RIVER VALLEY ESTATE, SUNSHINE NORTH STAGES 7E AND 9

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Consultant Report prepared for Atlantic Link Pty Ltd

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1. EXECUTIVE SUMMARY

Atlantic Link Pty Ltd engaged Brett Lane & Associates Pty Ltd (BL&A) to undertake an assessment of impacts on Matters of National Environmental Significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the remaining stages of the River Valley Estate development in Sunshine North — Stages 7E and 9.

The study area for this investigation was approximately 26 hectares of freehold land located at Sunshine North, some 12 kilometres north-west of the Melbourne CBD. The study area is bordered by the Maribyrnong River to the north-east, the Melbourne-Sydney railway line to the north-west, Baldwin Avenue, Vermont Avenue and neighbouring vacant land to the south-west and earlier stages of the River Valley Estate to the south. Surrounding land predominantly supports residential, industrial, business, recreation and transport land uses.

The study area is composed of a gently sloping plain of heavy basaltic soils with moderate basalt rock outcroppings at the highest elevation (in the west). Adjoining the plain is the steep escarpment of the Maribyrnong River. This landform comprised extensive basalt rock outcropping and skeletal and erodible soils at higher elevation, which graded into much deeper soils and little rock outcropping at the lowest elevation. Riparian floodplain extends from the water-line of the Maribyrnong River to the base of the escarpment — a narrow strip adjacent the river. Soils here are derived from flood sediments and are very deep and fertile.

The area to the immediate south of the study area is a deep disused quarry pit with associated access tracks and other clearings. Virtually all of this landscape comprised artificial and highly modified substrates.

Evidence on site, including floristic composition and soil characteristics, suggested that *Heavier-soils* Plains Grassland (EVC 132_61); Escarpment Shrubland (EVC 895) and Floodplain Riparian Woodland (EVC 56) were present within the study area.

A total of nine remnant patches (referred to herein as habitat zones) comprising the above mentioned EVCs were identified in the study area. A total of 10.84 hectares of native vegetation were mapped within the study area.

One ecological community listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was recorded in the study area, being:

- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) (3.64 hectares).

One EPBC Act-listed species was recorded within the study area, being:

- Spiny Rice-flower (73 plants).

Suitable habitat was considered to exist within the study area for the following EPBC Act-listed species:

- White-throated Needletail;
- Growling Grass Frog; and
- Grey-headed Flying-fox.

The current development proposal involves developing just over half of the study area for urban residential purposes. All of Habitat Zone A (supporting NTGVVP and the vast majority

of the Spiny Rice-flower plants), part of Habitat Zone C (being Escarpment Shrubland) and the majority of the Floodplain Riparian Woodland (EVC 56) will be retained.

The project will result in the following impacts to the EPBC Act listed threatened community NTGVVP (listed as critically endangered):

- Removal of 2.14 hectares.

An assessment of impacts on NTGVVP against significant impact thresholds indicates that the proposed action will have a significant impact on NTGVVP on the basis that it will:

- Reduce the extent of the ecological community; and
- Cause a substantial reduction in the quality or integrity of the ecological community.

The project will result in the following impact to the EPBC Act listed threatened species Spiny Rice-flower:

- Removal of 10 plants.

An assessment of impacts on Spiny Rice-flower against significant impact thresholds indicates that the proposed action will have a significant impact on Spiny Rice-flower on the basis that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species; and
- Interfere with the recovery of the species.

It is considered unlikely that the proposed action will significantly impact the following MNES, given that minimal (if any) suitable habitat will be removed or impacted:

- White-throated Needletail;
- Growling Grass Frog; and
- Grey-headed Flying-fox.

In light of the current assessment, the proposal has the potential for significant impacts on the EPBC Act listed species and community presented below.

- NTGVVP; and
- Spiny Rice-flower.

Therefore, a Referral under the EPBC Act will be required.

It is recommended that the proposed action be Referred as a ‘Controlled Action’.

2. INTRODUCTION

Atlantic Link Pty Ltd engaged Brett Lane & Associates Pty Ltd (BL&A) to undertake an assessment of impacts on Matters of National Environmental Significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the remaining stages of the River Valley Estate development in Sunshine North — Stages 7E and 9.

The specific area investigated, referred to herein as the 'study area', comprised approximately 26 hectares of land at 71 Penna Avenue, Sunshine North, some 12 kilometres north-west of the Melbourne CBD. The study area for this investigation encompasses Stages 7E and 9 of the River Valley Estate residential development. The study area is bordered by the Maribyrnong River to the north-east, the Melbourne-Sydney railway line to the north-west, Baldwin Avenue, Vermont Avenue and neighbouring vacant land to the south-west and earlier stages of the River Valley Estate to the south. Surrounding land predominantly supports residential, industrial, business, recreation and transport land uses.

This investigation was commissioned to provide information on the Matters of National Environmental Significance in the study area. This report outlines any implications under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Specifically, the scope of the investigation included:

- Review of 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); and
    - The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool.
- Site surveys involving:
    - Characterisation and mapping of native vegetation on the site;
    - Native vegetation quality assessment (habitat hectare assessment) of any native vegetation:
    - Compilation of flora and fauna species lists for the site;
    - Assessment of the nature and quality of native fauna habitat;
    - Assessment of the likelihood of occurrence of EPBC Act listed flora, fauna and communities on the site; and
    - Targeted surveys for listed threatened flora and fauna species

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

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 matters 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 (often lasting between three and nine months, depending on the level of assessment).

Implications under the EPBC Act for the proposal based on the current assessment are discussed in Section 7.

4. EXISTING INFORMATION & METHODS

4.1. Existing information

Existing information used for this investigation is described below.

4.1.1. Existing reporting and documentation

The reports, planning scheme and/or development plans below, relating to the study area were reviewed.

- Brimbank Planning Scheme
- The development and staging plan provided by Atlantic Link Pty Ltd
- BL&A 2011, *River Valley Estate – Stage 7D, Habitat Hectare, Net Gain and Targeted Flora Assessment,* Report No. 8135 (3.2);
- BL&A 2014, *River Valley Estate, Sunshine – Northern Parcel – Stage 9, Targeted Flora and Fauna Surveys,* Report No. 8135 (6.0)
- BL&A 2018a, *River Valley Estate, Sunshine – Biodiversity Assessment Stages 7E & 9*, Report 8135 (20.2)
- BL&A 2018b, *River Valley Estate, Sunshine – Biodiversity Assessment Stage 7E*, Report 8135 (22.0)
- BL&A 2018c, *River Valley Estate, Sunshine – Biodiversity Assessment Stage 9*, Report 8135 (23.0)

4.1.2. 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 bioregion[1] (DSE 2004a); and
- Biodiversity Interactive Map (DELWP 2015).

4.1.3. 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˚ 45' 05" S and longitude 144˚50' 47" 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 (2018).

The online *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (DoEE 2018) was consulted to determine whether

[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).

nationally listed species or communities potentially occurred in the search region based on habitat modelling.

4.2. Field methods

The initial field assessment for Stage 7 was conducted between late August and early September 2008. During the field assessment, the study area was inspected on foot.

The initial field assessment for Stage 9 was conducted on the 11th June 2013. During this assessment, the study area was surveyed initially by vehicle and areas supporting remnant native vegetation and fauna habitat were inspected in more detail on foot.

Sites in the study area found to support native vegetation or the potential to support listed matters were mapped. Mapping was undertaken through a combination of aerial photograph interpretation and ground-truthing using a hand-held GPS (accurate to approximately five metres).

Targeted surveys for threatened flora within Stage 7 were undertaken over several additional surveys on the following dates:

- 28th August 2008;
- 11th and 12th November 2009;
- 20th January 2010; and
- 28th September 2010.

Within the Stage 9 study area, targeted flora surveys were undertaken in August (winter), October (spring) and December (summer) 2013.

During each targeted flora survey, transect lines spaced less than five metres apart were searched on foot, within areas of suitable habitat (i.e. patches of native vegetation).

The targeted survey for Striped Legless Lizard in Stage 9 involved laying out tile grids on 28th August 2013 and monitoring them at fortnightly intervals. The first monitoring took place on 10th October 2013 with the last checked on 30th December 2013. Each grid was checked six times.

To determine if Golden Sun Moth were present in potential habitat within Stage 9 a series of transects were walked. Targeted surveys for Golden Sun Moth were conducted from 16th December 2013 to 14th January 2014.

Targeted surveys for listed fauna species have not been undertaken within the Stage 7 study area. Given that fauna habitats within the Stage 7 study area are comparable and contiguous with those surveyed in the Stage 9 survey area, the targeted surveys undertaken within the Stage 9 survey area are considered sufficient to address potential impacts to fauna within the Stage 7 study area.

No surveys for Growling Grass Frog were undertaken — the species is presumed to be present within the Maribyrnong River.

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 Guidelines (DELWP 2017a) further classify native vegetation as belonging to two categories:

- Patch; or

- Scattered tree.

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

Patch

A patch of native vegetation is either:

- An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; or
- Any area with three or more native canopy trees[2] where the drip line[3] of each tree touches the drip line of at least one other tree, forming a continuous canopy; or
- Any mapped wetland included in the *Current wetlands map*, available in DELWP systems and tools.

Patch condition is assessed using the habitat hectare method (Parkes *et al*. 2003; DSE 2004b) whereby components of the patch (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 Native Vegetation Information Management (NVIM) system (DELWP 2017f) provides modelled condition scores for native vegetation to be used in certain circumstances.

