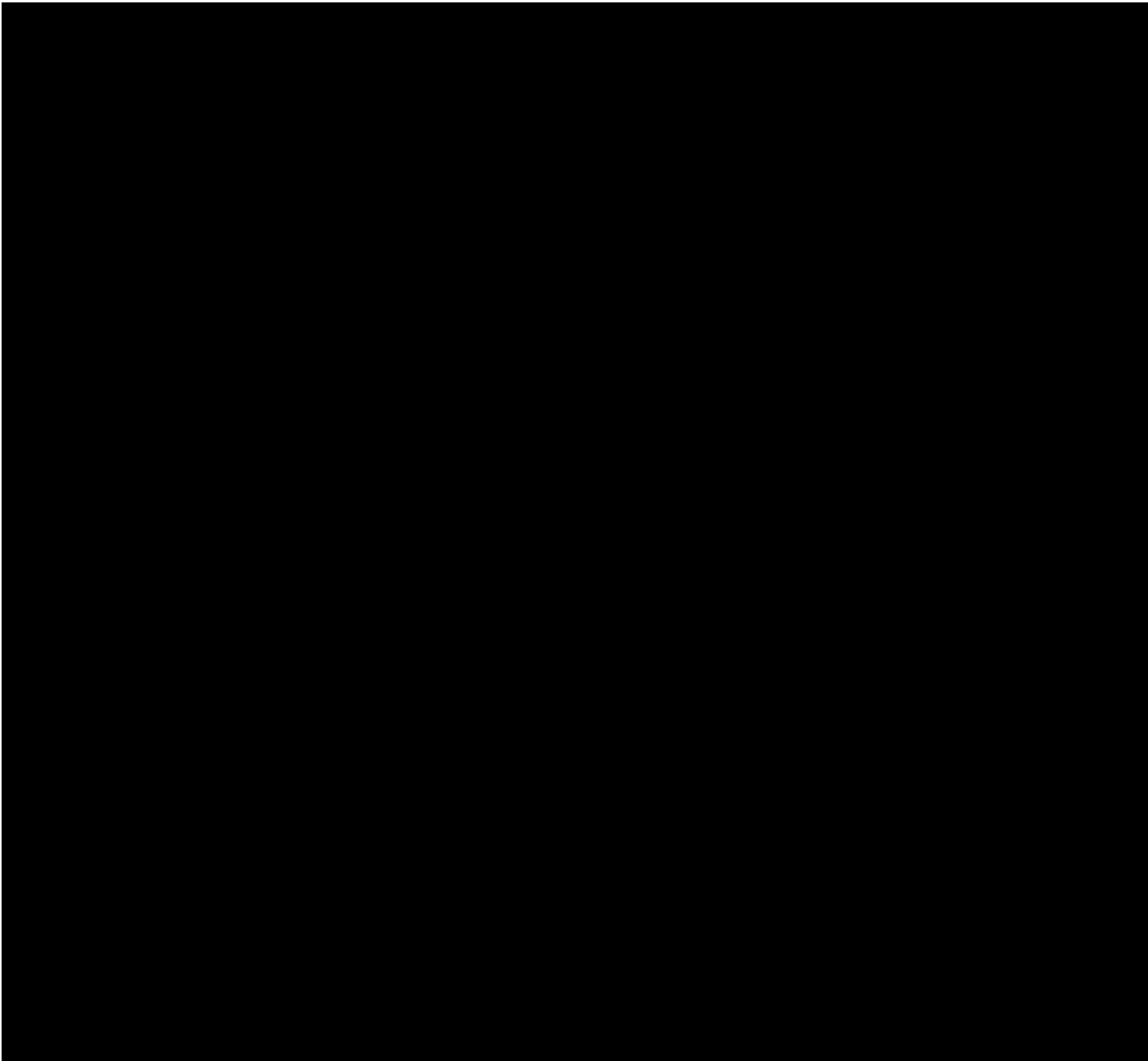
Where development is proposed on Commonwealth land in an Australia leased airport a Major Development Plan (MDP) may be required.

Section 89 of the Act outlines those proposed actions that trigger the need for an MDP.

4.1.2 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (NES) protected under the Act.

Link for further information including a guide to the referral process is available at: <http://www.environment.gov.au/epbc/index.html>

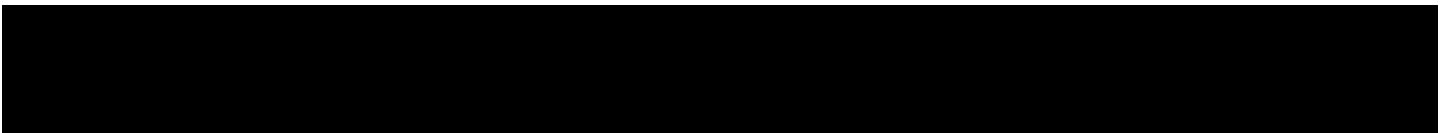


4.2 State

4.2.1 Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is Victorian legislation with the objectives of conserving threatened species and communities and managing potentially threatening processes. Under the FFG Act a permit is required from DSE to 'take' protected flora species from public land. A permit is generally not required for removal of protected flora from private land.

