Macedon Ranges Shire Council

Final Report:

Environmental Management Plan – Barringo Recreation Reserve, New Gisborne

Prepared by Atlas Ecology

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Environmental Management Plan
Barringo Recreation Reserve, New Gisborne

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Photography: All photos taken by Bianca Aquilina, Tanya Loos, Matt Aquilina (Atlas Ecology), except:

David Francis – Plate 2- Cat's Claw Grevillea *Grevillea alpina*; Plate 3- Matted Bossiaea *Bossiaea decumbens*; Plate 4- Wallflower Orchid *Diuris orientis*, Purple Midge-orchid *Corunastylis despectans*, Spotted Sun-orchid *Thelymitra ixioides*; Plate 5- Hairy-leaf Triggerplant *Stylidium armeria* subsp. *pilosifolium*.

Front cover photos, clockwise from top left: Satin-green Forester Moth *Pollanisus viridipulverulenta*; Heathy Dry Forest in full bloom; Spotted Sun-orchid *Thelymitra ixioides*; Echidna; Blotched Blue-tongue Lizard.

Back cover photo: Eastern Grey Kangaroo.

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We would like to acknowledge the Wurundjeri who are the traditional custodians of this land.

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1 VISION

Barringo Recreation Reserve is highly valued as an ecologically diverse location that supports flora species of state significance.

Biodiversity at Barringo Recreation Reserve is actively managed by Council and the community to conserve and enhance its biodiversity values and to provide resilience to the vegetation communities present.

Local residents and visitors alike are provided an opportunity to learn and engage with the biodiversity values through an informal track network that provides access across the reserve.

Barringo Recreation Reserve provides passive recreational and tourism opportunities for bushwalking, photography, bird watching, naturalists and students.

Barringo Recreation Reserve is valued as an important contributor to the tourism values of the Macedon Ranges and its reputation as a clean, green destination.

2 INTRODUCTION

2.1 Reserve Location and Description

Barringo Recreation Reserve ('the reserve') is a 34 hectare forest owned by the Macedon Ranges Shire Council. The reserve is located on the foothills of the Macedon Ranges, approximately seven kilometres north-east of the Gisborne township and five kilometres east of the Macedon township (Figure 1). The reserve is situated approximately 50 kilometres north-west of the Melbourne central business district.

The reserve features spurs, gullies and valley floors that form part of the northern Robertson Range of the Macedon Ranges. The reserve was once part of a large grazing property that was gifted by the landowners to Council in the early 1980's. Two forest vegetation communities are present, being Heathy Dry Forest and Valley Grassy Forest that vary in quality and density across the reserve. A total of 75 indigenous fauna species and 152 indigenous flora species have been recorded during site surveys, including four flora species of state significance.

The northern section of the reserve is home to the Macedon Pony Club (Figure 2), who have occupied the site since 1991 under a licence agreement with Council. The Pony Club area features a range of equine infrastructure including ménage arenas, club house and various jumps and obstacles.

For the passive recreational visitor, the reserve features walking tracks of varying grade that provide an excellent opportunity to observe the rich floristic diversity present. Most of these tracks are located within the Grasstree Nature Conservation Area ('the conservation area') within the southern portion of the reserve (see Figure 2). This area is excluded from use by the Pony Club and is separated by a series of bollards to delineate the exclusion zone (see dashed white line in Figure 2).

An offset site (30 x 80m in area) is located within the eastern corner of the reserve (Figure 2). This offset site has been established to compensate for vegetation removal as part of council road works (under Permit #207-0187). An Offset Management Plan has been prepared by council for this area.

2.2 Regional Context

The reserve is immediately bordered by properties of varying size that have retained most of their vegetation. Beyond this area, a fragmented landscape of forested ranges and cleared foothills characterise the Macedon Ranges. South of the ranges, the plains grassy woodland that once dominated the lowlands of New Gisborne, Gisborne and Riddells Creek has now been largely removed for grazing, equine, agriculture and growing urban townships.

To the north of Barringo Recreation Reserve is the 2,379 hectare Macedon Regional Park, managed by Parks Victoria. Across Shannons Road from the main entrance is the Barringo Reserve, a Parks Victoria managed picnic ground with facilities that forms part of the Macedon Regional Park. Other reserves, including Sandy Creek Reserve, Mt Charlie Flora and Fauna Reserve, Mt Teneriffe and Conglomerate Gully Flora Reserve are located close to the reserve (Figure 1). The botanically diverse and locally known area of 'Barrm Birrm' is within close proximity and is located along the Robertson Range (Figure 1).

2.3 Zones and Overlays

The reserve is zoned Public Park and Recreation (PPRZ). The purpose of this zone is to; recognise areas for public recreation and open space; protect and conserve areas of significance where appropriate and; provide for commercial uses where appropriate. An Environmental Significance Overlay – Schedule 5 (ESO5), Significant Landscape Overlay – Schedule 1 (SLO1) and a Bushfire Management Overlay (BMO) cover the entire reserve.

2.4 Bioregion

Victoria is divided into 28 bioregions each representing different ecological characteristics and underlying geological features. The Bioregional Conservation Status of an Ecological Vegetation Class (EVC) (see below) is assessed at this bioregional level.

The reserve occurs within the *Central Victorian Uplands Bioregion* (CVU), which extends from Stawell in the west, to Ballarat and the You Yangs in the south, to the north-east through Alexandra and Mansfield, ending near Bright (DSE 2012).

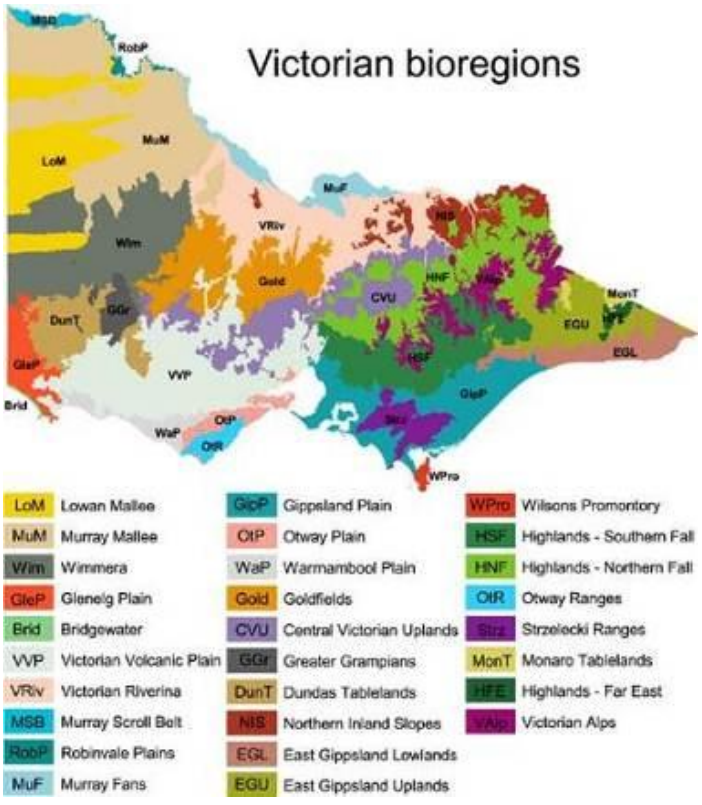
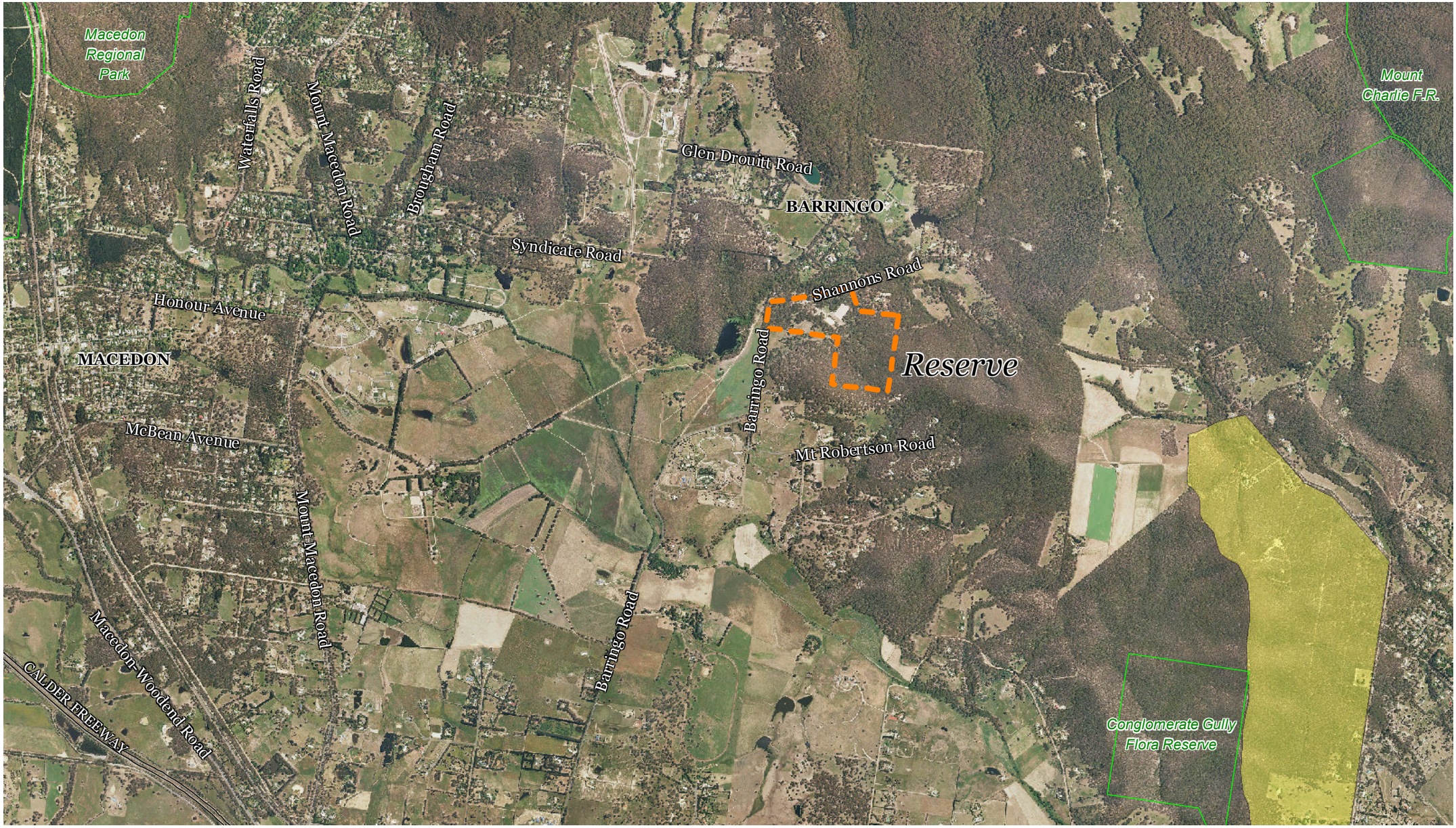


Figure 1 - Location of Barringo Recreation Reserve



Note: Map features are approximate and are to be used as a guide only.