Scattered tree

A scattered tree is:

- A native canopy tree[2] that does not form part of a patch.

Scattered trees are counted and mapped, the species identified and their circumference at 1.3 m above the ground is recorded.

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.

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.

[2] A native canopy tree is a mature tree (i.e. it is able to flower) that is greater than 3 metres in height and is normally found in the upper layer of the relevant vegetation type.
[3] The drip line is the outermost boundary of a tree canopy (leaves and/or branches) where the water drips on to the ground.

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; and
- General searches for reptiles and frogs; including identification of frog calls in seasonally wet areas.

The quality of fauna habitats and their potential to support listed species was assessed based on habitat components that include old-growth trees, fallen timber, leaf litter and surface rocks.

Wherever appropriate, a precautionary approach was adopted in determining the likelihood of occurrence or fauna listed under the EPBC 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 study area was assessed against published descriptions of relevant listed ecological communities modelled to potentially occur in the study area.

4.3. Limitations of field assessment

Whilst this assessment was not designed to provide an exhaustive inventory of flora and fauna species in the study area, all efforts were made to schedule site assessments across the year to capture the majority of native vegetation life forms and habitat niches present. Nevertheless, site assessments may fail to record all life-forms because of the seasonal absence of some species and sampling nature of surveys.

The initial site assessment for both stages was carried out in winter, when many annual and seasonally-emergent plant species may have been absent or in the senescent or pre-flowering stage of their life-cycle.

The fauna assessment was undertaken during fine, cool and cloudy winter weather conditions with light winds. These conditions were considered suitable for detecting most fauna groups likely to occur in the study area with the exceptions of spring- and summer-active frogs, reptiles and a few migratory birds.

The review of existing information, combined with the field surveys, including targeted surveys (all conducted at the appropriate time of year), were considered sufficient to complete this assessment.

Wherever appropriate, a precautionary approach was adopted in the discussion of implications for matters listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. 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. The implications under legislation and policy are considered accordingly.

5. ASSESSMENT RESULTS

5.1. Site description

The study area for this investigation (Figure 1) was approximately 26 hectares of freehold land located at Sunshine North, some 12 kilometres north-west of the Melbourne CBD. The study area is bordered by the Maribyrnong River to the north-east, the Melbourne-Sydney railway line to the north-west, Baldwin Avenue, Vermont Avenue and neighbouring vacant land to the south-west and earlier stages of the River Valley Estate to the south. Surrounding land predominantly supports residential, industrial, business, recreation and transport land uses.

The study area is composed of a gently sloping plain of heavy basaltic soils with moderate basalt rock outcroppings at the highest elevation (in the west). Adjoining the plain is the steep escarpment of the Maribyrnong River. This landform comprised extensive basalt rock outcropping and skeletal and erodible soils at higher elevation, which graded into much deeper soils and little rock outcropping at the lowest elevation. Riparian floodplain extends from the water-line of the Maribyrnong River to the base of the escarpment — a narrow strip adjacent the river. Soils here are derived from flood sediments and are very deep and fertile.

The area to the immediate south of the study area is a deep disused quarry pit with associated access tracks and other clearings. Virtually all of this landscape comprised artificial and highly modified substrates.

Past land use is likely to have included grazing - evidenced by the absence of grazing-sensitive plant species, and perhaps horticulture on the flood plain. More recently, a network of dirt tracks has been established throughout the study area. Current land use includes:

- Trail-bike riding as well as 4X4 driving along the dirt tracks; and
- Rubbish and land fill dumping, particularly within the plain and historic quarry areas.

Vegetation within Stage 7 comprised both areas of native and introduced vegetation. The upper plain supported a moderate-sized area of Kangaroo Grass, Spear Grass and Wallaby Grass-dominated grassland, with a low cover of native herbs. The escarpment supported a large area of Lightwood, Blackwood and Sweet Bursaria dominated shrubland in the central western part of the study area. The understorey in this area was dominated by Kangaroo Grass, Grey Tussock-grass, Smooth Rice-flower and a patchy covering of native herbs. The river floodplain supported a large area of River Red-gum dominated woodland, with a wattle dominated understorey. Disturbed areas associated with 4WD tracks, heavy rabbit grazing, quarrying and dumped rubbish supported introduced vegetation dominated by high-threat species such African Box-thorn, Serrated Tussock and Artichoke Thistle.

Vegetation in the Stage 9 study area consisted mainly of introduced pasture grasses and weeds, with some large patches of remnant native vegetation. Main vegetation components observed in the western grassland area included Kangaroo Grass and a variety of weeds such as Chilean Needle-grass, Serrated Tussock, Spanish Artichoke, African Thistle and Ribwort. Escarpment shrubland occupied much of the eastern two-thirds of the study area. It was mostly degraded and dominated by Chilean Needle-grass, Serrated Tussock, Cocksfoot and African Boxthorn, with scattered River Red-gum, Lightwood, Sweet Bursaria and Tree Violet. Riparian woodland was confined to a narrow

corridor along the Maribyrnong River and was dominated by River Red-gum, with an understorey and ground layer that included Soursob and Nettles.

The riparian woodland along the Maribyrnong River extends both upstream and downstream and as such the study area forms a habitat corridor. Similarly, grassland and shrubland are present patchily to the north and may allow movement of species using these habitats. The riparian woodland supported a number of large old trees.

The study area lies within the Victorian Volcanic Plain bioregion and falls within the Port Phillip and Western Port catchment.

5.2. Native vegetation

5.2.1. Patches of native vegetation

Pre–European EVC mapping (DELWP 2015c) indicated that the study area and surrounds would have supported Plains Grassland (EVC 132), Floodplain Riparian Woodland (EVC 56) and Escarpment Shrubland (EVC 895) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

Evidence on site, including floristic composition and soil characteristics, suggested that *Heavier-soils* Plains Grassland (EVC 132_61); Escarpment Shrubland (EVC 895) and Floodplain Riparian Woodland (EVC 56) were present within the study area.

A total of nine remnant patches (referred to herein as habitat zones) comprising the above mentioned EVCs were identified in the study area (Figure 1). A total of 10.84 hectares of native vegetation were mapped within the study area. A description of the habitat zones is provided in Table 1.

5.2.2. Scattered trees

Two scattered trees were recorded in the study area. These would have once comprised the canopy components of Floodplain Riparian Woodland (EVC 56) and Escarpment Shrubland (EVC 895) (Figure 1). Scattered trees were not matters of national environmental significance.

5.3. Listed ecological communities

The Heavier-soils Plains Grassland recorded within the study area (i.e. Habitat Zones A, B, F and H) was identified as the ecological community **Natural Temperate Grasslands of the Victorian Volcanic Plain** (NTGVVP, listed as critically endangered under the EPBC Act). A total of 3.64 hectares of NTGVVP was mapped within the study area.

The following listed ecological communities were found not to occur in the study area, as the condition thresholds were not met:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain;
- Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia; and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Table 1: Description of habitat zones in the study area

Habitat Zone	EVC	Area (ha)	Description	Listed Matters
A	Heavier-soils Plains Grassland (EVC 132_61)	1.503	This zone comprised high quality plains grassland which was dominated by indigenous species such as kangaroo Grass, Veined Spear-grass and wallaby grasses. Scattered throughout were indigenous herbs such as Narrow-leaf Plantain, Lemon Beauty-heads, Sheep's Burr and Prickly Woodruff. The critically endangered Spiny Rice-flower was also recorded. Exotic species comprised approximately 20% cover, 15% of which was considered to be high threat. The more dominant of these species were Onion Grass, Ribwort, Chilean Needle-grass and Serrated Tussock.	NTGVVP Spiny Rice-flower
B	Heavier-soils Plains Grassland (EVC 132_61)	1.107	This zone comprised moderate quality plains grassland. Vegetation was dominated by indigenous species such as kangaroo Grass, spear grasses and Grey Tussock-grass. Scattered throughout was a minor cover of indigenous herbs such as Lemon Beauty-heads, Sheep's Burr, and Prickly Woodruff. The critically endangered Spiny Rice-flower was also recorded. Exotic or non-indigenous native, elements comprised approximately >50% cover, 60% of which was considered to be high threat. The more dominant of these species were Artichoke Thistle, Onion Grass, Ribwort, Chilean Needle-grass and Serrated Tussock.	NTGVVP Spiny Rice-flower
C	Escarpment Shrubland (EVC 895)	1.698	This zone comprised moderate quality escarpment shrubland which was dominated by indigenous species such as kangaroo Grass and Grey Tussock-grass. A very thin canopy of Lightwood, Tree Violet and Sweet Bursaria was scattered throughout. Scattered throughout the understory were indigenous herbs such as Kidney Weed, Crane's-bill, Sheep's Burr, Raspwort, Speedwell and Nodding Salt-bush. One large River Red Gum was also present. Exotic or non-indigenous native, elements comprised >50% cover, 75% of which was considered to be high threat. The more dominant of these species were Serrated Tussock, African Box-thorn, and Artichoke Thistle.	–
D	Escarpment Shrubland (EVC 895)	1.980	This zone comprised low quality escarpment shrubland which was dominated by indigenous species such as kangaroo Grass and Grey Tussock-grass. The canopy was effectively absent. Scattered throughout the understory were indigenous herbs such as Kidney Weed, Crane's-bill, Sheep's Burr. Exotic or non-indigenous native, elements comprised approximately >50% cover, 80% of which was considered to be high threat. The more dominant of these species were African Box-thorn, Ribwort, Twiggy Turnip, Artichoke Thistle and Serrated Tussock.	–