Link for further information: <http://delwp.vic.gov.au/environment-and-wildlife/conserving-threatened-species-and-communities/flora-and-fauna-guarantee-act-1988/ffg-listed-taxa-communities-and-potentially-threatening-processes>.



4.2.2 Catchment and Land Protection Act 1994 (CaLP Act)

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species. Declared noxious weeds identified in the study area are listed in Appendix 1.

The proponent must take all reasonable steps to eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds, and prevent the spread of and as far as possible eradicate established pest animals. The State is responsible for eradicating State prohibited weeds from all land in Victoria.

Link for further information: <http://www.depi.vic.gov.au/agriculture-and-food/pests-diseases-and-weeds/protecting-victoria-from-pest-animals-and-weeds/legislation-policy-and-permits/legislation>.

4.2.3 Planning and Environment Act 1987 (incl. Planning Schemes)

The *Planning and Environment Act 1987* controls the planning and development of land in Victoria, and provides for the development of planning schemes for all municipalities.

Of particular relevance are controls relating to the removal, destruction or lopping of native vegetation contained within the relevant local government Planning Scheme (the Scheme), including permit requirements. The Scheme (Clause 72) defines 'native vegetation' as 'Plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. It is an objective of Clause 12.01-2 of the State Planning Policy Framework (SPPF) (Native Vegetation Management) that permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.

Reforms to the native vegetation permitted clearing regulations were gazetted on 20 December 2013 through planning scheme amendment VC105. The reforms made changes to the Victoria Planning Provisions including the State Planning Policy Framework (SPPF), Clause 52.16 and 52.17 of all planning schemes within Victoria and introduced the Permitted clearing of native vegetation: Biodiversity Assessment Guidelines (the Guidelines, DEPI 2013b). For more information on these reforms refer to <http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/native-vegetation>.

Victoria's Biodiversity Assessment Guidelines

The Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria (DEPI 2013b). The purpose of the Guidelines is to guide how impacts on biodiversity should be considered when assessing a permit application to remove, destroy or lop native vegetation.

5. Victoria's biodiversity assessment guidelines

The *Permitted clearing of native vegetation: Biodiversity assessment guidelines* (the Guidelines) were introduced in December 2013. As Victorian Government policy the Guidelines are not a requirement for Commonwealth land but they are outlined here to provide context, and to allow APAM to voluntarily comply with the objectives of the Guidelines if deemed appropriate. The Guidelines describe the following objective for permitted clearing of native vegetation in Victoria:

"No net loss in the contribution made by native vegetation to Victoria's biodiversity"

This objective is to be achieved through Victoria's planning system using a risk-based approach that relies on strategic planning and the permit and offset system. The key strategies for achieving no net loss at the permit level are:

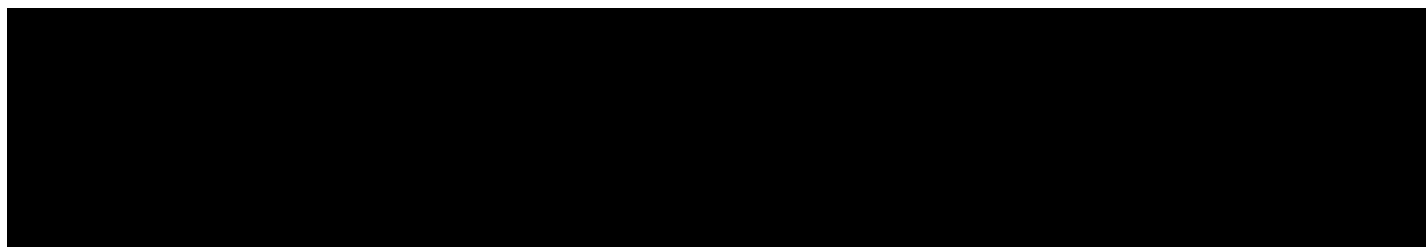
- avoiding the removal of native vegetation that makes a significant contribution to Victoria's biodiversity
- minimising impacts to Victoria's biodiversity from the removal of native vegetation
- where native vegetation is permitted to be removed, ensuring it is offset in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.