3 EXISTING VALUES AND USES WITHIN RESERVE

3.1 Flora

3.1.1 Ecological Vegetation Class and Vegetation Communities

Ecological Vegetation Classes (EVC's) consist of groups of plants which commonly occur together within a recognisable environmental niche. This is determined by rainfall, soil type, soil moisture levels, slope and altitude (e.g. mountains, plains, and foothills), aspect (e.g. north or south) and type of canopy (e.g. open or closed canopy). An EVC is likely to be made up of a similar group of species where a certain combination of these factors recurs. An EVC typically consists of between one to three different vegetation layers (such as overstorey, mid-storey and ground layer). There are approximately 300 recognised EVCs within Victoria.

Two EVCs are present within the reserve – Heathy Dry Forest (EVC 20) and Valley Grassy Forest (EVC 47) (see Figure 2). Both EVCs represent differing characteristics with respect to soils, position in the landscape, aspect and vegetation structure. Heathy Dry Forest has a conservation status of 'Least Concern' within the Central Victorian Uplands bioregion; due to greater than 50% of the community's pre-European extent still remaining in Victoria (Venn 2010a). The relatively high retention rate of this vegetation community is attributed to the unsuitability of these dry rocky sites for agriculture (Venn 2010a).

Valley Grassy Forest has a conservation status of 'Vulnerable' within the Central Victorian Uplands bioregion, as the majority of this vegetation community occurs in low-lying fertile areas more suitable for agriculture and development. A detailed description of these EVCs, and their structure and composition within the reserve are provided in Section 3.1.3 below.

3.1.2 Flora Species

A comprehensive flora species list of the reserve has been compiled and added to by various individuals and groups since 1983. The Macedon Range Conservation Society compiled the original species list in the 1980s, and more recently, David Francis has updated species' nomenclature and contributed to the species list up to the present time. Additional indigenous species have been added to this list through field work undertaken for this management plan. A species list is available in a website dedicated to the reserve at http://home.vicnet.net.au/~barringo/welcome.htm.

Introduced species records have not previously formed part of the species list, however incidental sightings were noted during the preparation of this management plan. A more comprehensive flora survey is likely to record additional introduced species.

As at 2012, a total of 183 flora species have been recorded within the reserve. This includes 152 indigenous and 31 introduced flora species. All of these species, together with their significance rating or status, are listed in Appendix 1.1.

3.1.3 Current Vegetation Description

One of the key characteristics of the reserve is its range of topographical features, which provide for not only an interesting landscape, but a floristically rich and diverse reserve that is rare for the local area. Gullies and large remnant trees in low-lying areas give way to grassy valley floors, fringed by large dry rocky rises. This series of spurs, gullies and valley floors form part of the northern Robertson Range; which occupies the southern part of the Macedon Ranges.

Vegetation across the reserve generally supports remnant and regenerating forest with varied composition and quality; dependent on its position in this diverse landscape and past and current land uses and management. The overstorey comprises a range of eucalypt species of different age classes, whilst the mid-storey layer is variable in cover and diversity. The ground layer is largely grassy with a rich and diverse range of herbs, lilies, rushes and orchids. The position of vegetation communities (or EVCs, see Section 3.1.1) within the landscape largely follow the reserve's topography, which influences soil type, moisture availability and vegetation composition and structure. Bryophyte and lichen micro-habitats, such as logs, woody debris, stones, tussocks and organic litter, are common throughout the reserve.

Heathy Dry Forest

Heathy Dry Forest occupies exposed crests and spurs within the reserve (see Figure 2, Plate 1) and is characterised by colluvial shallow loam soils of low fertility and moisture holding capacity. Vegetation here has adapted to these conditions with only a select combination of species occupying these areas. Heathy Dry Forest occurs on easterly, westerly and northerly aspects encompassing three separate hills that 'fringe' the valley floor vegetation (Figure 2). A vegetation assessment in 2010 (Venn 2010a) noted this area as the most 'botanically and visually interesting' section of the reserve with the highest proportion of uncommon and rare species. Isolated weed occurrences (see Figure 3) and the presence of the pathogen Phytophthora, or dieback *Phytophthora cinnamomi* (Pc) are key issues within this vegetation community.

Overstorey eucalypts here are generally short and stunted in form and are of similar age and size. Eucalypt cover is dense and the presence of large trees is minimal. Species include Broad-leaved Peppermint *Eucalyptus dives* and Long-leaf Box *Eucalyptus goniocalyx*, which are characteristic of Heathy Dry Forest communities. The mid-storey is dominated by Austral Grass-tree *Xanthorrhoea australis*, a striking natural feature particularly towards hill crests (Plate 1). Small to medium sized shrubs include Bushy Needlewood *Hakea decurrens* subsp. *physocarpa*, Cat's Claw Grevillea *Grevillea alpina* (Plate 2) and Common Heath *Epacris impressa* var. *impressa,* however their cover is sparse and much lower than the ideal 50% benchmark cover (DSE 2004a). The lack of recruitment and coverage of these shrubs has previously been noted in the vegetation quality assessment undertaken at the reserve (Venn 2010a). Recent drought conditions and overgrazing by kangaroos are possible causes of this issue (Venn 2010a).

Plate 1. Heathy Dry Forest community

Plate 2. Cat's Claw Grevillea

The ground layer is the most floristically diverse and visually impressive component of the entire reserve. Introduced species cover is minimal amongst the indigenous array of grasses, rushes, herbs, lilies, orchids and prostrate shrubs. Dominant grasses are Silvertop Wallaby-grass *Rytidosperma pallidum*, Grey Tussock-grass *Poa sieberiana* and Wattle Mat-rush *Lomandra filiformis* subsp. *coriacea*. Herbs and lilies include Milkmaids *Burchardia umbellata* (Plate 3), Chocolate Lily *Arthropodium strictum*, Tall Fringe-lily *Thysanotus tuberosus* (Plate 3), Blue Pincushion *Brunonia australis* (Plate 3), Button Everlasting *Coronidium scorpioides* and Black-anther Flax-lily *Dianella admixta*. Orchids include Spotted Sun-orchid *Thelymitra ixioides*, Wallflower Orchid *Diuris orientis* and Purple Midge-orchid *Corunastylis despectans* (Plate 4). Small and prostrate shrubs such as Matted Bossiaea *Bossiaea decumbens* and Trailing Podolobium *Podolobium procumbens* are dominant within discrete areas (Plate 3).

The state significant Hairy-leaf Triggerplant *Stylidium armeria* subsp. *pilosifolium* occurs throughout this vegetation community (Plate 5, Figure 2). This species has only recently been classified and is endemic to the Riddells Creek area.

Plate 3. Understorey features of Heathy Dry Forest, from top to bottom: Milkmaids, Blue Pincushion, Tall Fringe-lily, Trailing Podolobium and Matted Bossiaea

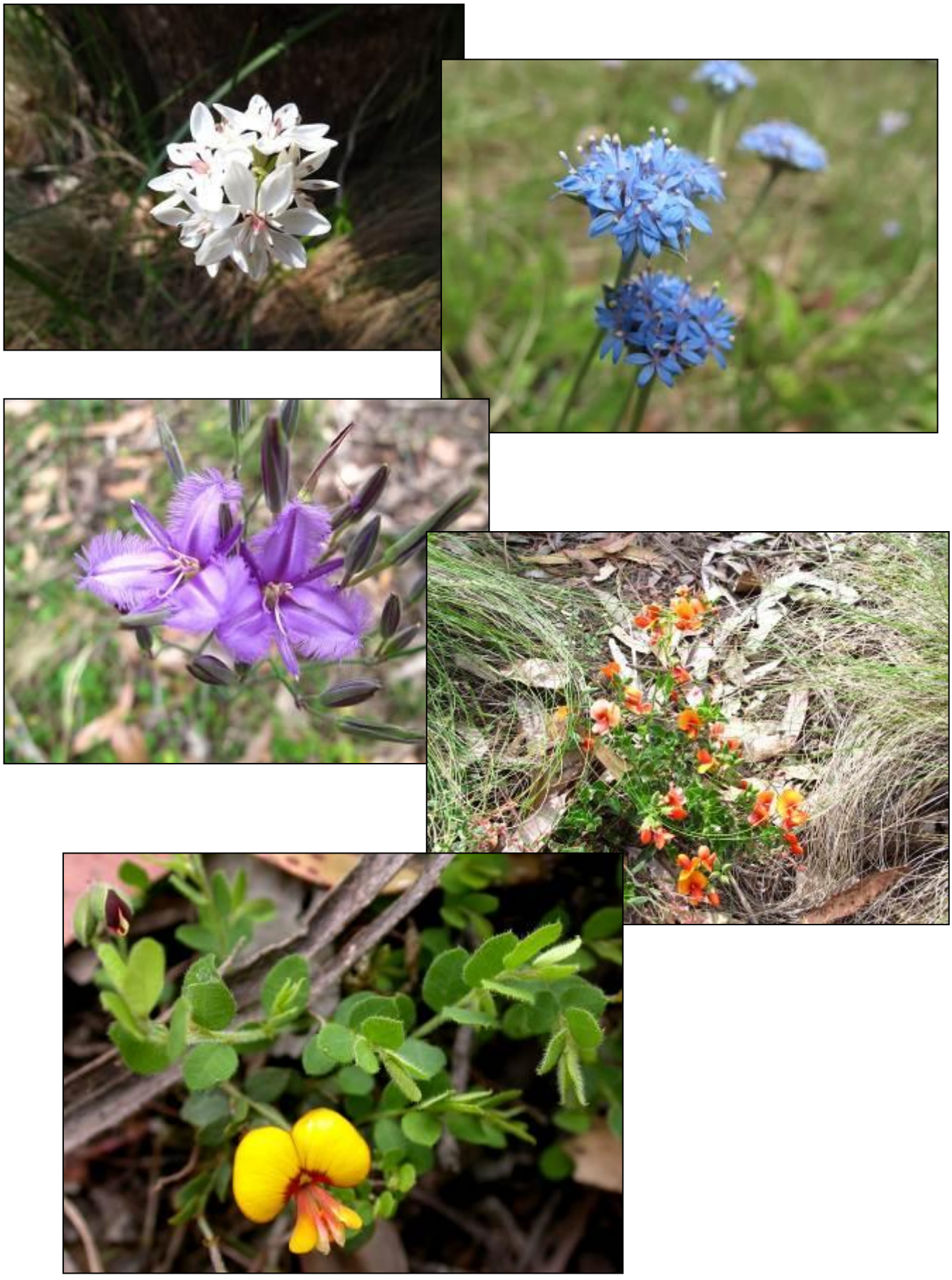


Plate 4. Orchids within Heathy Dry Forest: Wallflower Orchid, Purple Midge-orchid and Spotted Sun-orchid

Plate 5. Hairy-leaf Triggerplant

Valley Grassy Forest

Valley Grassy Forest occupies deeper, fertile soils in the valley between the hills of Heathy Dry Forest (Figure 2). Several ephemeral gullies flow through this area from Mount Robertson to the south, eventually flowing into Barringo Creek north of the reserve (Figure 2). Higher moisture availability and retention, coupled with increased nutrient-rich inputs, has influenced the current vegetation composition and cover. In comparison to the Heathy Dry Forest, introduced species proliferate here and this area has been modified through past grazing and horse riding (David Francis, *pers. comm.* 2012). Weed encroachment, particularly Sweet Vernal-grass *Anthoxanthum odoratum* and wattle senescence are major issues for the biodiversity values within Valley Grassy Forest.