Habitat Zone	EVC	Area (ha)	Description	Listed Matters
E	Escarpment Shrubland (EVC 895)	0.169	This zone comprised low quality escarpment shrubland which was dominated by indigenous species such as kangaroo Grass and Grey Tussock-grass. The canopy was effectively absent. Scattered throughout the understory were indigenous herbs such as Seiber Crassula, Kidney Weed, Crane's-bill, Sheep's Burr. Exotic or non-indigenous native elements comprised approximately 60% cover, 60% of which was considered to be high threat. The more dominant of these species were African Box-thorn, Ribwort, Twiggy Turnip, Artichoke Thistle and Serrated Tussock.	–
F	Heavier-soils Plains Grassland (EVC 132_61)	0.836	This zone comprised low quality plains grassland which was dominated by indigenous species such as kangaroo Grass, Grey Tussock-grass and Weeping Grass. Scattered throughout were indigenous herbs such as Kidney Weed, Cranesbill, Grassland Wood-sorrel and Sheep's Burr. Exotic or non-indigenous native elements comprised approximately 35% cover, 80% of which was considered to be high threat. The more dominant of these species were Onion Grass, Ribwort, African Box-thorn, Artichoke Thistle, Chilean needle-grass and Serrated Tussock. The latter two of those species are highly threatening grass species.	NTGVVP
G	Escarpment Shrubland (EVC 895)	1.615	This zone comprised moderate - high quality escarpment shrubland which was dominated by a thin canopy of Lightwood, Blackwood, Tree Violet and Sweet Bursaria. The understorey was dominated by indigenous species such as kangaroo Grass, Grey Tussock-grass and Smooth Rice-flower. Scattered throughout the understory were indigenous herbs such as Seiber Crassula, Kidney Weed, Crane's-bill, Sheep's Burr and Prickly Woodruff. One large River Red Gum was also recorded. Exotic, or non-indigenous native, elements comprised approximately 30% cover, 90% of which was considered to be high threat. The more dominant of these species were African Box-thorn, Ribwort, Sweet Briar, Twiggy Turnip and Serrated Tussock.	–
H	Heavier-soils Plains Grassland (EVC 132_61)	0.195	This zone comprised moderate - high quality plains grassland which was dominated by indigenous species such as kangaroo Grass and Grey Tussock-grass. Scattered throughout was a substantial cover of indigenous herbs such as Lemon Beauty-heads, Sheep's Burr, Narrow Plantain and Prickly Woodruff. The critically endangered Spiny Rice-flower was also recorded. Exotic or non-indigenous native elements comprised approximately 25% cover, 60% of which was considered to be high threat. The more dominant of these species were Artichoke Thistle, Onion Grass, Ribwort, Chilean Needle-grass and Serrated Tussock. The latter two of those species are highly threatening grass species.	NTGVVP

Habitat Zone	EVC	Area (ha)	Description	Listed Matters
I	Floodplain Riparian Woodland (EVC 56)	1.670	This zone comprised moderate - high quality floodplain riparian woodland which was dominated by a relatively uniform canopy of River Red Gum. The understorey was dominated by indigenous shrubs/trees such as Silver Wattle, and Blackwood. The ground layer was dominated by exotic species, which comprised 85% cover, of which >50% was considered to be high threat. The more dominant of these species were African Box-thorn, Soursob, Twiggy Turnip and Panic Veldt-grass. Indigenous elements of the understorey were limited to a substantial cover of nettle. 14 large River Red Gums were recorded within this patch.	Growling Grass-frog Grey-headed Flying Fox
J	Floodplain Riparian Woodland (EVC 56)	0.068	This zone comprised moderate - high quality floodplain riparian woodland which was dominated by a relatively uniform canopy of River Red Gum. The understorey was dominated by indigenous shrubs/trees such as Silver Wattle, Black Wattle, Blackwood and River Bottle-brush. The ground layer was dominated by exotic species, which comprised 65% cover, of which 70% was considered to be high threat. The more dominant of these species were African Box-thorn, Soursob, Twiggy Turnip and Panic Veldt-grass. Indigenous elements of the understorey were limited to a substantial cover of nettle. Eight large River Red Gums were also recorded.	Growling Grass-frog Grey-headed Flying Fox
TOTAL		**10.841**		

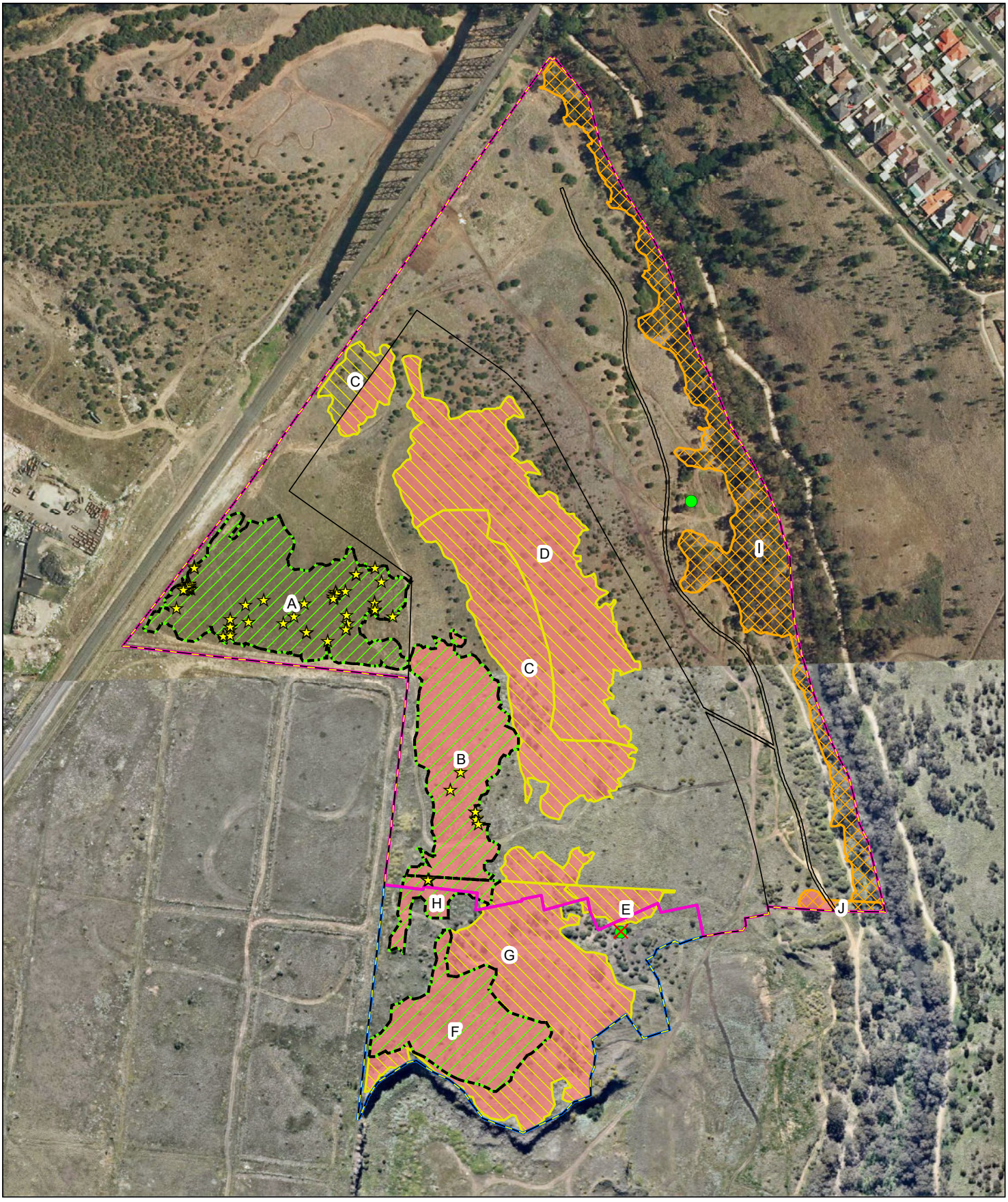

Figure 1: Study area and MNES, including impacts

Project: River Valley Estate **Client**: YourLand Pty Ltd **Date**: 29/05/2018

- Study area
- Stage 9
- Stage 7E
- Development extent

Native vegetation

- Escarpment Shrubland (EVC 895)
- Floodplain Riparian Woodland (EVC 56)
- Heavier-soils Plains Grassland (EVC 132_61)
- NGTVVP
- Native vegetation to be removed
- Scattered Tree
- Spiny Rice-flower
- Scattered tree to be removed

N

Metres 0 100

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5.4. Flora species

5.4.1. Species recorded

During the habitat hectare assessment, 199 plant species were recorded. Of these, 106 (53%) were indigenous and 93 (47%) were introduced or non-indigenous native in origin (Appendix 1).

5.4.2. Listed species

VBA records (DELWP 2018) and the EPBC Protected Matters Search Tool (DoEE 2018) indicated that within the search region there were records of, or there occurred potential suitable habitat for, 16 flora species listed under the Commonwealth EPBC Act.