DELWP has provided biodiversity information tools to assist with determining the risk associated with permitted clearing and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

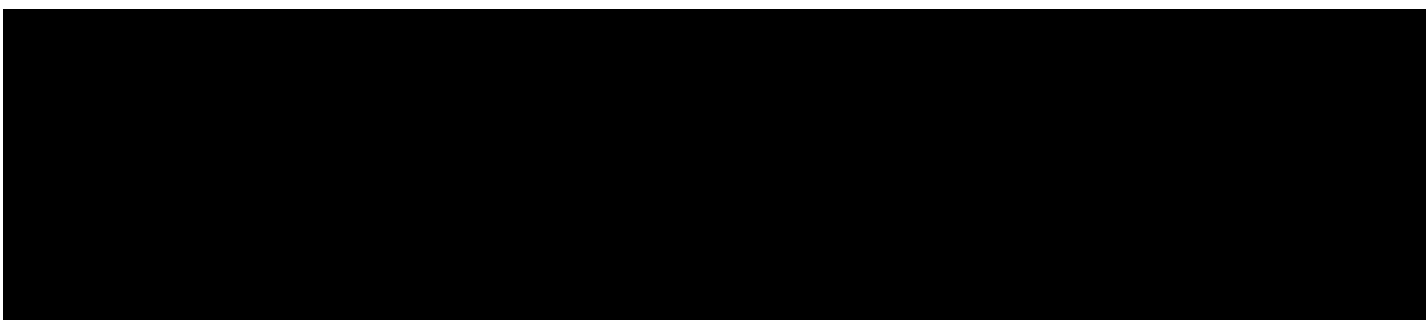
The Guidelines are an incorporated document in Victoria's *Planning and Environment Act 1987*, and the requirements of the Guidelines are triggered by the requirement for a permit to remove, destroy or lop native vegetation (under Clause 52.17 of the local planning scheme).

The biodiversity information tools have two components outlined below.

5.1 Site-based information



5.2 Landscape scale information



5.3 Proposed removal of native vegetation

5.3.1 Native vegetation

Numerous patches of Plains Grassland were mapped within the study area. These were variously separated by existing infrastructure or other areas of disturbance (Figure 2). This results in a total area of about 18.25 ha of native vegetation within the study area (0.04 ha of Plains Grassland does not correlate with NTGWVP). This vegetation is of relatively uniform condition and is allocated a habitat score of 37/100 (Table 3).

Table 3 Habitat scores for patch vegetation within the study area

Habitat Zone			1
Bioregion			Victorian Volcanic Plain
EVC Name			Heavier soils Plains Grassland
EVC Number			132-61
EVC Bioregional Conservation Status			Endangered
		Max Score	Score
Condition Score	Large Old Trees	10	Not Applicable
	Canopy Cover	5	Not Applicable
	Lack of Weeds	15	9
	Understorey	25	5
	Recruitment	10	6
	Organic Matter	5	3
	Logs	5	Not Applicable
	Total Site Score		23
	EVC standardiser (x 75/55)		1.36
	Adjusted Condition Score		31.28
Landscape Score		25	6
Habitat points = #/100		100	37.28
HABITAT SCORE		1	0.37
Habitat Zone extent (ha)			18.25
Habitat Hectares (Hha)			6.75

There are 18 scattered remnant trees within the study area. These trees equate to 0.26 Habitat hectares (Table 4).

Table 4 Habitat hectare conversion for scattered remnant trees within the study area

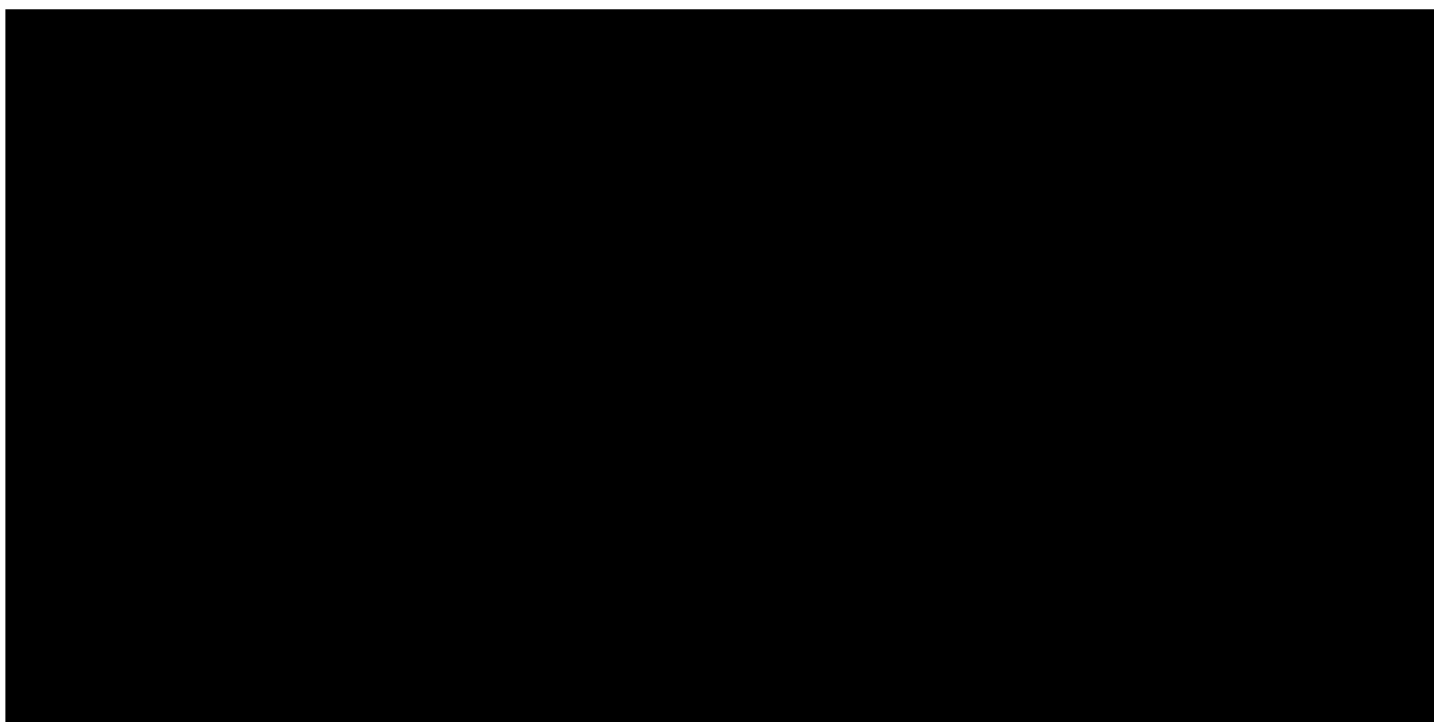
Number of scattered trees	Weighted average condition multiplier*	Standard extent (ha)	Habitat hectares (Hha)
18	0.2	0.07	0.25