The overstorey consists of eucalypt species that favour moister or more fertile environments, such as Manna Gum *Eucalyptus viminalis* subsp. *viminalis* and Swamp Gum *Eucalyptus ovata* var. *ovata* within and near gullies. Slightly drier areas contain Messmate Stringybark *Eucalyptus obliqua*, Narrow-leaf Peppermint *Eucalyptus radiata* subsp. *radiata* and Broad-leaved Peppermint *Eucalyptus dives* (Plate 6). Large trees are concentrated within the

western gully line and scattered around the lower areas of the reserve (Plate 7). These trees were likely retained during previous grazing periods. The remainder of the dense, young eucalypts have regenerated after the removal of grazing animals in the reserve (David Francis, *pers. comm. 2012)*. Young trees are particularly dense in cover within and around the Pony Club area where past grazing may have been concentrated (Plate 8).

Plate 6. Higher quality Valley Grassy Forest within slightly drier areas away from gullies

Plate 7. Large multi-stemmed trees are a feature of low lying areas in and around gullies

Plate 8. The Pony Club area supports dense stands of young eucalypts

In comparison to the sparse mid-layer of Heathy Dry Forest, a diverse mid-storey occurs within the Valley Grassy Forest. Of particular note is the advanced senescence of wattles across this vegetation community (Plate 9). This is likely attributed to the persistent Fireblight Beetle which has recently been recorded throughout Riddells Creek. The beetle is discussed in more detail in Section 4.3.2. Wattles affected include Black Wattle *Acacia mearnsii*, Silver Wattle *Acacia dealbata* subsp. *dealbata* and the state significant Large-leaf Cinnamon-wattle *Acacia leprosa* var. *uninervia* which was recorded during the current site assessment (Figure 2). The Large-leaf Cinnamon-wattle has almost entirely been affected by the beetle, and in most cases, the affected plants show few signs of life except for a small number of straggling leaves.

Plate 9. Dead and senescing wattles are common throughout conservation area

The western gully channel (Figure 2) is wide and shallow at the far southern end, gradually becoming steeper and narrower as it runs to the north (Plate 10). Conversely, the eastern gully channel (Figure 2) is steeply incised and narrow at the southern end, tending to wide and shallow further north (Plate 11). Tunnel and gully erosion is apparent along both gullies (Plate 10), which become densely shrubby towards the northern end of the conservation area. Shrubs include Cassinia *Cassinia* spp., Snowy Daisy-bush *Olearia lirata* (Plate 12), Prickly Moses *Acacia verticillata* subsp. *verticillata* and Prickly Currant-bush *Coprosma quadrifida*. More isolated occurrences of Cluster Pomaderris *Pomaderris racemosa* and Victorian Christmas-bush *Prostanthera lasianthos* (Plate 12) are present. Most of these shrub species are typical of wet, sheltered positions such as Damp Forest areas that are common in the southern Macedon Ranges. Gully lines therefore support a mosaic of vegetation communities including elements of Damp Forest. The state significant Dwarf Silver Wattle *Acacia nano-dealbata* is present within this vegetation community (Plate 13, Figure 2).

Shrub cover is visibly sparser away from the moist gully lines where Cherry Ballart *Exocarpos cupressiformis* and Black Wattle are common. Blackwood *Acacia melanoxylon* is prolific along the northern and western extent of the reserve, whilst Blackberry *Rubus fruticosus* is locally dominant in or near gully lines (Figure 3).

Plate 10. Looking downstream from upper extent of western gully

Plate 11. Left- Looking downstream from upper extent of eastern gully; Right- edge of eastern gully further downstream with higher shrub cover

Plate 12. Left- Snowy Daisy-bush in seed; Right- Victorian Christmas-bush

Plate 13. The state significant Dwarf Silver Wattle

The understorey varies in composition, cover and quality depending on aspect, soil and moisture availability. Lower positions in the landscape, such as along or near gully lines on more exposed aspects, generally support large swathes of Sweet Vernal-grass (Plate 14). Isolated occurrences were observed in typically inhospitable areas such as on the dry, rocky hills of Heathy Dry Forest. This species is discussed in greater detail in Section 4.3.1.

Plate 14. Sweet Vernal-grass dominates the understorey within eastern extent of Pony Club area

Within higher quality areas, common indigenous herbs and lilies include Common Raspwort *Gonocarpus tetragynus*, Kidney Weed *Dichondra repens*, various Fireweeds *Senecio* spp., Ivy-leaf Violet *Viola hederacea*, Blue Pincushion and Black-anther Flax-lily (Plate 15). Shiny Everlasting *Xerochrysum viscosum* is prolific within drier areas with northerly aspects (Plate 16). Grasses include Veined Spear-grass *Austrostipa rudis*, Reed Bent-grass *Deyeuxia quadriseta*, Grey Tussock-grass and Wattle Mat-rush in drier areas and Cluster-headed Mat-rush *Lomandra longifolia* subsp. *exilis* and Variable Sword-sedge *Lepidosperma laterale* in moister areas. Small and prostrate shrubs are interspersed within the higher quality areas and include Honey-pots *Acrotriche serrulata*, Common Rice-flower *Pimelea humilis* and Grey Parrot-pea *Dillwynia cinerascens*.

Plate 15. Understorey of Veined Spear-grass and Blue Pincushion within higher quality areas

Plate 16. Shiny Everlasting is locally dominant on northern aspects

The far western extent of the Pony Club area (Figure 2) supports a slightly different environment whereby Variable Sword-sedge, Hop Goodenia *Goodenia ovata* and Blackwood are locally dominant along gully lines (Plate 17).

Plate 17. Gullies at downstream extent are dominated by Variable Sword-sedge and Blackwood (top) and Hop Goodenia (bottom)

See Appendix 4 for definitions of vegetation condition.

3.1.4 Significant Flora Species

National Significance

No flora species of national significance have been recorded within the reserve. One nationally significant flora species has previously been recorded within 5 kilometres of the reserve: Southern Shepherd's Purse *Ballantinia antipoda* (see Appendix 1.2). This species occurs in higher altitude wet to damp forest environments and is unlikely to be present due to a lack of suitable habitat.

State Significance

Four species of state significance were recorded as present within the reserve – the endangered Hairy-leaf Triggerplant *Stylidium armeria* subsp. *pilosifolium* (Plate 4), the rare Large-leaf Cinnamon-wattle *Acacia leprosa* var. *uninervia* (Plate 18), the rare Dwarf Silver Wattle *Acacia nano-dealbata* (Plate 13) and the rare Slender Fireweed *Senecio microbasis* (see Appendix 1.2 and Figure 2).

The Hairy-leaf Triggerplant is a newly discovered species that has only previously been recorded within the Riddells Creek area. The Hairy-leaf Triggerplant is a large perennial herb with narrowly oblanceolate hairy leaves at the base and flowering stems up to 80 centimetres tall (see Plate 5). Flowers are white to pale pink and have a 'trigger-arm' that is activated by pollinators (Best and Francis 2008). The species is only found on dry, bare soils where other forms of Triggerplant are not found (Best and Francis 2008). Within the reserve the species is common atop the crests of Heathy Dry Forest (Figure 2).

Large-leaf Cinnamon-wattle was recorded at three separate areas, with the largest population occupying a 20 metre by four metre area close to the western gully (Figure 2). This species has not formally been identified within the reserve. Almost all specimens are either dead or heavily senesced through targeted defoliation by the Fireblight Beetle (see Section 4.3.2). The future of this rare species within the reserve depends upon its ability to re-establish once the beetle has moved on. Other populations within the Macedon Ranges have also been affected by the beetle (pers.observ.).

Large-leaf Cinnamon-wattle is an open shrub, two to four metres tall with yellow spherical flower heads in late winter to early spring (Best and Francis 2008). This large phyllode form has one main vein along its leaves and a glistening varnish-like coating on the leaves. Populations of this species have been recorded throughout the lower slopes of the Macedon Ranges.

Plate 18. Large-leaf Cinnamon-wattle has been adversely affected by the Fireblight Beetle

Several small patches of Dwarf Silver Wattle were recorded within the reserve (see Plate 13, Figure 2). This species has not formally been identified within the reserve. This distinctive large shrub to small tree grows two to six metres tall and yellow spherical flowers emerge in mid-winter to early spring (Best and Francis 2008). Green bipinnate leaves with touching or overlapping pinnules (Best and Francis 2008) are a key feature of this species. Although classed as rare, this species is relatively common within parts of the Macedon Ranges. The species is regenerating well and is one of the few wattle species in the local area that remains unaffected by the Fireblight Beetle (pers.observ.).

Slender Fireweed is present within areas of Heathy Dry Forest (Figure 2). This species has recently been re-classified, having previously formed part of *Senecio* sp. aff. *tenuiflorus*. Slender Fireweed has been recorded within other areas of the Macedon Ranges. This large perennial herb can reach up to 60 centimetres tall and supports narrow leaves at the base of and along the stem, which bears yellow flower heads in spring-summer (FIS 2012).

An additional five flora species of state significance have previously been recorded within five kilometres of the reserve (see Appendix 1.2). Two of these species have potential habitat present within the reserve: Naked Beard-orchid *Calochilus imberbis* and Common Cinnamon-wattle *Acacia leprosa* var. *graveolens* (also known as Southern Varnish Wattle), however neither have been recorded within the reserve.

Regional Significance

Of the 152 indigenous species recorded within the reserve, 70 are considered to be significant at a regional scale (within the Central Victorian Uplands bioregion). Appendix 1.1 contains a list of regionally significant and locally significant flora species.

Definitions of ecological significance for species, communities and sites are provided in Appendix 3.

3.2 Fauna

3.2.1 Previous and current fauna assessment

Two fauna surveys have previously been conducted at the reserve: a mammal survey commissioned by the Macedon Ranges Shire Council in 1985 (MRSC 1985) and, more recently, a fauna survey by Venn in 2010. Neither survey recorded rare or threatened fauna species.