One flora species listed under the EPBC Act — Spiny Rice-flower — was recorded during the field survey in both Stages 7E and 9 (Figure 1). A total of 73 Spiny Rice-flower plants were recorded. Habitat Zone A in the western part of the study area supported the vast majority of these plants. A small number were recorded within Habitat Zone B.

The likelihood of occurrence in the study area of species listed under the EPBC Act is addressed in Table 2. 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.

Targeted surveys for EPBC Act listed flora species were undertaken in August (winter), October (spring) and December (summer) 2013 for Stage 9, and on the following dates for Stage 7:

- 28th August 2008,
- 11th and 12th November 2009;
- 20th January 2010; and
- 28th September 2010.

No EPBC Act listed flora species, additional to Spiny Rice-flower, were detected during targeted surveys. As such, listed flora species other than Spiny Rice-flower are now considered unlikely to occur within the study area.

Table 2: EPBC Act listed flora species and likelihood of occurrence and impact

Common Name	Scientific name	EPBC	Habitat	Number of records	Date of last record	Likelihood of occurrence
River Swamp Wallaby-grass	*Amphibromus fluitans*	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 (DoEE 2018).	1	23/10/1991	No habitat in the study area – **unlikely to occur.**
Matted Flax-lily	*Dianella amoena*	EN	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 (DoEE 2018).	47	14/12/2012	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Small Golden Moths	*Diuris basaltica*	EN	Grows in herb-rich native grasslands, dominated by Kangaroo Grass (Themeda triandra) on heavy basaltic soils, often embedded with basalt boulders. All locations that the species is known to occur form part of the 'Natural Temperate Grassland of the Victorian Volcanic Plain'(DoEE 2018).	19	31/10/1996	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Sunshine Diuris	*Diuris fragrantissima*	EN	Native grasslands dominated by Kangaroo Grass, on heavy basalt soils, often with embedded basalt boulders. The sole remaining natural population at Sunshine occurs in a small (0.1 ha) remnant of Western (Basalt) Plains Grassland (DoEE 2018).	27	12/10/2009	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Trailing Hop-bush	*Dodonaea procumbens*	VU	Grows in low lying, often winter wet areas in woodland, low open-forest heathland and grasslands on sands and clays. Largely confined to SW of Victoria (DoEE 2018).	0	N/A	Suitable (but sub-optimal) habitat in study area. No records within 10 km. **Unlikely to occur.**
Clover Glycine	*Glycine latrobeana*	VU	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 (DoEE 2018).	0	N/A	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Adamson's Blown-grass	*Lachnagrostis adamsonii*	EN	Confined to slow moving creeks, swamps, flats, depressions or drainage lines that are seasonally inundated or waterlogged and usually moderately to highly saline. Appear to favour sites that have some shelter from the wind (DoEE 2018).	0	N/A	No suitable habitat. **Unlikely to occur.**
White Sunray	*Leucochrysum albicans var. tricolor*	EN	Occurs in a wide variety of grassland, woodland and forest habitats, generally on heavy soils. Plants found in natural or semi-natural and grazed or ungrazed habitat. Bare ground is required for germination (DoEE 2018).	0	N/A	No habitat present - **Unlikely to occur.**
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	CR	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.	589	3/05/2017	Habitat present in the study area – **Recorded in study area (Habitat Zones A & B).**
Maroon Leek-orchid	*Prasophyllum frenchii*	EN	Grows mainly in open sedge swampland or in wet grassland and wet heathland bordering swampy regions. Sites are low altitude, flat and moist. Soils are rich sandy or black clay loams. Climate is mild, with an annual rainfall of 600–1100 mm, occurring in winter and spring (DoEE 2018).	0	N/A	No habitat in the study area – **unlikely to occur.**
Fragrant Leek-orchid	*Prasophyllum suaveolens*	EN	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).	13	1/10/1962	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Leafy Greenhood	*Pterostylis cucullata*	VU	Tea-tree scrubs on tall sandy and calcareous dunes, in moist, open or even deep shaded locations (Jones 1994).	0	N/A	No habitat present – **Unlikely to occur.**
Button Wrinklewort	*Rutidosis leptorhynchoides*	EN	In Victoria restricted to open stands of plains grassland and grassy woodlands on fertile clays to clay loams, usually in areas where the grass cover is open as a result of recurrent fires or grazing. It also occurs on low rises with shallow, stony soils at less than 100 m above sea level.	29	12/03/2015	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Large-headed Fireweed	*Senecio macrocarpus*	VU	In Victoria, Large-fruit Fireweed occurs most commonly in grasslands on red-brown earth soils. It may also occur in grassy woodlands and open woodlands predominantly in the Western (Basalt) Plains grassland on red brown earth soils found on recent Quaternary (basalt) deposits (DoEE 2018).	13	12/03/2015	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Austral Toad-flax	*Thesium australe*	VU	Austral Toadflax is semi-parasitic on roots of a range of grass species, notably Kangaroo Grass (Themeda triandra). It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams (DoEE 2018).	1	1/10/1904	Habitat present in the study area – **Not recorded in study area during targeted surveys.**
Swamp Everlasting	*Xerochrysum palustre*	VU	Grows in wetlands including sedge-swamps and shallow freshwater marshes, often on heavy black clay soils. Commonly associated genera include Amphibromus, Baumea, Carex, Eleocharis, Isolepis, Lachnagrostis, Lepidosperma, Myriophyllum, Phragmites, Themeda and Villarsia (DoEE 2018).	0	N/A	No suitable habitat. **Unlikely to occur.**

Notes: EPBC = threatened species status under EPBC Act: CR = critically endangered; EN = endangered; VU = vulnerable.

5.5. Fauna habitats

The study area supported three fauna habitat types.

- Grassland;
- Shrubland;
- Riparian Woodland;

Grassland: This habitat occupied the western third of the study area. It was dominated by Kangaroo Grass with some other native elements such as Nodding Saltbush and Cotton Fireweed. Introduced elements were widespread in this habitat, e.g. Chilean Needle-grass, Serrated Tussock, Spanish Artichoke, Ribwort and African Boxthorn shrubs. Some piles of collected rocks and earth were present, but these elements were not abundant. Degraded grassland extends north and south of the study area, which may provide connectivity to a variety of grassland-adapted fauna.

This habitat was considered to be *moderate* quality fauna habitat.

Shrubland: This habitat occupied the central section of the study area. It was degraded and dominated by introduced species such as African Boxthorn. A few River Red-gums remained, together with scattered copses of Lightwood, Sweet Bursaria and Tree Violet. Ground cover was largely introduced, including Chilean Needle-grass, Cocksfoot, Annual Veldt-grass, Galenia and Soursob. Some native ground cover remained, e.g. Cotton Fireweed and Nodding Saltbush. There were scatted outcrops of rocks that might serve as habitat for reptiles, as well as some debris of human origin.

This habitat was considered to be *moderate* quality fauna habitat.

Riparian Woodland: This habitat occurred in a narrow corridor of approximately 50 metres width from the Maribyrnong River was dominated by River Red-gum overstorey and some Silver Wattle, Blackwood and Kangaroo Apple in the understorey. Otherwise the ground layer was dominated by introduced grasses and weeds such as Soursob, Nettles, Galenia, Canary Grass, Blackberry and Bastard's Fumitory. Several of the Red-gums were large and contained hollows useful as roost or nest sites for birds, bats and possums. Fallen timber or rocks were scant. Habitat connectivity upstream and downstream is good and aquatic and riparian zone fauna species would use the habitat as a movement corridor.

This habitat was considered to be *low* quality fauna habitat.

5.6. Fauna species

The review of existing information indicated that 40 fauna species listed under 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. The likelihood of occurrence of these species in the study area was assessed and the results are presented in Table 3.

This analysis of potential occurrence of listed fauna species excludes:

- Marine fauna given that the study area is inland; and
- 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.

During targeted fauna surveys within the Stage 9 study area (BL&A 2014), neither Golden Sun Moth nor Striped Legless Lizard were detected. These species are now considered unlikely to occur.

Targeted surveys for listed fauna species have not been undertaken within the Stage 7 study area. Given that fauna habitats within the Stage 7 study area are comparable and contiguous with those surveyed in the Stage 9 survey area, targeted surveys undertaken within the Stage 9 survey area are considered sufficient to address potential impacts to fauna within the Stage 7 study area.

This analysis indicates that three listed fauna species are likely to occur or have the potential to occur. These species are:

- White-throated Needletail;
- Growling Grass Frog; and
- Grey-headed Flying-fox.