*From DELWP NVIM

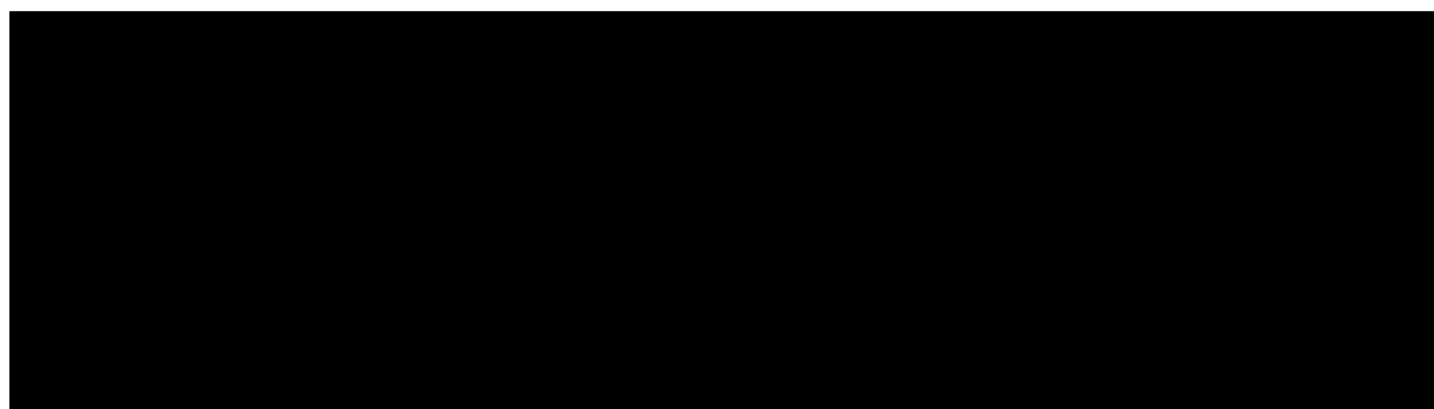
Summary of Habitat hectares within the study area

In summary, the study area supports 7.00 Habitat hectares.