The 1985 survey recorded nine native mammal species and five introduced species. Of particular interest is the Greater Glider record, as their distribution in western Victorian forests is patchy and restricted to areas with large hollow bearing trees used as dens (Macak, Chick and Loyn 2010). The 2010 fauna survey recorded nine native mammal species, three introduced mammal species and 20 native bird species. The current assessment (November 2012) did not record Greater Glider.

An on-site walk and interview was undertaken during the preparation of this management plan with two members of Riddells Creek Landcare, David Francis and Russell Best, both of whom are familiar with the reserve. David and Russell supplied recent local reports that have not been recorded onto the Atlas of Victorian Wildlife (AVW) database, including Brush-tailed Phascogale and the presence of Fallow Deer.

The website dedicated to the reserve supplies fauna records of commonly seen species, as well as the results of night surveys and hair funnel analysis. A checklist of 52 bird species is supplied on the website compiled by David Francis.

3.2.2 Fauna Species at the Reserve

Fauna species recorded within the reserve, together with their significance rating or status, are listed in Appendix 2.1. This list includes species recorded from the surveys noted above, as well as a site assessment conducted during the preparation of this management plan in November 2012.

A total of 80 fauna species have been recorded within the reserve since site surveys and records began in 1985. This comprises 17 mammals (12 native and five introduced), one

native reptile, an unknown frog species (as tadpoles), three native invertebrates and 59 birds (58 native and one introduced).

The November 2012 site assessment recorded a total of 34 fauna species. This comprises six mammals (four native and two introduced) and 27 birds (26 native and one introduced). Eight of these species had not previously been recorded within the reserve: Long-billed Corella, Black-faced Cuckoo-shrike, Common Blackbird, Blotched Blue-tongue Lizard, unknown frog species (as tadpoles), Satin-green Forester Moth, Bright Shield-skipper and Common Brown Butterfly (see Appendix 2.1).

The results of the current (November 2012) assessment and comments incorporating the results of previous fauna surveys are provided below.

Native Birds

Three BirdLife Australia area search surveys were conducted– one in the morning, one in the afternoon and one evening spotlighting session. The BirdLife Australia area search involves surveying for bird species around a central point; these areas can cover a small area within 500 metres of the central point, or a large area out to 5 kilometres. The search area can be any shape and the search time can be anywhere between 20 minutes and one month. The surveys undertaken at Barringo Reserve were all 1 – 2 hours in duration and were focussed within approximately 500 metres of a central point.

The surveys revealed a typical suite of forest birds, with high numbers of Red Wattlebirds observed feeding on the Drooping Mistletoe *Amyema pendula* subsp. *pendula* which was in flower. The species richness and numbers of birds counted was higher along the western gully (see Figure 2) (cf. Palmer and Bennett 2006).

Less commonly seen forest specialists such as Gang Gang Cockatoo, Crescent Honeyeater, and Bassian Thrush have been recorded at Barringo Reserve by David Francis.

Venn (2010a) recorded Yellow Thornbill and Weebill in bird surveys undertaken at the reserve. These species may have been recorded in error, as the report states it was “difficult to identify many of the smaller species in the tall eucalypts”. The Yellow Thornbill is a woodland and acacia specialist, and the Weebill is also regarded as a woodland bird species. The Striated Thornbill is a commonly seen forest species which is quite yellow in plumage in western Victoria compared to the pictures in the popular identification guides. The Striated Thornbill is missing from Venn’s bird list, and it is likely that two small flocks of Striated Thornbill were misidentified and recorded as Yellow Thornbill and Weebill.

Native Mammals

During recent incidental bird surveys, the ground was scanned for scats, feeding traces, scratches and other signs that may indicate the presence of mammalian fauna.

The most obvious mammal species using Barringo Reserve is the Eastern Grey Kangaroo. Approximately 10-20 individuals were observed near the open grassy areas used by the Pony Club, and also resting on a slope in the Heathy Dry Forest. Scat and resting areas occur throughout the reserve.

Typical gully habitat is present for the Swamp Wallaby; this species was not recorded during recent diurnal surveys but has previously been recorded as "commonly seen".

The stag watching and spotlighting survey undertaken in November 2012 recorded arboreal mammals including two Koalas and one Common Ringtail Possum. Hollow-using arboreal fauna such as Gliders and other possum species were not recorded during the survey.

Greater Gliders were recorded at the reserve in 1985 (MRSC 1985). Greater Gliders require large hollows for den sites; there are a low number of such hollows at Barringo Reserve, however the species may be present.

Brush-tailed Possum and Ringtail possums have previously been recorded as "commonly seen" and this is expected due to the high quality habitat in the reserve.

Ground fauna such as Antechinus are rarely detected during spotlighting surveys, but a hair analysis survey undertaken (Venn 2010a) successfully detected this species in the reserve. Agile Antechinus *Antechinus agilis* is an insectivorous dasyurid species with fairly broad requirements; coarse woody debris and plenty of intact ground understory helps provide these active mammals with the insects and nesting areas they require.

Frogs

The tadpoles of one unidentified species of frog were observed in the chain of ponds in the gully in the Valley Grassy Forest area of the reserve. No frogs were calling during the night surveys, so a positive identification could not be made of any frog species at the reserve.

Prior surveys did not record frog species.

Reptiles

No reptiles were recorded in diurnal or spotlighting surveys, however a Blue-tongue Lizard was noted incidentally. Prior surveys did not record reptile species.

In the Heathy Dry Forest in the western area of the reserve, a nest of reptile eggs was photographed (Plate 19). The eggs had leathery shells, and were approximately 2 cm in length. Blue-tongued Lizards are viviparous (live-bearing) so the eggs may be from another lizard species such as the Jacky Lizard or from a Copperhead snake.

Plate 19. Reptile eggs in Heathy Dry forest in the west of the reserve

Pest animals

The only introduced avian species recorded was a Common Blackbird, recorded in gully vegetation.

The other five mammal pest animal species recorded include Brown Hare, European Rabbit, Red Fox, Fallow Deer and Feral Goat.

The Feral Goat sighting dates from 1985; goats have not been present in the area for a decade or more (D Francis, *pers. comm.* 2012). During diurnal surveys for this assessment, no sign of scats or browsing damage was noted.

Two Brown Hare were observed during diurnal surveys in the Pony Club area. Management recommendations for this species are provided in Section 4.2.4 - Pest Animal Management.

3.2.3 Fauna Habitat

Grassy Ground Cover, Grass trees and rocky habitat in Heathy Dry Forest

The Heathy Dry Forest on the eastern slopes supports areas of grassy groundcover. This groundcover provides useful ecosystem functions and dispersal opportunities for a wide range of fauna species. The tussocks provide grazing opportunities for macropods; cover and

nesting resources for small mammals, birds, frogs and reptiles; and food resources for seed-eating and insectivorous birds.

A healthy diversity and number of wildflower and orchid species occur in the inter-tussock spaces of the grassy ground cover in the reserve (Plate 20). Wildflowers are key components in the lifecycles of many invertebrate species, which in turn provide food for insectivores such as birds and small mammals. Orchid tubers are a source of food for White-winged Choughs.

When in flower, the tall spikes of the grass trees provide abundant nectar resources for a variety of honeyeaters, small parrots and small mammals such as Feathertail Gliders and Sugar Gliders. Insectivorous birds forage upon the insects attracted to the flowering spikes. The ample tussocks of the grass trees provide nesting habitat for birds and mammals. Secluded resting spots for kangaroos and Swamp Wallabies may be found between the grass trees (Plate 20).

Plate 20. Grassy ground cover and Grass trees in Heathy Dry Forest

Gully with chain of ponds

The gully that runs through the reserve has ephemeral water flows during high rainfall events, with a chain of ponds style formation (Plate 21). The small pools that persist provide a source of water for a range of avifauna and larger mammals such as macropods and pest animals including Hares. The ponds provide breeding habitat for a range of frog species, as well as invertebrates including dragonflies. Tadpoles from an unidentified species of frog were observed in one of the deeper pools.

Plate 21. Small pool in western gully

Tree and Shrub Cover

Throughout the reserve tree and shrub cover varies in species, density and age class according to past management history, as well as natural determinants including vegetation type, slope and aspect (Plate 22).

Plate 22. Gully vegetation and eucalypts in a relatively young age class

Large old trees, both living and dead, represent significant resources for a wide range of fauna. Large old trees produce more nectar when they flower than younger trees, and have higher populations of insects within their peeling bark and dead branches. The larger boughs provide resting sites for larger arboreal mammals such as Brushtail Possums and Koalas. Most importantly, the numerous hollows within large old trees provide nesting, roosting and shelter sites for a large number of bird, mammal, frog and reptile species.

Most of the large old trees with hollows are present in the Pony Club section of the reserve. These trees are mainly Manna Gums and may provide significant roosting and nesting sites for fauna (Plate 23). Large old trees are present along the chain of ponds, western gully line in the Valley Grassy Forest. Although many of these trees in the gully line were of substantial girth, closer inspection revealed that most of these large old trees had not yet developed hollows. This may be related to their species, as stringybarks such as Messmate Stringybark are slower to develop hollows than gum species such as Manna Gum (Gibbons and Lindenmayer 2002). Local history accounts report that while the area was not affected by the Ash Wednesday fires, the area was cleared by previous landowners and grazed by cattle (D. Francis *pers. comm.* 2012). Many of the Swamp Gums are approximately 60 years old which is well below the age class required for hollow development. This increases the importance of the hollows present in the Pony Club area (see fauna management Section 4.3.6).

Plate 23. Large old tree with hollows in Pony Club area

Eucalypt tree cover is complemented in the reserve by a healthy and diverse mid-layer of small trees and large shrubs such as *Olearia*, *Cassinia* and *Acacia*, particularly in the Valley Grassy Forest gully areas (Plate 24). Large graminoids such as *Lepidosperma* are present in the gully areas. These plants provide food for seed-eating pigeons, parrots and finches, as well

as insectivorous birds, possums and gliders in the form of insect diversity and sap resources. Structurally, the shrubs form important pathways and connectivity for arboreal mammals as they move around the reserve.

Prickly plants such as the wattle Prickly Moses, the Prickly Currant-bush and Bushy Needlewood provide dense cover for nesting and foraging resources for small birds such as honeyeaters, thornbills and Grey Fantails.

At the time of assessment, the Black Wattles in the reserve were defoliated as a result of attack from the Fireblight Beetle (see Section 4.3.2). The life cycle of the beetle had completed, and new leaves were returning to some of the shrubs. During the outbreak, the habitat value of Black Wattle drops markedly as the absent foliage reduces the suitability of the wattles for shelter and protection from predators, and as a food source. It is expected that the Black Wattles will return to health and/or be replaced by adequate levels of recruitment in the ground layer.

Cherry Ballart is present in the Valley Grassy Forest, including the Pony Club area (Plate 24). These small parasitic trees provide food for berry eating birds such as Whistlers and provide dense cover for large predatory birds to rest in during the day. Powerful Owls use Cherry Ballart as daytime roosts, as the thickly covered branches shield the owls from detection and subsequent mobbing by other birds. Cherry Ballart are used by Koalas as shady rest spots during heat events in summer.