Table 3: Listed fauna species from the search region and likelihood of occurrence

Common Name	Scientific name	EPBC-T	EPBC-M	Habitat	Number of records	Date of last record	Likelihood of occurrence
Birds							
Australasian Bittern	*Botaurus poiciloptilus*	EN		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 & Higgins 1990).	3	15/05/1976	No suitable habitat– **Unlikely to occur.**
Australian Painted Snipe	*Rostratula australis*	EN		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 (DoEE 2018).	1	23/10/1977	No suitable habitat– **Unlikely to occur.**
Bar-tailed Godwit	*Limosa lapponica*	VU	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	Mainly coastal species, usually in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats (Higgins & Davies 1996).	8	5/11/1977	No suitable habitat– **Unlikely to occur.**
Black-faced Monarch	*Monarcha melanopsis*		M (Bonn (A2H))	Rainforests, eucalypt woodlands, coastal scrub and damp gullies (Higgins et al. 2006)	0	N/A	No suitable habitat– **Unlikely to occur.**
Common Greenshank	*Tringa nebularia*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins & Davies 1996).	0	N/A	No suitable habitat– **Unlikely to occur.**
Common Sandpiper	*Actitis hypoleucos*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	Inhabits a wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands. In Vic. Mostly found Westernport and Port Phillip Bay. (Higgins & Davies 1996).	40	14/03/2007	No suitable habitat– **Unlikely to occur.**
Curlew Sandpiper	*Calidris ferruginea*	CR	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins & Davies 1996).	4	5/11/1977	No suitable habitat– **Unlikely to occur.**
Double-banded Plover	*Charadrius bicinctus*		M (Bonn (A2H))	Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Marchant & Higgins 1993).	1	8/07/1903	No suitable habitat– **Unlikely to occur.**
Eastern Curlew	*Numenius madagascariensis*	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 & Davies 1996).	4	7/11/1977	No suitable habitat– **Unlikely to occur.**
Fork-tailed Swift	*Apus pacificus*		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 (Higgins et al 2006b).	6	1/05/1950	No suitable habitat– **Unlikely to occur.**
Glossy Ibis	*Plegadis falcinellus*		M (CAMBA, Bonn (A2S))	Prefer freshwater inland wetlands, in particular, permanent or ephemeral water bodies and swamps with abundant vegetation (Marchant & Higgins 1990).	6	8/02/2010	No suitable habitat– **Unlikely to occur.**
Latham's Snipe	*Gallinago hardwickii*		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).	164	31/01/2014	No suitable habitat– **Unlikely to occur.**
Lesser Sand Plover	*Charadrius mongolus*	EN	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	Inhabits beaches of sheltered bays, harbours, and estuaries with large intertidal sandflats or mudflats. Regularly seen in Corner Inlet, Westernport and Port Phillip Bay. (Marchant & Higgins 1993).	8	1/07/1978	**No suitable habitat– Unlikely to occur**

Common Name	Scientific name	EPBC-T	EPBC-M	Habitat	Number of records	Date of last record	Likelihood of occurrence
Orange-bellied Parrot	*Neophema chrysogaster*	CE	M (JAMBA)	The Orange-bellied Parrot is endemic to south-eastern Australia. Its current non-breeding mainland distribution is from the mouth of the Murray River in South Australia, along the coast, to the east of Jack Smith Lake in South Gippsland, Victoria, covering approximately 1000 km of coastline. The most used sites in Victoria are around Port Phillip Bay and Bellarine Peninsula. In South Australia, Carpenter Rocks is the main site. During winter on the mainland, found mostly within 3 km of the coast. In Victoria, they mostly occur in sheltered coastal habitats, such as bays, lagoons and estuaries, or, rarely, saltworks. They are also found in low samphire herbland dominated by Beaded Glasswort (Sarcocornia quinqueflora), Sea Heath (Frankenia pauciflora) or Sea-blite (Suaeda australis), and in taller shrubland dominated by Shrubby Glasswort (Sclerostegia arbuscula). They are sometimes found in low samphire dominated by Grey Glasswort (Halosarcia halocnemoides) or in Chenopodium herbfields. Breeds at Melaleuca in Tas during spring/summer months (DoEE 2018).	1	16/04/1977	**No suitable habitat– Unlikely to occur**
Painted Honeyeater	*Grantiella picta*	VU		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).	0	N/A	**No suitable habitat– Unlikely to occur**
Plains-wanderer	*Pedionomus torquatus*	CR		This species inhabits native grasslands with sparse cover, preferring grasslands that include wallaby grass and spear grass species (Marchant & Higgins 1993).	21	1/01/1979	No suitable habitat – grassland is too dense. **Unlikely to occur.**
Red Knot	*Calidris canutus*	EN	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps (DoEE 2018).	0	N/A	No suitable habitat– **Unlikely to occur.**
Regent Honeyeater	*Anthochaera phrygia*	CR	M (JAMBA)	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).	0	N/A	No suitable habitat– **Unlikely to occur.**
Rufous Fantail	*Rhipidura rufifrons*		M (Bonn (A2H))	In east and south-east Australia, mainly inhabits tall wet sclerophyll forests, often in gullies. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, as well as parks and gardens (Higgins et al. 2006).	19	2/04/2008	Habitat suboptimal (riparian woodland.) **Unlikely to occur regularly.**
Sanderling	*Calidris alba*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	Inhabits open sandy beaches exposed to sea-swells; also on exposed sandbars and spits (Higgins & Davies 1996).	4	5/11/1977	No suitable habitat– **Unlikely to occur.**
Satin Flycatcher	*Myiagra cyanoleuca*		M (Bonn (A2H))	Tall forests and woodlands in wetter habitats but not in rainforest (Higgins et al. 2006)	2	14/11/1982	No suitable habitat– **Unlikely to occur.**
Sharp-tailed Sandpiper	*Calidris acuminata*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins & Davies 1996).	40	14/09/2009	No suitable habitat– **Unlikely to occur.**
Swift Parrot	*Lathamus discolor*	CR		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).	16	5/09/2015	Habitat suboptimal – prefers large blocks of box ironbark woodland inland of the divide. **Unlikely to occur**
White-throated Needletail	*Hirundapus caudacutus*		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).	57	3/03/2007	Some suitable habitat exists for this species. **Likely to occur.**

Common Name	Scientific name	EPBC-T	EPBC-M	Habitat	Number of records	Date of last record	Likelihood of occurrence
Yellow Wagtail	*Motacilla flava*		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 (DoEE 2018).	0	N/A	No suitable habitat– **Unlikely to occur.**
Fish							
Australian Grayling	*Prototroctes maraena*	VU		Large and small coastal streams and rivers with cool, clear waters with a gravel substrate and altering pools and riffles (Cadwallader & Backhouse 1983).	8	5/03/2015	No suitable habitat– **Unlikely to occur.**
Dwarf Galaxias	*Galaxiella pusilla*	VU		Barwon River to Mitchell River. Vegetated margins of still water, ditches, swamps and backwaters of creeks, both ephemeral and permanent (Allen et al. 2002).	0	N/A	No suitable habitat– **Unlikely to occur.**
Macquarie Perch	*Macquaria australasica*	EN		Cool, clear water of rivers and lakes. Favours slower moving water (Allen et al. 2002).	3	1/01/1970	No suitable habitat– **Unlikely to occur.**
Murray Cod	*Maccullochella peelii*	VU		Slow flowing turbid water of rivers and streams of low elevation; also fast flowing clear upland streams (Allen et al. 2002).	2	1/01/1981	No suitable habitat– **Unlikely to occur.**
Silver Perch	*Bidyanus bidyanus*	CR		Rivers, lakes and reservoirs, preferring areas of rapid flow. Swims near the surface and tolerates a wide temperature range, often seen below rapids and weirs (Allen et al 2002).	1	1/01/1981	No suitable habitat– **Unlikely to occur.**
Frogs							
Growling Grass Frog	*Litoria raniformis*	VU		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 & Gillespie 2004).	248	14/11/2017	Species known from Maribyrnong River. **Presumed to be present at least occasionally within Floodplain Riparian Woodland (EVC 56 — HZ I & J).**
Invertebrates							
Eltham Copper Butterfly	*Paralucia pyrodiscus lucida*	EN		In the Eltham area of its range, this Butterfly appears to require a well-drained gentle slope, with a north to west aspect. Its known habitat is sparse dry woodland (Webster 2003).	2	1/01/1922	Although its foodplant (Bursaria spinosa) is present, site appears to lack other requirements e.g. has south/east aspect. **Unlikely to occur.**
Golden Sun Moth	*Synemon plana*	CR		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 2009b).	73	18/12/2017	Suitable native grassland habitat exists – although assessed as suboptimal (as minimal area of Rytidosperma). **Unlikely to occur — Not recorded in targeted surveys**
Mammals							
Eastern Barred Bandicoot	*Perameles gunnii*	EN		The habitat of the Eastern Barred Bandicoot (mainland) is perennial tussock grassland and eucalypt woodland with a grassy ground layer (Dufty 1994b; Seebeck 1995a, 2001). Drainage lines and areas of high vegetative cover have been identified as prime habitat. The key determining factor for persistence of this species appears to be high structural complexity and heterogeneity within the environment, reflected in its absence from agricultural areas but persistence in rubbish dumps and other variable habitats	0	N/A	Recently considered extinct in the wild in Victoria (DSE 2013). **Unlikely to occur.**
Greater Glider	*Petauroides volans*	VU		Forest habitats including peppermint, stringybark, ash and gum dominated (Menkhorst 1995).	0	N/A	No suitable habitat– **Unlikely to occur.**