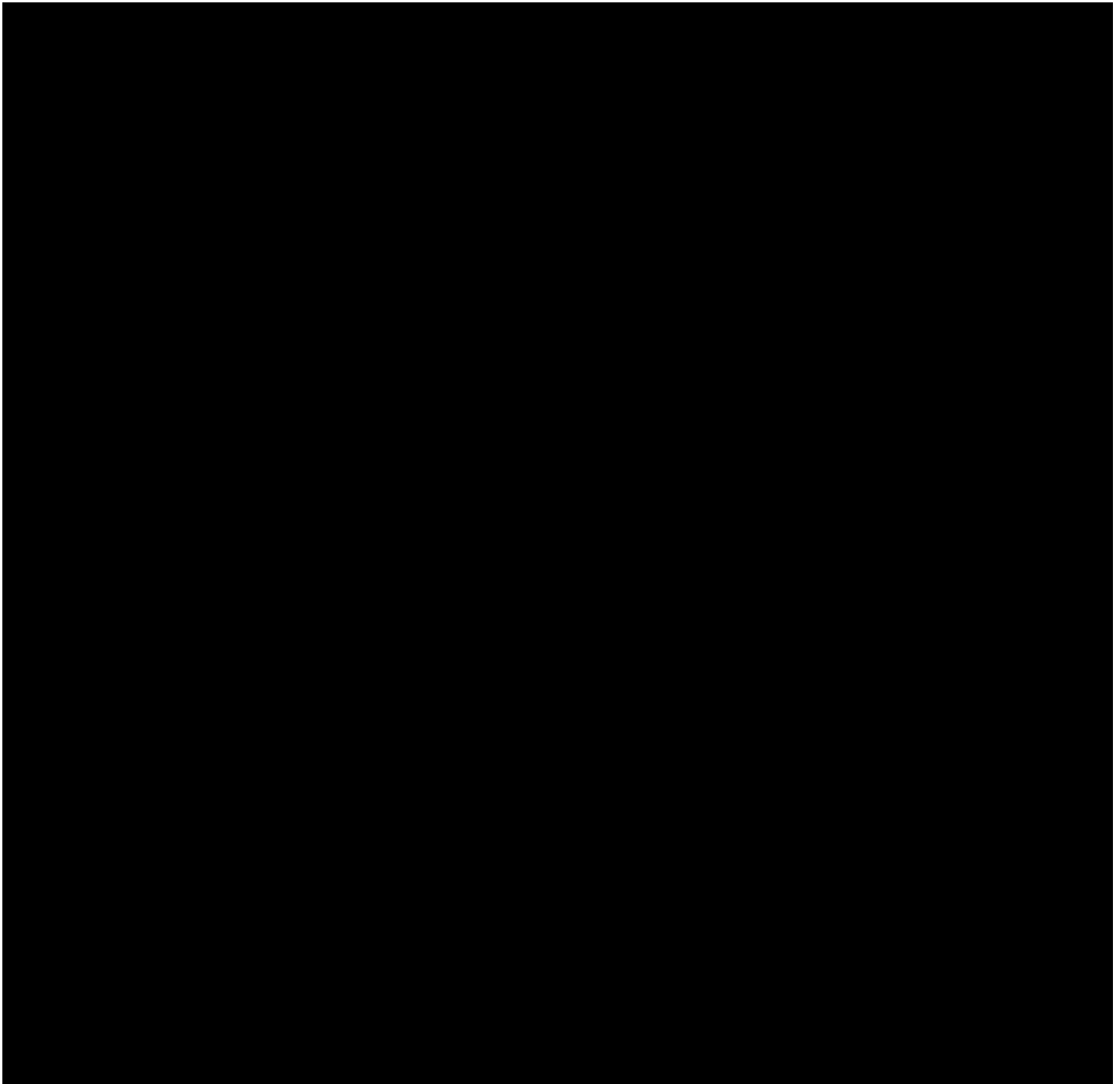
5.4 Determining the risk-based pathway



5.5 Offset requirements



6. Key ecological values and recommendations



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Appendices

Appendix 1: Flora

Notes to tables:

EPBC Act: CR - Critically Endangered EN - Endangered VU - Vulnerable PMST - Protected Matters Search Tool	DEPI 2014a: e - endangered v - vulnerable r - rare
FFG Act: L - listed as threatened under FFG Act	P - protected under the FFG Act (public land only)
Noxious weed status: SP - State prohibited species RP - Regionally prohibited species	RC - Regionally controlled species RR - Regionally restricted species

A1.1 Flora species recorded from the study area

Table A3.1. Flora species recorded from the study area.

Status	Scientific name	Common name
Rare or Threatened Indigenous species:		
r	<i>Geranium</i> sp. 3	Pale-flower Crane's-bill
Indigenous species:		
	<i>Acaena echinata</i>	Sheep's Burr
	<i>Asperula conferta</i>	Common Woodruff
	<i>Atriplex semibaccata</i>	Berry Saltbush
	<i>Austrostipa bigeniculata</i>	Kneed Spear-grass
	<i>Bothriochloa macra</i>	Red-leg Grass
	<i>Carex inversa</i>	Knob Sedge
	<i>Chloris truncata</i>	Windmill Grass
k	<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i>	Slender Bindweed
	<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Silky Blue-grass
	<i>Dichondra repens</i>	Kidney-weed
	<i>Einadia nutans</i>	Nodding Saltbush
	<i>Eleocharis acuta</i>	Common Spike-sedge
	<i>Eleocharis pusilla</i>	Small Spike-sedge
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush
	<i>Epilobium billardierianum</i>	Variable Willow-herb