Plate 24. A small Cherry Ballart in the Pony Club area

Coarse Woody Debris

The reserve supports a moderate amount of coarse woody debris in the form of fallen trees and shrubs, dead standing stags and litter (Plate 25). Much of this woody debris is in the lower size classes, but retains high habitat value.

Plate 25. Typical woody debris in the reserve

Coarse woody debris provides perching and hawking sites for insectivorous birds such as Grey Shrike-thrush, Pallid Cuckoos and Superb Fairy-wren, and structural habitat in the form of runways for small mammals such as antechinus and bush rats. The stags and fallen logs provide hollows for nesting and refuge for a wide range of fauna. Coarse woody debris is an essential component in nutrient cycling as invertebrates and fungi break down the woody debris, and these in turn provide a rich food source for the reserve's fauna.

3.2.4 Significant Fauna Species

No rare or threatened fauna species were recorded during the site survey. As detailed in Section 3.2.1, previous surveys did not record any rare or threatened species. A total of 13 rare and threatened species have previously been recorded within a five kilometre radius of the reserve (VBA 2012). In addition, three rare and threatened butterfly species have previously been recorded within a 30-minute square grid incorporating the study site. All of these species are listed in Appendix 2.2.

The last record for the state significant Brush-tailed Phascogale was in the mid 1970's, however there are local reports of this threatened species. David Francis and Russell Best state that Brush-tailed Phascogales are present on a property approximately one kilometre to the south-west of the reserve. The fauna survey conducted in 1985 (MRSC 1985) placed a

question mark against Brush-tailed Phascogale at the reserve. Without further information as to the nature of the possible sighting, it is difficult to comment further on this partial record. Further surveys for this species are strongly recommended.

The nationally significant Regent Honeyeater has not been recorded within five kilometres of the reserve since the 1970's and may be regionally extinct.

Powerful Owls (state significant) have been recorded within four kilometres north-west of the reserve at Anzac Road, Mount Macedon. They are commonly heard and seen along the nearby Sandy Creek valley (R. Best, *pers. comm.)*. The reserve is most likely used by Powerful Owls as part of their large home range, which may be 1,000 ha in forest areas and up to nearly 5,000 ha in Box-Ironbark forest (Soderquist and Gibbons 2007). Signs that indicate habitat use by Powerful Owls include hooting calls made by both male and female, white wash or droppings beneath roosts, large pellets, and the tails of Sugar Gliders, cut neatly at the base, and dropped to the ground while the whole animal is consumed.

A number of other rare and threatened species recorded within five kilometres of the reserve are unlikely to occur due to lack of suitable habitat.

Mountain Galaxias have been recorded in Barringo Creek, however they are unlikely to occur at the reserve due to the pond formation of the waterway. Mountain Galaxias are usually found in clear flowing streams with a sand gravel or boulder bottom, where the introduced Rainbow Trout is absent.

Growling Grass Frog, Eastern Great Egret, Australasian Bittern and Hardhead require dams, lakes and wetlands and are not considered likely to occur at the reserve.

A Black Falcon was recorded in the area in 1975. This species is often confused with the dark morph of the Brown Falcon. Both are species of open areas and farmland and are therefore unlikely to utilise the reserve on a regular basis.

3.3 Geology

The lowland section of the reserve that include the gullies and Valley Grassy Forest sections are located on post-Newer Volcanic hillwash of the Neogene (Miocene) period. This hillwash is characterised by gravel, sand and silt deposits. The foothill areas that include the Heathy Dry Forest sections of the reserve are characterised by conglomerate, sandstone and siltstone of the Palaeozoic (Silurian) (Riddells Creek Landcare, n.d.).

3.4 Recreation

Originally purchased by Council for community recreation needs, the reserve provides both passive and active recreation opportunities for locals and visitors alike.

Active recreation activities are focused around the Pony Club, which is located close to the entrance on Shannons Road (see Figure 2). Based at the reserve since 1991 under a licence arrangement with Council, the Pony Club facility includes two ménage arenas (see Plate 26), ranger yards, a cross country course with various jumps and obstacles, club house and toilets (Fergus Shaw, *pers. comm*. 26/11/12). It was observed that the cross country course winds its way through bushland at the foothills of the reserve (see Plate 27, Figure 2). The Club organises events on 15-16 weekends per year, including 10 Pony Club rallies and the Macedon Cup (Fergus Shaw, pers.comm. 26/11/12).

Under the licence arrangement, the Pony Club has access to designated areas within the reserve (see Figure 2). Bollards and signage have been placed where pony access is restricted (see Plate 28).

Plate 26. One of two ménage arenas

Plate 27. Cross country course

Plate 28. Bollards mark the end of the Pony Club access into the reserve

Passive recreational activities within the reserve include bushwalking, bird watching and nature photography. Single track paths criss-cross the conservation area behind the Pony Club and provide good access across this area (Plate 29).

Passive recreational visitors must traverse the Pony Club grounds to access bushland areas behind the Pony Club. It is unknown if this access issue detracts passive recreational visitors to the reserve.

Opposite the reserve on Shannons Road is a Parks Victoria picnic area called Barringo Reserve. A car park, toilets and table settings are provided within a managed park area (see Plate 45). This park will likely attract local visitors and day trippers who may venture across the road into the reserve.

Plate 29. Informal track through Heathy Dry Forest

4 MANAGEMENT ISSUES, THREATS AND ACTIONS

4.1 Management Objectives

The key management objectives for the reserve are to:

- Maintain and secure the existing conservation values and biodiversity.
- Restore and enhance native vegetation communities and improve their resilience in the face of potential impacts.
- To mitigate and, where possible, eliminate identified threats to conservation values.
- Ensure adjacent use or development does not compromise the environmental values of the reserve.
- Increase community awareness of the ecological significance of Barringo Recreation Reserve.
- Promote the opportunities for low impact, passive recreation.
- Conduct and facilitate appropriate monitoring and continued assessment of the site.
- To monitor, identify and manage new threats that may arise.
- To protect in perpetuity the biodiversity values present.

4.2 Management Priorities

Lack of active weed management within the conservation area, together with senescence of native species through beetles and pathogens, pose the largest threat to the ecological values identified. Sections 4.3.1 to 4.3.3 details these threats and issues and propose management actions to mitigate their impacts. These issues must be addressed as a priority in combination with the other biodiversity management actions proposed below. Management actions, their timing and level of priority are summarised in the action check list in Appendix 5.

4.3 Biodiversity Management

4.3.1 Invasive Plants

Objective: *To reduce invasive species cover over time through integrated management techniques.*

Invasive plants (introduced plants and weeds) can be categorised into three broad groups within the reserve (listed in order of priority for control):

- **Agricultural grasses** – the largest and most serious threat to the values of the reserve is the widespread and continuing encroachment of Sweet Vernal-grass. This perennial tufted or rhizomatous grass can occupy a variety of habitats and is widespread within areas receiving high rainfall. The grass is allelopathic (produces chemicals that suppress the growth of surrounding plants) and therefore competes vigorously with indigenous ground flora. Sweet Vernal-grass can grow on shallow soils with poor fertility, and subsequently grows in conditions that normally do not favour other weed species. The high quality Heathy Dry Forest within the reserve is therefore at risk from Sweet Vernal-grass, particularly with current and future climate variability scenarios (see Section 4.4). Sweet Vernal-grass is a high threat in this environment as it can readily grow and out-compete indigenous vegetation in an otherwise weed-free landscape. The high quality of the ground flora vegetation is being directly impacted by the spread of this weed.

  Sweet Vernal-grass currently dominates the ground layer within most areas of Valley Grassy Forest where moisture and nutrient inputs are high. The grass is, however, slowly spreading upslope into higher quality Heathy Dry Forest areas (Plate 30) and this is a concern due to the tenacious nature of the species. High rainfall and moist conditions over the previous seasons has likely exacerbated its movement deeper into the reserve. Whilst the species is concentrated within gullies and nearby areas, small isolated patches of the grass were observed high up on the hills. These 'source' populations (see Figure 3) within high quality vegetation must be prioritised and targeted for control immediately if conservation values are to be retained. Large Quaking-grass *Briza maxima* was recorded in discrete populations high up on the top of the hills and should be incorporated into the program for Sweet Vernal-grass.

  Recommended management actions for the species are listed below under 'actions'.

Plate 30. Sweet Vernal-grass (left) encroaching into high quality Heathy Dry Forest (right)

- **High-threat and Noxious weeds** – these plants are listed as declared noxious weeds within the Port Phillip and Westernport catchment, are Weeds of National Significance (see Appendix 1.1) or are not noxious but pose a high-threat to values within the landscape. Species include those identified within the Weed Action Plan previously prepared for the reserve (Venn 2010b) together with additional and emerging species that have not previously been identified. Key weed priorities previously identified in Venn (2010b) are Blackberry, Gorse *Ulex europaeus*, Bluebell Creeper *Billardiera heterophylla* and Sallow Wattle *Acacia longifolia*. Sallow Wattle was not observed during the current assessment. New and emerging species which can pose a high-threat to values include Spanish Heath *Erica lusitanica*, English Broom *Cytisus scoparius*, Sweet Briar *Rosa rubiginosa* and Hawthorn *Crataegus monogyna* (see Figure 3 for locations).

Blackberry

Blackberry posed the greatest concern in 2010 with levels of cover within the Pony Club area considered moderately dense with entire sections of the western area becoming infested with Blackberry (Venn 2010b). Blackberry within the conservation area was restricted to isolated ground covers with larger patches in the gully (Venn 2010). Today, almost all the Blackberry within the Pony Club area has been successfully treated with minimal re-growth observed (Plate 31). The highest cover of living Blackberry now occurs within the gullies in the conservation area (Figure 3). Small isolated plants are scattered throughout (Plate 31, Figure 3). Blackberry cover has visibly increased within the conservation area since 2010.

Plate 31. Left- Treated Blackberry within Pony Club area; Right- Blackberry in conservation area

Gorse

One plant was previously identified within the Pony Club area in 2010, whilst a larger patch of 20 plants was present in the conservation area (Venn 2010b). Today, the same areas of Gorse remain however other small isolated patches are apparent (Plate 32, Figure 3).

Plate 32. Gorse along northern boundary

Bluebell Creeper

Individual plants were previously recorded in 2010 in the conservation area (Venn 2010b), however today their presence is greater as they were observed scattered throughout both the Pony Club and conservation areas (Figure 3). The source population of this shrub or climber occurs within an adjoining property to the north where large patches of the species were observed. This species has spread around the landscape since the last vegetation assessment in 2010 and have not been treated (Plate 33).