Common Name	Scientific name	EPBC-T	EPBC-M	Habitat	Number of records	Date of last record	Likelihood of occurrence
Grey-headed Flying-fox	*Pteropus poliocephalus*	VU		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 areas (DoEE 2018).	8	18/12/2014	Habitat is suitable and within range of roosting site at Yarra Bend. **Likely to occur within Floodplain Riparian Woodland (EVC 56 — HZ I & J).**
Swamp Antechinus	*Antechinus minimus maritimus*	VU		Dense wet heath, tussock grassland, sedgeland heathy woodland and coastal heath and scrub (Menkhorst 1995).	0	N/A	No suitable habitat– **Unlikely to occur.**
Reptiles							
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	EN		The species is confined to native tussock grassland on basalt plains north and west of Melbourne, has not been confirmed in Victoria since the 1960's (Robertson & Cooper 2000).	1	19/11/1908	Lack of recent historical records anywhere in Victoria suggests this species is **unlikely to occur.**
Pink-tailed Worm-Lizard	*Aprasia parapulchella*	VU		Sites where the species is found generally include rocky outcrops or scattered partly buried rocks. It occurs under rocks in grassland and woodland in south-east Australia. It spends a considerable amount of time in burrows: the burrows have been constructed by, and may still by inhabited by, small black ants or termites. It feeds on the larvae and eggs of ants.	0	N/A	No suitable habitat– **Unlikely to occur.**
Striped Legless Lizard	*Delma impar*	VU		Grassland specialist. Known to occur in some areas dominated by introduced species such as Phalaris and Serrated Tussock and at sites with a history of grazing and pasture improvement. shelter in grass tussocks, thick ground cover, soil cracks, under rocks, spider burrows, and underground debris such as timber. The majority of sites in Victoria and NSW occur on cracking clay soils with some surface rock which provide shelter for the species (DoEE 2018).	485	27/09/2017	Suitable native grassland habitat exists. Unlikely to occur — **not recorded in targeted surveys.**

Notes: EPBC-T = threatened species status under EPBC Act; CR = critically endangered; EN = endangered; VU = vulnerable; **EPBC-M** = migratory status under the EPBC Act; M = listed migratory taxa; Bonn (A2H) - Convention on the Conservation of Migratory Species of Wild Animals – listed as a member of a family; Bonn (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.

5.6.1. 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

Based on the assessment of habitat suitability and previous records in the search region (Table 3), one listed bird species is likely to occur in the study area. The vulnerability of this species to possible impacts from the proposed development is discussed below.

- White-throated Needletail

  (EPBC Act: migratory)

  This aerial foraging species inhabits most land habitats with a preference for forested country (Higgins 1999). It is a highly mobile species that constantly remains in flight. The broad scale movements of this migratory species would suggest it may use the study area only rarely. As only one tree within the wooded riparian vegetation in the study area will be removed, this species should remain unaffected by any proposed development.

Mammals

Based on the assessment in Table 3, one listed mammal species is likely to occur in the study area. The vulnerability of this species to possible impacts from the proposed development is discussed below.

- Grey-headed Flying-fox

  (EPBC Act: Vulnerable)

  This species is likely to occur in the study area at least occasionally on foraging excursions from the main roost site at Yarra Bend. It could feed in the riparian zone on flowering River Red-gum. Adverse impacts on the species may occur if the number of flowering trees within the riparian vegetation is significantly reduced. As only one tree within the wooded riparian vegetation in the study area will be removed, this species should remain unaffected by any proposed development.

Reptiles

Based on the assessment in Table 3, no listed reptile species is likely to occur in the study area.

Frogs

Based on the assessment in Table 3, one listed frog species has the potential to occur in the study area. The vulnerability of this species to potential impacts from the proposed development is discussed below.

- Growling Grass Frog

  (EPBC Act: Vulnerable)

This species is known to use the Maribyrnong River and its banks as a movement corridor during times of dispersal such as after floods and breeding events. Adverse impacts on the species may occur if the riparian corridor is permanently disturbed, sedimentation of waterways occurs. Targeted surveys for this species are not necessary and are not recommended as precautionary approach has been taken with the species assumed to be present, at least occasionally. As only minimal disturbance will occur within the riparian vegetation in the study area (one tree will be removed), this species should remain unaffected by the proposed development.

Invertebrates

Based on the assessment in Table 3, no listed invertebrate species has the potential to occur in the study area.

6. IMPACTS OF THE PROPOSED ACTION

6.1. Proposed action

The proposed action involves developing just over half (14 hectares) of the study area for residential purposes. The development proposal involves removal of Heavier-soils Plains Grassland (EVC 132_61), Escarpment Shrubland (EVC 895) and a small amount (one tree) of Floodplain Riparian Woodland (EVC 56). All of Habitat Zone A (supporting NTGVVP and the vast majority of the Spiny Rice-flower plants), part of Habitat Zone C (Escarpment Shrubland) and the vast majority of the Floodplain Riparian Woodland (EVC 56) will be retained. The proposed impacts are shown in Figure 1.

Habitat Zone A in the western part of the study area has been identified as being a priority for conservation (BL&A 2018a & BL&A 2018c). Habitat Zone A comprised high quality plains grassland which was dominated by indigenous species such as Kangaroo Grass, Veined Spear-grass and Wallaby Grasses. Scattered throughout were indigenous herbs such as Narrow-leaf Plantain, Lemon Beauty-heads, Sheep's Burr and Prickly Woodruff. The critically endangered Spiny Rice-flower was also recorded in significant numbers. Habitat Zone A was found to be NTGVVP. Habitat Zone I is riparian vegetation providing an important buffer to the Maribyrnong River and potential habitat for Grey-headed Flying-fox and Growling Grass Frog and so will also be retained.

6.1.1. Threatened ecological communities

The proposed action will result in the following impacts:

- Removal of 2.14 hectares of Natural Temperate Grasslands of the Victorian Volcanic Plain (listed as critically endangered under the EPBC Act) including 1.109 ha from HZ B, 0.836 ha from HZ F and 0.195 ha from HZ H. This constitutes 59% of the NTGVVP mapped within the study area.

An assessment of impacts on NTGVVP against significant impact thresholds is presented in Table 4. This assessment indicates that the proposed action will have a significant impact on NTGVVP on the basis that it will:

- Reduce the extent of the ecological community; and
- Cause a substantial reduction in the quality or integrity of the ecological community.

Table 4: Assessment of impacts on NTGVVP against significant impact thresholds

NTGVVP	
Impact Threshold *(Endangered and Critically Endangered)*	**Evaluation of Activity**
Action will have a significant impact if there is a real chance or possibility that it will reduce the extent of an ecological community (DoE 2013).	The proposed action will result in the removal of 2.14 hectares of the listed community. Therefore, the proposed action **will** significantly impact on NTGVVP on the basis that it will reduce the extent of the ecological community.

NTGVVP	
Impact Threshold *(Endangered and Critically Endangered)*	**Evaluation of Activity**
Action will have a significant impact if there is a real chance or possibility that it will fragment or increase fragmentation of an ecological community (DoE 2013).	The community at this location is already fragmented. Further fragmentation will not occur, as the area of NTGVVP to be retained is contiguous with the community beyond the study area. Therefore, the proposed action **will not** significantly impact on NTGVVP on the basis that it will fragment or increase fragmentation of the ecological community.
Action will have a significant impact if there is a real chance or possibility that it will adversely affect habitat critical to the survival of an ecological community (DoE 2013).	The community at this location is not considered habitat critical to the survival of the ecological community, that is, it is not necessary: ▪ for the long-term maintenance of the ecological community; ▪ to maintain genetic diversity and long term evolutionary development; or ▪ for the reintroduction of populations or recovery of the species or ecological community (DoE 2013). No habitat critical to the survival of this community will be adversely impacted. Therefore, the proposed action **will not** significantly impact NTGVVP on the basis that it will adversely affect habitat critical to the survival of the ecological community.
Action will have a significant impact if there is a real chance or possibility that it will modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns (DoE 2013).	The proposed action will not modify or destroy abiotic factors necessary for the ecological community's survival, as NTGVVP beyond the impact area will be protected from sedimentation and changes in surface water drainage through fencing, signage and sediment control. Therefore, the proposed action **will not** significantly impact NTGVVP on the basis that it would modify or destroy abiotic factors necessary for an ecological community's survival.
Action will have a significant impact if there is a real chance or possibility that it will cause a substantial change in the species composition of an occurrence of an ecological community (DoE 2013).	As the proposed action involves the removal of lower-quality (and therefore less species diverse) NTGVVP, it is unlikely to cause a substantial change in the species composition of the remaining occurrence of NTGVVP. Therefore, the proposed action **will not** have a significant impact on NTGVVP on the basis that it will cause a substantial change in the species composition of the ecological community.

NTGVVP	
Impact Threshold *(Endangered and Critically Endangered)*	**Evaluation of Activity**
Action will have a significant impact if it will cause a substantial reduction in the quality or integrity of an occurrence of an ecological community (DoE 2013).	As the proposed action entails the removal of approximately 60% of the NTGVVP recorded in the study area, it is likely to cause a substantial reduction in the integrity of this occurrence of NTGVVP. Therefore, the proposed action **will** have a significant impact on NTGVVP on the basis that it will cause a substantial reduction in the quality or integrity of the ecological community.

6.1.2. Listed flora species

The proposed action will result in the following impacts:

- Removal of 10 Spiny Rice-flower plants (being 14% of the population recorded within the study area).

An assessment of impacts on Spiny Rice-flower against significant impact thresholds is presented in Table 4. This assessment indicates that the proposed action will have a significant impact on Spiny Rice-flower on the basis that it could:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species; and
- Interfere with the recovery of the species.

Table 5: Assessment of impacts on Spiny Rice-flower against significant impact thresholds

Spiny Rice-flower	
Impact Threshold *(Critically Endangered or Endangered)*	**Evaluation of Activity**
Action will have a significant impact if there is a real chance or possibility that it will lead to a long-term decrease in the size of a population (DoE 2013).	The proposed action will result in the removal of 10 Spiny Rice-flower plants. As this is greater than the significant impact threshold of five plants listed in the Significant Impact Guidelines for Spiny Rice-flower (DEWHA 2009a), it is considered that this may lead to a long-term decrease in the size of the population. Therefore, the proposed action **will** significantly impact on Spiny Rice-flower on the basis that it will lead to a long-term decrease in the size of a population.