Status	Scientific name	Common name
	<i>Geranium retrorsum</i> s.s.	Grassland Crane's-bill
	<i>Haloragis heterophylla</i>	Varied Raspwort
P	<i>Helichrysum luteoalbum</i>	Jersey Cudweed
	<i>Juncus amabilis</i>	Hollow Rush
	<i>Juncus bufonius</i>	Toad Rush
	<i>Juncus subsecundus</i>	Finger Rush
	<i>Lythrum hyssopifolia</i>	Small Loosestrife
	<i>Oxalis perennans</i>	Grassland Wood-sorrel
	<i>Rytidosperma bipartitum</i> s.s.	Leafy Wallaby-grass
	<i>Rytidosperma caespitosum</i>	Common Wallaby-grass
	<i>Rytidosperma carphoides</i>	Short Wallaby-grass
	<i>Rytidosperma duttonianum</i>	Brown-back Wallaby-grass
	<i>Rytidosperma erianthum</i>	Hill Wallaby-grass
	<i>Rytidosperma fulvum</i>	Copper-awned Wallaby-grass
	<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass
	<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Slender Wallaby-grass
	<i>Rytidosperma setaceum</i>	Bristly Wallaby-grass
	<i>Schoenus apogon</i>	Common Bog-sedge
	<i>Typha domingensis</i>	Narrow-leaf Cumbungi
	<i>Wahlenbergia communis</i> s.s.	Tufted Bluebell
	<i>Walwhalleya proluta</i>	Rigid Panic
Introduced species:		
	<i>Avena</i> spp.	Oat
	<i>Brassica fruticulosa</i>	Twiggy Turnip
	<i>Briza maxima</i>	Large Quaking-grass
	<i>Briza minor</i>	Lesser Quaking-grass
	<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>	Soft Brome
	<i>Cenchrus clandestinus</i>	Kikuyu
	<i>Centaureum erythraea</i>	Common Centaury
RC	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Conyza bonariensis</i>	Flaxleaf Fleabane
RC	<i>Cynara cardunculus</i> subsp. <i>flavescens</i>	Artichoke Thistle

Status	Scientific name	Common name
	<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch
	<i>Cyperus eragrostis</i>	Drain Flat-sedge
	<i>Dactylis glomerata</i>	Cocksfoot
	<i>Erodium cicutarium</i>	Common Heron's-bill
	<i>Erodium moschatum</i>	Musky Heron's-bill
	<i>Galenia pubescens</i> var. <i>pubescens</i>	Galenia
	<i>Gazania linearis</i>	Gazania
	<i>Helminthotheca echioides</i>	Ox-tongue
	<i>Hirschfeldia incana</i>	Buchan Weed
	<i>Hordeum leporinum</i>	Barley-grass
	<i>Hypochaeris radicata</i>	Flatweed
RC	<i>Juncus acutus</i> subsp. <i>acutus</i>	Spiny Rush
	<i>Leontodon taraxacoides</i> subsp. <i>taraxacoides</i>	Hairy Hawkbit
	<i>Lepidium africanum</i>	Common Peppercross
	<i>Lolium rigidum</i>	Wimmera Rye-grass
RC	<i>Lycium ferocissimum</i>	African Box-thorn
	<i>Malva nicaeensis</i>	Mallow of Nice
	<i>Medicago polymorpha</i>	Burr Medic
	<i>Moraea flaccida</i>	One-leaf Cape-tulip
RR	<i>Nassella neesiana</i>	Chilean Needle-grass
RC	<i>Nassella trichotoma</i>	Serrated Tussock
RR	<i>Oxalis pes-caprae</i>	Soursob
	<i>Oxalis purpurea</i>	Large-flower Wood-sorrel
	<i>Paspalum dilatatum</i>	Paspalum
	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
	<i>Plantago coronopus</i>	Buck's-horn Plantain
	<i>Plantago lanceolata</i>	Ribwort
	<i>Romulea rosea</i>	Onion Grass
RC	<i>Rosa rubiginosa</i>	Sweet Briar
	<i>Sisymbrium officinale</i>	Hedge Mustard
	<i>Sonchus oleraceus</i>	Common Sow-thistle
	<i>Sporobolus africanus</i>	Rat-tail Grass

Status	Scientific name	Common name
	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Narrow-leaf Clover
	<i>Trifolium dubium</i>	Suckling Clover
	<i>Trifolium</i> spp.	Clover
	<i>Trifolium subterraneum</i>	Subterranean Clover
	<i>Vicia sativa</i>	Common Vetch
	<i>Vulpia</i> spp.	Fescue

A1.2 Listed flora species

The following table includes the listed flora species that have potential to occur within the study area. The list of species is sourced from the Victorian Flora Information System and the Protected Matters Search Tool (DEE; accessed on 12.05.14).