Plate 33. Bluebell Creeper

Spanish Heath

This is a new weed species previously not identified by Venn (2010b), nor the current custodians of the reserve. The species' stronghold for this tenacious shrub is within the far upper reaches of the western gully (Plate 34, Figure 3) and hundreds of new germinants were observed surrounding this parent population (Plate 34). The ability for this species to spread in this climate is of serious concern and its current somewhat contained distribution allows for easy removal with minimal resources. Action is required immediately to prevent this becoming a larger uncontrollable problem in the future. Large populations of this species were recorded upstream within the same gully in neighbouring property. This is likely the source population that needs to be addressed.

Plate 34. Spanish Heath

Sweet Briar and English Broom

These woody weeds were previously not identified within Venn (2010b), and although their occurrence within the reserve is sparse and isolated (Figure 3), treatments should be applied as the species' will create larger problems if populations increase.

Hawthorn

One mature shrub was recorded in the reserve (Figure 3), however a larger population was observed along the Barringo Road reserve to the west. These plants can easily be removed and should be targeted to avoid further encroachment.

- **Low-threat and isolated weed populations** – these include woody species or isolated plants that are either low in cover or easily eradicated, and include: Cootamundra Wattle *Acacia baileyana*, Cedar Wattle *Acacia elata*, White Sallow Wattle *Acacia floribunda*, Sticky Wattle *Acacia howittii* (Plate 35), Ovens Wattle *Acacia pravissima* (Plate 35), Agapanthus *Agapanthus praecox* subsp. *orientalis* and Radiata Pine *Pinus radiata* (Figure 3). Most of these species are present as isolated individuals or discrete small populations and can be readily removed.

Plate 35. Large mature population of Sticky Wattle near western gully (left); Ovens Wattle (right)

Management measures focused on these three broad weed groups should aim to reduce or eliminate their presence within the reserve. Weed control, together with other measures outlined in this plan, will help to increase native species cover, improve the overall ecological value and resilience of the reserve, strengthen this core area of vegetation and provide improved habitat for native fauna species. These outcomes can only be achieved through an on-going and long-term commitment by the land manager to reduce weed cover.

An integrated, planned and well-timed weed control response, in cooperation with adjoining landholders, is required to successfully eradicate or control targeted weed species. Varying weed control methods need to be utilised dependent on the ecology and morphology of the target species, the environment surrounding the target species and its current spread within the reserve. An integrated weed management approach includes methods such as:

- Manual weed control;
- Foliar spray with herbicide;
- Cut and paint or scrape and paint;
- Drill and fill;
- Slashing; and
- Fire.

Recommended weed control strategies, priorities and timing for target species are provided in Table 1 below. The locations of key weed species are indicated within Figure 3. It should be noted that actions targeting weeds within the reserve need to be implemented in accordance with the aims and objectives of the Macedon Ranges Shire Council's *Weed Management Strategy* (Macedon Ranges Shire Council 2009).

A Timeline and Checklist for Management Actions table (Appendix 5) provides a chronological seasonal guide to the actions listed below.

Actions (in order of priority)***:***

- *Implement a Sweet Vernal-grass control programme*. Whilst this species is widespread within the reserve, action should be taken to reduce the species' long-term cover and dispersal opportunities within the high quality Heathy Dry Forest areas. The species is concentrated within low-lying areas along gullies and throughout Valley Grassy Forest, however encroachment into Heathy Dry Forest is evident. This species has the ability to totally alter the composition of plant communities and is far more difficult to treat and control than listed noxious weeds. A high level of resources and a long-term commitment is required in order to successfully implement the following program:
    - The edges of Sweet Vernal-grass populations at the base of the Heathy Dry Forest hills should be treated each winter-spring with an appropriate grass-

selective herbicide using a spray shield to minimise impacts to other ground flora. This will minimise further dispersal into higher quality areas upslope (i.e. high quality Heathy Dry Forest, which may in time become engulfed by Sweet Vernal-grass if not controlled). This treatment should be implemented as a priority if funds are not available to carry out the additional works listed below.

  - Small outlying populations of the grass were recorded within Heathy Dry Forest and should be treated immediately to avoid direct dispersal into this high quality environment (Figure 3).

  - Treatment of Sweet Vernal-grass with a grass-selective herbicide in winter-spring within the contained area- gradually moving into the infestation from the outer edges upslope down to the gully below. A linear 'line' of treatment could be followed along the edges of the population, gradually moving inwards into the infestation itself. In sensitive areas supporting significant species, herbs or orchids, plants should be wick-wiped with herbicide.

  - Slash infestations to avoid flowering and seed dispersal where timing or funding does not allow for immediate herbicide control.

- *Consultation with private properties on northern and southern boundaries*. Private property to the north (north of conservation area and east of Pony Club area) should be contacted regarding the Bluebell Creeper entering the reserve from their source population. This species is an ornamental shrub or climber that has been planted widely in gardens and landholders may not be aware that it is classed as an environmental weed. Removing the source population will greatly aid weed control efforts in the reserve in the long-term. Similarly, Spanish Heath appears to be entering the reserve from the western gully on the property to the south.

- *Target the noxious weed Blackberry within the conservation area as a priority*. Larger source populations within the western gully should be prioritised for treatment, starting from the upstream end and moving down. Once larger patches have been treated, scattered or isolated plants further away from gullies should be targeted. In some cases, individual plants growing amongst native vegetation are still quite small and could be treated with more sensitive control measures such as the scrape and paint method (see Table 1 below). Control of Blackberry is a long term commitment which requires on-going and regular monitoring within their active period of spring-summer. Blackberry appears to have been successfully treated within the Pony Club area. This should be emulated within the higher quality conservation area.

- *Target other noxious weeds which support smaller populations: Gorse, Bluebell Creeper, Spanish Heath, Sweet Briar, English Broom and Hawthorn*. These species have been listed in order of priority for control. All populations of these species are

currently at manageable levels however if no active management begins in the short-term, their cover will increase as has already been observed from 2010 to present. Bluebell Creeper and Spanish Heath, in particular, have greatly increased their cover or have emerged as new pest species since 2010. Sweet Briar has been sprayed within the Pony Club area.

- *Target low-impact and isolated weed populations*. The target species include a variety of wattles (listed above), one Agapanthus and one Radiata Pine. These isolated and often discrete populations can easily be cut and painted with herbicide, or in the case of Agapanthus, chipped out entirely with a mattock.

General recommendations:

- Ensure weed control works are undertaken by qualified and experienced contractors with appropriate licenses and permits. They must be aware of the objectives of this management plan and should be sensitive to the reserve's ecological values. They must possess sound flora identification skills to limit the chance of off-target spot spraying or disturbance to native vegetation.

- Any use of herbicide must take into account the proximity of native vegetation and protective measures must be incorporated accordingly. Ensure the right type and ratio of herbicide is used for the conditions and vegetation to be targeted, avoiding off-target damage. Herbicide run-off should not be allowed to enter into any gully lines.

- Ensure weed control works are undertaken at the appropriate time of year in accordance with the life cycle of plants to be targeted, i.e. weed control works to be undertaken whilst plants are actively growing but before they set seed. Weed control works undertaken at inappropriate times of the year result in poor outcomes and an unnecessary excess of chemical residue entering the environment. Native species including orchids that appear for short periods can be used to plan the application periods of chemicals, with spraying to be avoided during these active times.

- Ensure noxious weed material is removed from the site without harming native vegetation and appropriately disposed of.

Table 1. Key weeds for control within reserve

Botanical Name	Common Name	Location	Timing	Control Method*	Comments
TREES & SHRUBS					
Pinus radiata	Radiata Pine	One plant observed. Figure 3	Any time	CP, DF	Logs can be retained on-site
Rosa rubiginosa	Sweet Briar	Scattered. Figure 3	Any time	CP, HP	Mature plants to be cut and painted. Younger plants can be hand pulled
Rubus fruticosus	Blackberry	Throughout. Figure 3	Sep-Dec	FS, SP	Larger plants need to be foliar sprayed. Individual plants amongst native vegetation should be scraped and painted to avoid damage to other plants. Dead canes to be retained
Crataegus monogyna	Hawthorn	One mature shrub (Figure 3)	Any time	CP	Easily removed
Acacia howittii	Sticky Wattle	One source population with scattered individuals elsewhere. Figure 3	Any time	CP	Care must be taken to avoid damaging surrounding native vegetation when trees are felled. Care to be taken when transporting debris as no vehicle access close to population
Acacia pravissima	Ovens Wattle	Scattered. Figure 3	Any time	CP	Care must be taken to avoid damaging surrounding native vegetation when trees are felled. Care to be taken when transporting debris as no vehicle access close to population
Acacia baileyana	Cootamundra Wattle	Isolated individuals. Figure 3	Any time	CP	Care must be taken to avoid damaging surrounding native vegetation when trees are felled. Care to be taken when transporting debris as no vehicle access close to population
Acacia elata and *Acacia floribunda*	Cedar Wattle and White Sallow Wattle	Isolated individuals. Figure 3	Any time	CP	Care must be taken to avoid damaging surrounding native vegetation when trees are felled. Care to be taken when transporting debris as no vehicle access close to population
Erica lusitanica	Spanish Heath	One population in western gully. Isolated individuals elsewhere. Figure 3	Any time	CP, SL, SS	Mature plants can be cut at base with both cut stump and peeled back bark painted with herbicide. If timing is critical, plants can be slashed before seed set with re-growth spot sprayed. Many germinants observed surrounding population which need to be spot sprayed
Ulex europaeus	Gorse	One source population. Scattered individuals. Figure 3	Any time	CP, FS	Population is small enough to cut and paint all plants and avoid damage to native vegetation
Cytisus scoparius	English Broom	Isolated plants. Figure 3	Any time	CP, HP	Minimal plants. Easily removed

HERBS & CLIMBERS					
Billardiera heterophylla	Bluebell Creeper	Scattered individuals. Figure 3	Spring-early summer	HP, CP, CH	Sever vines where they grow in native vegetation (i.e. grass trees) and leave to dry out. Stems can be cut and painted. Smaller plants can be hand pulled or chipped out ensuring all root fragments are removed
GRASSES					
Anthoxanthum odoratum	Sweet Vernal-grass	Widespread.	Winter-spring	SL, SS, WW	Slash where required before seed set. Otherwise spot spray, hand pull or wick-wipe amongst native vegetation. Areas to be prioritised as per actions listed above.

* HP = Hand Pull; CP = Cut and Paint with herbicide; SP = Scrape stem at base and paint with herbicide; CH = chip out with mattock; FS = Foliar spray; SS = Spot spray with herbicide; SL = Slash or Brushcut; DF = Drill and fill; WW = Wick-wipe

4.3.2 Fireblight Beetle

Objective: *To monitor wattle dieback within the reserve as a result of the Fireblight Beetle.*

The Fireblight Beetle is a native Australian beetle that has become a significant pest within wattle plantations and wattle re-growth after bushfire (Traralgon South and District Environmental Action 2012). Widespread defoliation of Black Wattle and Silver Wattle has occurred within re-growth areas affected by the Black Saturday bushfires of 2009. The beetle emerges in autumn to feed on foliage and lay eggs, whilst the larvae in turn feed on the foliage (Traralgon South and District Environmental Action 2012). Although the stronghold for this species is within the Kinglake area, the beetle has been observed in the Barrm Birrm area of Riddells Creek where defoliation of wattles is evident (see http://natureshare.org.au/observation/6652/). Black Wattles in Barrm Birrm have, however, shown signs of re-growth after defoliation (R. Best, *pers. comm.*).