Spiny Rice-flower	
Impact Threshold *(Critically Endangered or Endangered)*	**Evaluation of Activity**
Action will have a significant impact if there is a real chance or possibility that it will reduce the area of occupancy of the species (DoE 2013).	The proposed action will result in the removal of known Spiny Rice-flower habitat. Therefore, the proposed action **will** significantly impact on Spiny Rice-flower on the basis that it will reduce the area of occupancy of the species.
Action will have a significant impact if there is a real chance or possibility that it will fragment an existing population into two or more populations (DoE 2013).	The 10 Spiny Rice-flower to be removed occur separately to the remaining population (Figure 1). No Spiny Rice-flower have been recorded south of those to be removed. Therefore, the proposed action will not fragment an existing population. Therefore, the proposed action **will not** significantly impact Spiny Rice-flower on the basis that it will fragment an existing population into two or more populations.
Action will have a significant impact if there is a real chance or possibility that it will adversely affect habitat critical to the survival of a species (DoE 2013).	The Spiny Rice-flower habitat to be removed is not considered critical to the survival of the species given its disjunction from the main population at the site and the lower condition of the habitat in Habitat Zone B relative to Habitat Zone A. Therefore, the proposed action **will not** significantly impact Spiny Rice-flower on the basis that it will adversely affect habitat critical to the survival of a species.
Action will have a significant impact if there is a real chance or possibility that it will disrupt the breeding cycle of a population (DoE 2013).	The proposed action is not considered likely to disrupt the breeding cycle of the Spiny Rice-flower given that 86% of the population will remain in higher-quality habitat. Therefore, the proposed action **will not** significantly impact Spiny Rice-flower on the basis that it will disrupt the breeding cycle of a population.

Spiny Rice-flower	
Impact Threshold *(Critically Endangered or Endangered)*	**Evaluation of Activity**
Action will have a significant impact if there is a real chance or possibility that it will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline (DoE 2013).	The proposed action is not considered likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline given that 86% of the population will remain in higher-quality habitat. Therefore, the proposed action **will not** significantly impact Spiny Rice-flower on the basis that it will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Action will have a significant impact if there is a real chance or possibility that it will result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat (DoE 2013).	Construction mitigation measures will be in place to manage the risk of introduction or spread of invasive species. Therefore, the proposed action **will not** significantly impact Spiny Rice-flower on the basis that it will result in invasive species that are harmful to Spiny Rice-flower becoming established in remaining Spiny Rice-flower habitat.
Action will have a significant impact if there is a real chance or possibility that it will introduce disease that may cause the species to decline (DoE 2013).	Construction mitigation measures will be in place to manage the risk of introduction or spread of disease. Therefore, the proposed action **will not** significantly impact Spiny Rice-flower on the basis that it will introduce disease that may cause the species to decline.
Action will have a significant impact if there is a real chance or possibility that it will interfere with the recovery of the species (DoE 2013).	The proposed action will result in the removal of 10 Spiny Rice-flower plants. As this is greater than the significant impact threshold of five plants listed in the Significant Impact Guidelines for Spiny Rice-flower (DEWHA 2009a), it is considered that this may interfere with the recovery of the species. Therefore, the proposed action **will** significantly impact on Spiny Rice-flower on the basis that it will interfere with the recovery of the species.

6.1.3. Listed fauna species

The analysis of susceptibility of listed fauna species to impacts presented in Section 5.6.1 identified that the following species could be impacted by any development in the study area:

- Grey-headed Flying-fox (EPBC Act: Vulnerable)
- Growling Grass Frog (EPBC Act: Vulnerable)

These species were identified as likely to occur in patches of Floodplain Riparian Woodland (EVC 56) within the study area (Table 3). The proposed development will involve only minimal removal of Floodplain Riparian Woodland (one tree will be removed). No impacts to the Maribyrnong River watercourse itself are anticipated.

The analysis of susceptibility found White-throated Needletail should remain unaffected.

Therefore, it is considered unlikely that the project would constitute a significant impact to any of these species.

Further mitigation and management measures are provided in Section 6.2 to reduce the risk of indirect impacts.

6.2. Mitigation and management measures

Mitigation and management measures will be employed to ensure the impacts to biodiversity are minimised.

- The proposed development will be designed in a way that does not alter the site's hydrology in areas that support native vegetation that will be retained.
- No-go zones will be established wherever the impact area sits adjacent to native vegetation that will be retained, including NTGVVP, to prevent fill, equipment, materials, wastes or works facilities from entering and being stored in the areas to be retained. Secure fencing will be placed along the boundary of the no-go zone and will be clearly signed to prevent disturbance of vegetation to be retained. These measures will have the input of a qualified and experienced botanist and will be formalised in the CEMP for the project.
- Machinery and plant hygiene measures will be implemented throughout the construction period. All machinery will enter and exit works along defined routes that do not impact on native vegetation that will be retained or cause soil disturbance and weed spread. All machinery wash down, lay down and personnel rest areas will be defined (fenced) and located in disturbed areas. This will mitigate the potential spread of weeds, disease and pathogens into or throughout the site. This would also reduce the potential for inadvertent impacts on surrounding habitat.
- A detailed Construction Environmental Management Plan (CEMP) will be prepared to address the potential for the erosion and degradation of landforms and ecological values across the entire project area.
- Best-practice sediment controls will be implemented to protect the Maribyrnong River and riparian vegetation in accordance with EPAV 1991.

7. IMPLICATIONS UNDER 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 matters require the approval of the Australian Minister for the Environment.

It is considered unlikely that the proposed action will significantly impact the following MNES, given that minimal (if any) suitable habitat will be removed or impacted:

- White-throated Needletail;
- Growling Grass Frog; and
- Grey-headed Flying-fox.

However, the current assessment found that the proposal will have a significant impact on the EPBC Act listed values presented below.

- NTGVVP; and
- Spiny Rice-flower.

Therefore, a Referral under the EPBC Act will be required.

It is recommended that the proposed action be Referred as a 'Controlled Action'.

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Appendix 1: 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	Recorded
	Black Wattle	*Acacia mearnsii*		X
	Blackwood	*Acacia melanoxylon*		X
	Hedge Wattle	*Acacia paradoxa*		X
	Sheep's Burr	*Acaena echinata*		X
	Bidgee-widgee	*Acaena novae-zelandiae*		X
	Honey-pots	*Acrotriche serrulata*		X
*	Brown-top Bent	*Agrostis capillaris*		X
	River Swamp Wallaby-grass	*Amphibromus fluitans*	VU	
*	Cape weed	*Arctotheca calendula*		X
	Chocolate Lily	*Arthropodium strictum s.l.*		X
	Common Woodruff	*Asperula conferta*		X
	Spear Grass	*Austrostipa spp.*		X
*	Wild Oat	*Avena fatua*		X
*	Bluebell Creeper	*Billardiera heterophylla*		X
	Creeping Bossiaea	*Bossiaea prostrata*		X
	Red-leg Grass	*Bothriochloa macra*		X
*	Large Quaking-grass	*Briza maxima*		X
*	Great Brome	*Bromus diandrus*		X
	Sweet Bursaria	*Bursaria spinosa subsp. spinosa*		X
*	Saffron Thistle	*Carthamus lanatus*		X
	Desert Cassinia	*Cassinia arcuata s.s.*		X
*	Spear Thistle	*Cirsium vulgare*		X
*	Hawthorn	*Crataegus monogyna*		X
	Couch	*Cynodon dactylon*		X
	Sweet Hound's-tongue	*Cynoglossum suaveolens*		X
*	Drain Flat-sedge	*Cyperus eragrostis*		X
*	Cocksfoot	*Dactylis glomerata*		X
	Wallaby Grass	*Danthonia s.l. spp.*		X
	Matted Flax-lily	*Dianella amoena*	EN	
	Black-anther Flax-lily	*Dianella revoluta s.l.*		X
	Kidney-weed	*Dichondra repens*		X
*	South African Orchid	*Disa bracteata*		X
	Small Golden Moths	*Diuris basaltica*	EN	
	Sunshine Diuris	*Diuris fragrantissima*	EN	