Table A3.2. Listed flora species recorded / predicted to occur within 5 km of the study area.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	DSE	FFG					
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	VU				PMST	Swampy areas, mainly along the Murray River between Wodonga and Echuca with scattered records from southern Victoria.	Low	Highly localised suitable habitat present
<i>Carex tasmanica</i>	Curly Sedge		v	L		PMST	Seasonally wet areas, such as around drainage lines and freshwater swamps, on fertile, clay soils derived from basalt.	Negligible	No suitable habitat present
<i>Dianella amoena</i>	Matted Flax-lily	EN	e	L	2012	PMST	Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays.	Negligible	The heavily disturbed nature of the site suggests its presence is highly unlikely. Other more common members of this genus which otherwise also occupy this type of habitat are also absent from this site.
<i>Glycine latrobeana</i>	Clover Glycine	VU	v	L		PMST	Grasslands and grassy woodlands, particularly those dominated by <i>Themeda triandra</i> .	Negligible	The heavily disturbed nature of the site suggests its presence is highly unlikely. No <i>T. triandra</i> observed. Other similar, more common species such as <i>Glycine tabacina</i> are also absent.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	DSE	FFG					
<i>Lepidium hyssopifolium</i>	Basalt Peppercress	EN	e	L	1977	PMST	Basalt plains grassland and woodland communities.	Negligible.	The heavily disturbed nature of the site suggests its presence is highly unlikely. The species is distinctive and would have been observed at this time of year if present.
<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	CR	e	L		PMST	Primarily grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although also recorded in grassland dominated by introduced perennial grasses.	Negligible	Study area is east of Jacksons Creek therefore outside the natural range of the species.
<i>Prasophyllum frenchii</i>	Maroon Leek-orchid	EN	e	L		PMST	Grassland and grassy woodland environments on sandy or black clay loam soils that are generally damp but well drained.	Negligible	The heavily disturbed nature of the site suggests its presence is highly unlikely. No other orchid species were observed
<i>Pterostylis cucullata</i>	Leafy Greenhood	VU	v	L	1500		Coastal and inland subspecies have differing habitat characteristics.	Negligible	No suitable habitat present.
<i>Rutidosia leptorhynchoidea</i>	Button Wrinklewort	EN	e	L		PMST	Higher quality Plains Grassland and Grassy Woodland in Western Victoria, particularly those with fertile soil and light timber cover.	Negligible	Degraded habitat present, no local records.
<i>Senecio macrocarpus</i>	Large-headed Fireweed	VU	e	L		PMST	Grassland, shrubland and woodland habitats on heavy soils subject to waterlogging and/or drought conditions in summer.	Negligible	Degraded habitat present, no local records.

Appendix 2: Fauna

Notes to tables:

EPBC Act: EX - Extinct CR - Critically Endangered EN - Endangered VU - Vulnerable CD - Conservation dependent PMST – Protected Matters Search Tool	DSE 2009, DSE 2013: ex - extinct cr - critically endangered en - endangered vu - vulnerable nt - near threatened dd - data deficient rx - regionally extinct
FFG Act: L - listed as threatened under FFG Act N - nominated for listing as threatened I - determined ineligible for listing	
PS - pest species listed under the CaLP Act	* - introduced species

Fauna species in these tables are listed in alphabetical order within their taxonomic group.

A2.1 Listed fauna species

The following table includes a list of the listed fauna species that have potential to occur within the study area. The list of species is sourced from the Victorian Biodiversity Atlas and the Protected Matters Search Tool (DEE; accessed on 12.05.14).

Table A4.3. Listed fauna species recorded, or predicted to occur, within 5 km of the study area.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Mammals									
<i>Perameles gunnii</i>	Eastern Barred Bandicoot	EN	ew	L	2003	PMST	Once occurring in native perennial tussock grasslands and grassy woodlands of south-western Victoria, the mainland population is now presumed extinct. A captive breeding program was established in 1988 and reintroduced populations currently exist at three sites.	Negligible	Extinct in region. Reintroduced population in Woodlands Historic Park.
Birds									
<i>Anthochaera phrygia</i>	Regent Honeyeater	CR	cr	L	1908	PMST	Inhabits dry woodlands and forests dominated by Box Ironbark eucalypts. Distribution currently restricted to the Chiltern - Mt Pilot National Park in north-eastern Victoria following severe range contraction and population decline.	Negligible	Outside current distribution
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	en	L	1960	PMST	Occurs in wetlands with tall, dense vegetation where it forages in shallow water at the edges of pools or waterways. Prefers permanent freshwater habitats, particularly when dominated by sedges, rushes and reeds.	Negligible	No suitable habitat
<i>Calyptorhynchus banksii</i>	Red-tailed Black-Cockatoo	EN	en	L	1908		Red-tailed Black-Cockatoos generally forage within seed producing Desert Stringybark <i>Eucalyptus arenacea</i> , Brown Stringybark <i>Eucalyptus baxteri</i> and Buloke <i>Allocasuarina luehmannii</i> trees. Large hollow-bearing trees and stags provide a critical nesting resource for this species.	Negligible	Outside current distribution