Almost all stands of Black Wattle, Silver Wattle and the state significant Large-leaf Cinnamon-wattle within the reserve have been adversely affected by the beetle (see Plates 9 and 18). Cinnamon-wattles are not known to be susceptible to this beetle, however recent observations within the Riddells Creek area indicate that this species too is susceptible. Almost all Large-leaf Cinnamon-wattles within the reserve have succumbed to this beetle with most plants appearing to be dead with no new growth. Repeated defoliation can significantly lower growth rates and over consecutive seasons result in tree death (DPI 2008). This is a concern given the species is rare, is of state significance and there are very few plants within the reserve (see Figure 2). Black Wattle and Silver Wattle were interestingly not affected by this beetle within the Pony Club area. Wattle defoliation was only evident within younger stands within the conservation area.

In wattle plantations and bushfire re-growth areas, wattle dieback is often seen as an opportunity to open up the understorey and allow other species to flourish and survive (Traralgon South and District Environmental Action 2012); however wattle cover is quite low already within the reserve. Senescence of these species effectively reduces almost all of the mid-storey tree layer in the conservation area.

Treatment of the beetle is not recommended at this stage as the beetle may move on in time and the wattles may recover. Wattle populations should however be monitored during the beetle hibernation period over the hotter months to detect new plant growth. Observations by both council and local volunteers should be noted next autumn to spring to detect whether beetle defoliation is continuing. Defoliation by the Fireblight Beetle is a natural phenomenon, and although detrimental to the native wattles, treatment of the beetles should only be considered as a last resort after consecutive seasons of monitoring.

Actions:

- *Report any sightings of the Fireblight beetle and/or wattle defoliation to the Macedon Ranges Shire Council Environment Unit and local botanists and volunteers* who are contributing to the monitoring of the beetle through Nature Share (a locally produced database for documenting flora and fauna observations).

- *Continue to monitor wattle populations over consecutive seasons* with the assistance of local volunteers and botanists.

4.3.3 Phytophthora cinnamomi

Objective: *To contain and avoid the further spread of this pathogen within the reserve.*

Phytophthora cinnamomi (Pc) is an introduced water pathogen brought in by the early settlers in the 1800s (DSE 2008). It attacks the roots of susceptible plants and is spread through the movement of water, soil and plant material (DSE 2008). The pathogen spreads through the root systems of infected plants and kills off the plant's vascular system, thereby impeding its ability to absorb nutrients and water (DSE 2008). Symptoms are likened to drought stress or 'dieback' whereby the outer parts of the plant yellow and die first (DSE 2008). Heathy vegetation communities, such as Heathy Dry Forest, are the most susceptible to the pathogen and there is evidence that Pc is present within the reserve, most notably within the southern area of Heathy Dry Forest (Plate 36, Figure 2).

Plate 36. Evidence of Austral Grass-trees affected by Phytophthora within southern area of Heathy Dry Forest

Humans are the main cause of Pc spread through movement of infected plants or contaminated soil (DSE 2008). In the case of the Barringo Reserve, the pathogen has most likely been brought in via footwear of unknowing bushwalkers. It has appeared in the reserve only in the past 2 - 3 years, following the rain period which broke the long drought (R. Best, *pers. comm*.). The pathogen is most commonly spread through movement of soil and vehicle contamination, both of which do not apply to the infected area of reserve which has not been subject to soil stockpiling or vehicle access. The pathogen may have been spread by native animals (DSE 2008).

Once a site is infected, Pc spreads with the movement of water, therefore in the case of the reserve, the pathogen will likely continue to move downslope. Movement can occur across and upslope via root to root contact with nearby plants (DSE 2008). Over time, the pathogen can dramatically alter and reduce species composition and structure, which in turn affects the fauna assemblage (DSE 2008). The infected site within the reserve is surrounded by a patch of Sweet Vernal-grass (see Figure 3), which is not usual in these upper slopes of the reserve. Wilsons Promontory and Brisbane Ranges National Park are prominent parks well-known for their issues with the pathogen.

The aim within the reserve should be to contain the pathogen and minimise its movement through the landscape. As the pathogen has most likely been introduced through bushwalkers, access to infected sites should be restricted. Access to highly susceptible areas nearby should be avoided. The provision of educational signage and foot hygiene stations at the main entrance point to the reserve are key management requirements.

Actions:

- *Install educational signage at the main entrance point of reserve*. Although all reserve users, Pony Club members and bushwalkers alike use this entrance point, this will be the most effective point at which to provide information about the pathogen. Once bushwalkers walk through the front access gate, there are then various entrance points into the conservation area and installation of signage in other areas is not practical. Signage at the main entrance should include a brief introduction to the disease and how it's affecting the reserve. Signage should encourage walkers to avoid grass tree areas, and in particular areas where the pathogen exists. A photo of an infected grass tree on the sign could assist here.

- *Create more formal walking tracks through the reserve which avoid areas of grass trees*. At present, a large network of informal trails criss-cross the reserve, including areas with Pc. Walkers should be encouraged to use the trails near the gullies, or other tracks on the hill that skirt around the grass trees. There is presently no formal arrangement with walking trails. Small signs to denote walking trails could be considered to keep walkers on the track (see Section 4.6.2).

- *Establish footwear wash-down point at main entrance gate.* A running tap and trough are already at the main entrance gate. This creates an opportunity for a footwear wash-down station that provides running water, a scrubbing brush to scrub boots and spray bottles with methylated spirits to disinfectant footwear. This is a relatively simple set-up that would be easy and inexpensive to establish. A footwear wash-down station, together with appropriate signage, are the most effective and resourceful ways to combat Pc spread within the reserve. Signage should be placed at the wash-down point with instructions to remove soil and mud from boots with scrubbing brush and to spray boots with disinfectant both prior to and upon leaving the reserve. Refilling of spray bottles (which should have at least 70% methylated spirits) may need to be coordinated with local volunteers on a rotational basis.

- *Discuss the Phytophthora cinnamomi issue with Pony Club management* who may not be aware of its presence in the reserve. The pathogen is unlikely to be present within the Pony Club area and vegetation here is unlikely to be susceptible to the pathogen, however the Pony Club may be bringing in or moving soil, gravel and other materials which may be infected with the pathogen. Horse riders could be inadvertently spreading the pathogen as trails enter deeper into the reserve close to the conservation area. Education and liaison with the Pony Club, as well as other neighbours and volunteer groups, is essential.

- *Consider using a biodegradable fungicide to reduce the impact of Phytophthora cinnamomi.* Phosphonate (also called phosphite) is a biodegradable fungicide that reduces the impacts of Pc on host plants, however it will not eradicate it from a site (Suddaby and Liew 2008). Both infected plants and surrounding uninfected plants could be sprayed with the fungicide to minimise its spread. Further information can

be found at the Western Australian Dieback Working Group website: http://www.dwg.org.au/. This should only be applied once the above-mentioned management actions have been implemented.

4.3.4 Pest Animal Management

Objective: *Monitor the number of invasive pest animals within the reserve and adjoining properties, and reduce weeds which may provide den sites.*

Two European Hares were sighted at the reserve during the site visit in the Pony Club area. Hares have the potential to cause moderate environmental damage through the suppression of indigenous plant regeneration, competition with native wildlife for food resources, and providing a partial food source for foxes. No rabbits were sighted during the site visits, although they are numerous in the area (R. Best, *pers. comm.)*. Rabbits have the potential to cause serious environmental damage through the suppression of indigenous plant regeneration, competition with native wildlife for food resources, and by providing a ready food source for foxes.

No Red Fox scats were noted, however these animals are likely to be present. Foxes prey upon many smaller native animals and have been identified as a known or perceived threat to 34 indigenous fauna species in threat abatement plans provided under the EPBC Act. The European Hare and Red Fox, are declared Established Pest Animals under the *Catchment and Land Protection Act 1994* (CaLP Act). Under this Act, landowners must take all reasonable steps to control established pest animals on their property. Predation by foxes is listed as a Key Threatening Process under both the *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

No feral cats were recorded during site visits, however adjoining landholders have confirmed their presence within the reserve (C. Chapman, *pers. comm.)*. Cats are opportunistic predators – the current inventory of native species on which they are known to feed includes 64 mammals, 186 birds, 87 reptiles, at least 10 frogs and numerous invertebrates (Paton 1993). Observations in wildlife habitats throughout Victoria indicate that feral cats prey heavily on small indigenous mammals and birds, and it is possible that they may exert a detrimental effect on native carnivores by direct competition for food (Seebeck and Clunie 2004). Domestic cats, regardless of being fed or not, will prey on native animals. An average domestic cat has been estimated to kill at least 32 vertebrates per year (Paton 1991). Predation by cats is listed as a Threatening Process under both the FFG Act and the EPBC Act.

Fallow Deer are reported to be present in the reserve (D Francis, *pers.comm*. 2012), although no browsing damage or scats were observed during the site assessment. Deer have been recently spotted by members of the Riddells Creek Landcare at the Parks Victoria picnic area near the reserve and on Shannons Road, crossing from the Pony Club to the Macedon

Regional Park (R. Best, *pers. comm.).* Fallow Deer and other deer species such as the Sambar have the potential to cause moderate to severe environmental damage through the suppression of indigenous plant regeneration, spread of weed species and competition with native browsing mammals such as Swamp Wallabies. Reduction in biodiversity of native vegetation by Sambar (*Cervus unicolor*) is listed as a Potentially Threatening Process under the state FFG Act.

It should be noted that a Pest Animal Strategy is being developed by the Macedon Ranges Shire Council and is due for completion in 2014. Actions targeting pest animal management at the reserve will need to be conducted in accordance with this Strategy's aims and objectives.

Actions:

- *Implement weed control program as outlined in Section 4.3.1 of this management plan*. Works to target present and potential pest animal harbour to be implemented as per this management plan. This will reduce the cover of pest animal harbour and therefore the presence of pest animals within the wider area. Neighbouring landholders should be notified of these works and encouraged to undertake similar works on their own properties (see Section 4.7 – Adjoining Uses).

- *Monitor presence of Fallow Deer in the Reserve and any effects of grazing pressure, particularly on threatened species such as Hairy-leaf Triggerplant*. If necessary, deer numbers may need to be reduced via hunting. The Fallow Deer and other deer species are classified as game and protected fauna under the Victorian *Wildlife Act 1975*. They may be taken by licensed hunters under certain permit conditions, administered by the Department of Sustainability and Environment.