Origin	Common name	Scientific name	EPBC	Recorded
#	Trailing Hop-bush	*Dodonaea procumbens*	VU	
	Pale Sundew	*Drosera peltata s.l.*		X
	Variable Willow-herb	*Epilobium billardierianum*		X
	Blue Devil	*Eryngium ovinum*		X
	Manna Gum	*Eucalyptus viminalis subsp. viminalis*		X
*	Fennel	*Foeniculum vulgare*		X
	Crane's Bill	*Geranium spp.*		X
	Clover Glycine	*Glycine latrobeana*	VU	
	Trailing Goodenia	*Goodenia lanata*		X
*	Flatweed	*Hypochaeris radicata*		X
	Yellow Star	*Hypoxis vaginata var. brevistigmata*		X
	Rush	*Juncus spp.*		X
	Burgan	*Kunzea ericoides spp. agg.*		X
	Adamson's Blown-grass	*Lachnagrostis adamsonii*	EN	
	Wiry Buttons	*Leptorhynchos tenuifolius*		X
	White Sunray	*Leucochrysum albicans var. tricolor*	EN	
	Poison Lobelia	*Lobelia pratioides*		X
	Wattle Mat-rush	*Lomandra filiformis*		X
*	Horehound	*Marrubium vulgare*		X
	Tree Violet	*Melicytus dentatus s.s.*		X
	Wood Sorrel	*Oxalis spp.*		X
*	Paspalum	*Paspalum dilatatum*		X
*	Toowoomba Canary-grass	*Phalaris aquatica*		X
	Common Rice-flower	*Pimelea humilis*		X
	Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	CR	X
*	Radiata Pine	*Pinus radiata*		X
*	Buck's-horn Plantain	*Plantago coronopus*		X
	Narrow Plantain	*Plantago gaudichaudii*		X
*	Ribwort	*Plantago lanceolata*		X
	Common Tussock-grass	*Poa labillardierei var. labillardierei*		X
	Grey Tussock-grass	*Poa sieberiana*		X
	Maroon Leek-orchid	*Prasophyllum frenchii*	EN	
	Fragrant Leek-orchid	*Prasophyllum suaveolens*	EN	
	Austral Bracken	*Pteridium esculentum*		X
	Leafy Greenhood	*Pterostylis cucullata*	VU	
	Nodding Greenhood	*Pterostylis nutans*		X

Origin	Common name	Scientific name	EPBC	Recorded
*	Onion Grass	*Romulea rosea*		X
*	Sweet Briar	*Rosa rubiginosa*		X
*	Blackberry	*Rubus fruticosus spp. agg.*		X
*	Dock (naturalised)	*Rumex spp. (naturalised)*		X
	Button Wrinklewort	*Rutidosis leptorhynchoides*	EN	
	Large-headed Fireweed	*Senecio macrocarpus*	VU	
	Cotton Fireweed	*Senecio quadridentatus*		X
*	Variegated Thistle	*Silybum marianum*		X
	Smooth Solenogyne	*Solenogyne dominii*		X
*	Rat-tail Grass	*Sporobolus africanus*		X
	Sun Orchid	*Thelymitra spp.*		X
	Kangaroo Grass	*Themeda triandra*		X
	Austral Toad-flax	*Thesium australe*	VU	
	Yellow Rush-lily	*Tricoryne elatior*		X
*	Clover	*Trifolium spp.*		X
*	Gorse	*Ulex europaeus*		X
	Slender Speedwell	*Veronica gracilis*		X
	Bluebell	*Wahlenbergia spp.*		X
	Rigid Panic	*Walwhalleya proluta*		X
	Swamp Everlasting	*Xerochrysum palustre*	VU	

Notes:

EPBC Act = threatened species status under EPBC Act: CR = critically endangered; EN = endangered; VU = vulnerable;

X = recorded in the study area;

* = introduced to Victoria;

= Victorian native taxa occurring outside their natural range.

Appendix 2: 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	Recorded
Birds					
	Australasian Bittern	*Botaurus poiciloptilus*	EN		
	Australasian Pipit	*Anthus novaeseelandiae*			X
	Australian Magpie	*Gymnorhina tibicen*			X
	Australian Painted Snipe	*Rostratula australis*	EN		
	Australian Raven	*Corvus coronoides*			X
	Australian Shelduck	*Tadorna tadornoides*			X
	Australian Wood Duck	*Chenonetta jubata*			X
	Bar-tailed Godwit	*Limosa lapponica*	VU	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	
	Black-faced Monarch	*Monarcha melanopsis*		M (Bonn (A2H))	
	Black-fronted Dotterel	*Elseyornis melanops*			X
	Brown Falcon	*Falco berigora*			X
	Cattle Egret	*Ardea ibis*			
	Common Bronzewing	*Phaps chalcoptera*			X
	Common Greenshank	*Tringa nebularia*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	
	Common Sandpiper	*Actitis hypoleucos*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	
*	Common Starling	*Sturnus vulgaris*			X
	Crested Pigeon	*Ocyphaps lophotes*			X
	Crimson Rosella	*Platycercus elegans*			X
	Curlew Sandpiper	*Calidris ferruginea*	CR	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	
	Double-banded Plover	*Charadrius bicinctus*		M (Bonn (A2H))	
	Eastern Curlew	*Numenius madagascariensis*	CR	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	
	Eastern Great Egret	*Ardea modesta*			
	Eastern Rosella	*Platycercus eximius*			X
	European Goldfinch	*Carduelis carduelis*			X
	Flame Robin	*Petroica phoenicea*			X
	Fork-tailed Swift	*Apus pacificus*		M (JAMBA,CAMBA, ROKAMBA)	
	Galah	*Eolophus roseicapilla*			X
	Glossy Ibis	*Plegadis falcinellus*		M (CAMBA, Bonn (A2S))	
	Grey Shrike-thrush	*Colluricincla harmonica*			X

Origin	Common name	Scientific name	EPBC-T	EPBC-M	Recorded
	Jacky Winter	*Microeca fascinans*			X
	Latham's Snipe	*Gallinago hardwickii*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	
	Laughing Kookaburra	*Dacelo novaeguineae*			X
	Lesser Sand Plover	*Charadrius mongolus*	EN	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	
	Little Raven	*Corvus mellori*			X
	Long-billed Corella	*Cacatua tenuirostris*			X
	Magpie-lark	*Grallina cyanoleuca*			X
	Masked Lapwing	*Vanellus miles*			X
	Nankeen Kestrel	*Falco cenchroides*			X
	Noisy Miner	*Manorina melanocephala*			X
	Orange-bellied Parrot	*Neophema chrysogaster*	CE	M (JAMBA)	
	Pacific Black Duck	*Anas superciliosa*			X
	Painted Honeyeater	*Grantiella picta*	VU		
	Plains-wanderer	*Pedionomus torquatus*	CR		
	Rainbow Bee-eater	*Merops ornatus*			
	Red Knot	*Calidris canutus*	EN	M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H)	
	Red Wattlebird	*Anthochaera carunculata*			X
	Regent Honeyeater	*Anthochaera phrygia*	CR	M (JAMBA)	
	Rufous Fantail	*Rhipidura rufifrons*		M (Bonn (A2H))	
	Sanderling	*Calidris alba*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	
	Satin Flycatcher	*Myiagra cyanoleuca*		M (Bonn (A2H))	
	Sharp-tailed Sandpiper	*Calidris acuminata*		M (JAMBA, CAMBA, ROKAMBA, Bonn (A2H))	
*	Spotted Turtle-Dove	*Streptopelia chinensis*			X
	Sulphur-crested Cockatoo	*Cacatua galerita*			X
	Superb Fairy-wren	*Malurus cyaneus*			X
	Swift Parrot	*Lathamus discolor*	CR		
	Wedge-tailed Eagle	*Aquila audax*			X
	Welcome Swallow	*Petrochelidon neoxena*			X
	White-bellied Sea-Eagle	*Haliaeetus leucogaster*			
	White-faced Heron	*Egretta novaehollandiae*			X
	White-necked Heron	*Ardea pacifica*			X
	White-throated Needletail	*Hirundapus caudacutus*		M (JAMBA, CAMBA, ROKAMBA)	
	Willie Wagtail	*Rhipidura leucophrys*			X

Origin	Common name	Scientific name	EPBC-T	EPBC-M	Recorded
	Yellow Wagtail	*Motacilla flava*		M (JAMBA, CAMBA, ROKAMBA)	
	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*			X
Mammals					
	Eastern Barred Bandicoot	*Perameles gunnii*	EN		
	Eastern Grey Kangaroo	*Macropus giganteus*			X
*	European Rabbit	*Oryctolagus cuniculus*			X
	Greater Glider	*Petauroides volans*	VU		
	Grey-headed Flying-fox	*Pteropus poliocephalus*	VU		
*	Red Fox	*Vulpes vulpes*			X
	Swamp Antechinus	*Antechinus minimus maritimus*	VU		
Reptiles					
	Grassland Earless Dragon	*Tympanocryptis pinguicolla*	EN		
	Pink-tailed Worm-Lizard	*Aprasia parapulchella*	VU		
	Striped Legless Lizard	*Delma impar*	VU		
Fish					
	Australian Grayling	*Prototroctes maraena*	VU		
	Dwarf Galaxias	*Galaxiella pusilla*	VU		
	Macquarie Perch	*Macquaria australasica*	EN		
	Murray Cod	*Maccullochella peelii*	VU		
	Silver Perch	*Bidyanus bidyanus*			
Frogs					
	Common Froglet	*Crinia signifera*			X
	Growling Grass Frog	*Litoria raniformis*	VU		
	Spotted Marsh Frog (race unknown)	*Limnodynastes tasmaniensis*			X
Invertebrates					
	Eltham Copper Butterfly	*Paralucia pyrodiscus lucida*	EN		
	Golden Sun Moth	*Synemon plana*	CR		

Notes: EPBC-T = threatened species status under EPBC Act; CR = critically endangered; EN = endangered; VU = vulnerable; **EPBC-M** = migratory status under the EPBC Act; M = listed migratory taxa; Bonn (A2H) - Convention on the Conservation of Migratory Species of Wild Animals – listed as a member of a family; Bonn (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.

Appendix 3: Representative photographs of native vegetation recorded in the study area

Heavier-soils Plains Grassland (EVC 132_61), HZ B (NTGVVP and Spiny Rice-flower habitat)

Escarpment Shrubland (EVC 895), HZ C

Floodplain Riparian Woodland (EVC 56), HZ J