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	DSE	FFG					
<i>Lathamus discolor</i>	Swift Parrot	CR	en	L	1993	PMST	Migrates to south-east mainland Australia during the winter months where it prefers dry, open eucalypt forests and woodlands, especially Box Ironbark Forest in north-central Victoria. Has also been recorded in urban parks, gardens, street trees and golf courses with flowering ornamental trees and shrubs.	Low	Limited suitable habitat
<i>Pedionomus torquatus</i>	Plains-wanderer	CR	cr	L	1948	PMST	The Plains-wanderer is a small ground-dwelling bird that occupies high quality native grassland with a sparse, open structure. Due to a range of threatening processes, the species has declined markedly across most of its range. Populations are now patchily distributed throughout south-west Queensland, the Riverina district of NSW and north-central Victoria.	Negligible	No suitable habitat.
<i>Polytelis swainsonii</i>	Superb Parrot	VU	en	L	1908		Occurs mainly on open, tall riparian River Red Gum <i>Eucalyptus camaldulensis</i> forest or woodland primarily along the Murray and Murrumbidgee Rivers.	Negligible	No suitable habitat; no recent records.
<i>Rostratula australis</i>	Australian Painted Snipe	EN	cr	L		PMST	Generally found in shallow, terrestrial freshwater wetlands with rank, emergent tussocks of grass, sedges and rushes. Australian Painted Snipe can occur in well vegetated lakes, swamps, inundated pasture, saltmarsh and dams.	Negligible	No suitable habitat.
<i>Sternula nereis</i>	Fairy Tern	VU	en	L		PMST	Fairy Terns inhabit coastal environments including intertidal mudflats, sand flats and beaches. Nests above high-water mark on sandy shell-grit beaches.	Negligible	No suitable habitat.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Reptiles									
<i>Aprasia parapulchella</i>	Pink-tailed Worm-Lizard	VU	en	L		PMST	Isolated population near Bendigo. Favours areas with native grasses and partially buried rocks, sheltering beneath rock and in ant tunnels.	Negligible	No suitable habitat in highly managed environment
<i>Delma impar</i>	Striped Legless Lizard	VU	en	L		PMST	Inhabits native and modified grasslands, where sufficient cover is available to provide protection from predators. Often associated with soils of cracking clays with embedded and surface rocks. Occasionally recorded from grassy woodlands.	Low	No suitable habitat in highly managed environment
<i>Tympanocryptis pinguicolla</i>	Grassland Earless Dragon	EN	cr	L		PMST	Typically occurs in native temperate grasslands and prefers sites with little or no grazing. Last confirmed sighting in Victoria was at Little River in 1967 (AVW), despite recent surveys for the species throughout its former range within the state.	Low	No suitable habitat in highly managed environment
Amphibians									
<i>Litoria raniformis</i>	Growling Grass Frog	VU	en	L	2006	PMST	Occupies a variety of permanent and semi-permanent water bodies generally containing abundant submerged and emergent vegetation, within lowland grasslands, woodlands and open forests.	Low	No suitable habitat, but known to occur in adjacent waterways.
Fishes									
<i>Galaxiella pusilla</i>	Dwarf Galaxias	VU	en	L		PMST	Occurs in relatively shallow still or slow flowing water bodies including streams, wetlands, drains, that in many instances are ephemeral and partially dry up over summer. Typically requires abundant marginal and aquatic vegetation.	Negligible	No suitable habitat

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	DSE	FFG					
<i>Maccullochella peelii peelii</i>	Murray Cod	VU	vu	L	1981		Found within the Murray River catchment usually in sluggish turbid rivers, in deep holes or amongst fallen timber and other debris. Also occurs in upper reaches of rivers where water is clear and there is little fallen timber.	Negligible	No suitable habitat
<i>Prototroctes maraena</i>	Australian Grayling	VU	vu	L	1900	PMST	A diadromous species which spends most of its life in freshwater within rivers and large creeks. Juveniles inhabit estuaries and coastal seas. Adults occur in freshwater habitats, typically rivers and streams with cool, clear waters and gravel substrates, but occasionally also in turbid waters.	Low	No suitable habitat, though known to occur in adjacent waterways.
Invertebrates									
<i>Synemon plana</i>	Golden Sun Moth	CR	cr	L	2008	PMST	This medium-sized diurnal moth inhabits grassy woodlands and grasslands. Once thought to be a specialised species inhabiting grasslands dominated by Wallaby-grasses, it is now recognised that this species can also occur in exotic grasslands dominated by Chilean Needle Grass <i>Nassella neesiana</i> .	Low	Limited suitable habitat in highly managed environment. Surveys undertaken on adjacent airport land suggest species is not present.

A2.2 Migratory species (EPBC Act listed)

Table A3.2. Migratory fauna species recorded or predicted to occur within 5 km of the study area.

Scientific name	Common name	Most recent record
<i>Gallinago hardwickii</i>	Latham's Snipe	2000
<i>Rostratula australis</i>	Australian Painted Snipe	
<i>Ardea modesta</i>	Eastern Great Egret	2000
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	
<i>Merops ornatus</i>	Rainbow Bee-eater	1984
<i>Hirundapus caudacutus</i>	White-throated Needletail	1984
<i>Apus pacificus</i>	Fork-tailed Swift	
<i>Rhipidura rufifrons</i>	Rufous Fantail	2006
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	1994
<i>Monarcha melanopsis</i>	Black-faced Monarch	
<i>Bubulcus ibis</i>	Cattle Egret	