4.3.5 Native Fauna Management

Objective: *To retain habitat for the local macropod population whilst not compromising the values of the reserve.*

Macropod density at the reserve is moderate to high, depending on the use of the reserve by the surrounding macropod population. Eastern Grey Kangaroos use forested areas as secluded resting areas that are quiet and largely free from human disturbance. It is expected that Barringo Reserve is used by the surrounding Eastern Grey Kangaroo population at least some of the time, with movements in and out of the area to graze in the surrounding farmlands, especially to the south.

Grass specialists such as Eastern Grey Kangaroos do not pose a significant grazing threat to the ecological values of the reserve; it is likely they are grazing on the Sweet Vernal Grass that is found in large patches within the reserve.

General recommendations:

- Given the connectivity of the reserve with surrounding forest and open land, it is unlikely that macropod density will reach deleterious levels on site. Active control measures are therefore not advised at this stage.

4.3.6 Retention of large trees, logs and coarse woody debris

Objective: *To enhance habitat for hollow using fauna in Barringo reserve through the retention of large old trees and coarse woody debris in the Pony Club area*

Large old trees and logs are a reduced habitat component at Barringo Reserve. This has a particular impact on obligate hollow users such as Powerful Owls, Brushtail Possum, Sugar Gliders, parrots and other bird species such as Laughing Kookaburra and Sacred Kingfisher. Hollows, spouts, fissures and bark cover are required by smaller mammals such as microbats and antechinus as mating and maternity hollows (Gibbons and Lindenmayer 2002).

This assessment identified that many of the large old trees with hollows are located within the Pony Club area of the Reserve, and that the near natural areas of the reserve within the conservation area seemed to lack hollows despite the good number of large old trees.

Actions:

- *Retain all remaining large old trees and logs in the reserve as a high management priority*

- *If a hollow-bearing tree is deemed unsafe, then a number of actions can be undertaken before complete removal is carried out*. More than one independent arborist report will help the committee make a decision, as many arborists differ on safety and tree removal decisions. Partial removal, such as lopping branches, is preferable to total removal. Other management actions to reduce risk to Pony Club patrons include the establishment of fenced areas beneath the tree canopy, and diversion of paths or equipment to areas that are not beneath the tree canopy.

General recommendations:

- Nest boxes are often considered as a good solution to low numbers of hollow bearing trees, however the use of nest boxes as a management tool should be regarded with care and caution.

  Nest boxes require maintenance at least three times per year, ideally monthly. Their maintenance requires the use of a ladder which must be carried into the site, which may present problems due to the lack of direct access into the reserve. Adherence to

relevant regulations and procedures need to be followed when using a ladder, including Worksafe requirements. Volunteers must have access to people with carpentry skills, and expertise in feral bee and ant removal. Nest box programs are best carried out in conjunction with a TAFE, school or university so that there is a ready stream of able-bodied volunteers, and a long term commitment can be undertaken (Irvine and Bender 1997). Further options include contact with the Friends of Organ Pipes National Park who construct their own nest boxes, or volunteers with a local Men's Shed.

4.3.7 Fencing

Objective: *To delineate conservation areas whilst maintaining the safe passage of native wildlife.*

Delineation of the reserve from neighbouring properties should be prioritised to provide a focus for management activities and to ensure the use of adjacent properties does not impact on the reserve. There is presently no fence separating the property to the west of the reserve. To the east of the reserve, the fence is broken in sections and informal paths indicate horses or stock may be entering the reserve from this property (Plate 37).

Boundary fencing, where present, consists of metal star pickets and barbed wire, which is a hazard for wildlife, particularly kangaroos, wallabies and birds (Plate 38).

Plate 37. Broken fence, eastern boundary

Plate 38. Barbed wire fence

Actions:

- *Liaise with the adjoining landowner to the west to construct a wildlife-friendly fence line.*
- *Liaise with the landowner to the east to repair the fence line where it is broken.*
- *Modify fencing to adequately exclude grazing animals from the reserve and maintain safe passage of fauna*. The preference is to modify the existing fencing by retaining star pickets and replacing the barbed wire with a top strand that is visible to wildlife, i.e. white poly-piping or bright flags and tags for greater visibility. Barbed wire or electric fences should be avoided where possible as these can cause harm to native wildlife. Fence must be high enough and low enough to successfully exclude all grazing animals on adjoining properties, whilst ensuring ground dwelling animals can easily pass through (i.e. echidnas).

4.3.8 Habitat Connectivity

Objective: *Secure and broaden existing habitat corridors on public and private land and promote conservation programs to nearby landholders.*

The southern foothills of the Macedon Ranges rise up from the Plains Grassy Woodland that once dominated New Gisborne, Riddells Creek and surrounds. This mosaic landscape supported many different fauna species that bred, foraged and dispersed throughout their territories and beyond. Whilst the Macedon Ranges has retained a large portion of its

vegetation cover and has been afforded some degree of protection, the Plains Grassy Woodland has been largely cleared for grazing, cropping, equine and urbanisation. This clearing has resulted in isolated patches of native vegetation that remain in an otherwise cleared landscape around New Gisborne, Riddells Creek and beyond.

Native fauna species are less able to move across this ever changing landscape and are more vulnerable to local extinction. Local incidents of fire or disease can devastate populations that exist in remnant patches of vegetation, with species less able to recolonise areas they once occupied. With increasing urbanisation and smaller lot developments encroaching upon the reserve and the Macedon Ranges, there is an increased need for secure and healthy habitat corridors between Barringo Recreation Reserve and other reserves within the Macedon Ranges. It should be noted that Barringo Reserve, along with four private properties to the south that contain remnant vegetation, forms a critical habitat link between Conglomerate Reserve and Barrm Birrm to the south and the Macedon Regional Park to the north.

Improving and securing habitat connectivity on public and private land within the Macedon Ranges will link areas of remnant vegetation within an otherwise modified landscape. It will allow for the movement of wildlife between remnant patches of native vegetation and will provide useful fauna habitat, effectively reversing habitat fragmentation in the local area. Mammals, birds, reptiles, amphibians and invertebrates that would otherwise be isolated in one patch can utilise such connections to travel between patches with relative ease and safety. Habitat connectivity allows animals to respond to environmental variability, e.g. by enabling movement from areas of scarce resources to resource-rich areas. It allows animals to respond to population pressure, e.g. by movement from over-populated to under-populated areas, or to re-colonise areas after a population crash, preventing inbreeding and loss of genetic diversity and allowing the creation of a successful meta-population.

Private landholders on the foothills of the Macedon Ranges, especially around Shannons Road and Barringo Road, should be encouraged to revegetate cleared land and to enlarge existing vegetated patches and corridors. Opportunities for vegetation security arrangements with neighbouring landholders should be encouraged and promoted via Trust for Nature agreements or voluntary Land for Wildlife arrangements. This approach would increase the resistance and resilience of local flora and fauna communities, providing a stronger habitat link between the reserve and other core areas of remnant vegetation.

Actions:

- *Engage and encourage landholders located on Shannons and Barringo Road to revegetate cleared areas* and *to enlarge existing vegetated patches and corridors.*
- *Promote and engage local landholders to consider involvement in conservation programs such as Trust for Nature and Land for Wildlife.*

4.3.9 Further Surveys

A comprehensive flora species list has previously been compiled by local botanists and volunteers over a 30 year period (see Appendix 1.1). The species list, and other information about the reserve, can be viewed online at the Barringo Bushland website: http://home.vicnet.net.au/~barringo/welcome.htm.

Additional incidental records by council staff, contractors, botanists and volunteers will further add to our knowledge and the aims of this management plan.

Actions:

- *Encourage local council officers, ecologists, on-ground contractors and the community to identify and document new species*. Any new species records should be recorded and provided to local botanist David Francis via the Barringo Recreation Reserve website: http://home.vicnet.net.au/~barringo/welcome.htm, the Macedon Ranges Shire Council's Environment Unit, the Flora Information System (FIS) or any other relevant database systems available at the time. Local bushwalkers and naturalists use the site for recreation and should be encouraged to submit any new species information. The recording and submission of new species will increase our current knowledge of what is present within the reserve which will in turn further inform management practices.

- *Undertake a more comprehensive fauna survey of the reserve in spring to early summer*. For fauna, the methodology should include a general daytime survey, stag watching, spotlighting, the use of an Anabat detector and call playback and may include more intensive techniques (e.g. rock rolling, tiling, pit trapping, harp trapping, hair tubing and use of remote infrared cameras). Future bird surveys using the Birdlife Australia 20 minute two hectare search methodology would have the added bonus of including information on bird habitat.

- *Undertake a targeted survey for the state significant Brush-tailed Phascogale*. There are unconfirmed sightings of this species in the local area. A targeted survey over the spring-summer period using methods such as spotlighting, hair tubing and infrared cameras should be considered to confirm the species' presence/absence.

4.3.10 Protection covenant

Objective: *To protect in perpetuity the reserve's biodiversity values.*

Actions and initiatives that aim to improve the reserve's biodiversity values will be greatly assisted by covenant measures that protect the reserve in perpetuity. A Trust for Nature conservation covenant is an agreement between the landowner and Trust for Nature which

aims to permanently protect the natural values of the land. The covenants are registered on the Certificate of Title to the land and are legally binding. Costs may be incurred to Council in establishing the covenant.

Registration of a Trust for Nature covenant over Barringo Reserve was identified as a priority action (Action 4.3) in the Macedon Ranges Council's Natural Environment Strategy 2009. Councils that neighbour the Macedon Ranges have successfully utilised protection covenants to improve biodiversity outcomes on reserves, including Hume City Council's Evans Street Grassland and Melton Shire's Pinkerton Forest.

Actions:

- *Council to seek funding to enable a Trust for Nature covenant over the reserve.*

4.4 Climate Variability

Objective: *Implement an adaptive management framework that is cognisant of the potential impacts of climate change.*

A changing climate presents a major challenge for conservation planning and for the management of natural assets. Climate change is expected to have a wide range of impacts on species and ecosystems, including changes in species distribution and abundance, ecosystem processes, interactions between species and various threats to biodiversity (DCC 2008). Whilst presenting some unique challenges, the impacts of climate change can be considered yet another stressor that adds to and interacts with existing stressors that have already impacted upon our biodiversity assets (DCC 2008). Furthermore:

'*Without early and vigorous mitigation actions, climate change has the potential by the second half of the century to become an overwhelmingly profound and pervasive driver of change in Australia's biotic fabric, resulting in many extinctions and the formation of many novel ecosystems that might not provide the essential ecosystem services on which humans depend*' (DCC 2008, p. 3).

Predictions for the north central region of Victoria, which includes the Macedon Ranges, are for drier and hotter conditions under climate change scenarios. By 2030 a temperature increase of 0.9^{o}C is predicted, while a temperature increase of between 1.4^{o} C and 2.8^{o} C can be expected by 2070. Less rainfall events are likely with a total net reduction of 4% annually expected, and bushfire intensity and frequency will rise (State Government of Victoria 2011). In Victoria, climate change has already impacted on flora and fauna species, with preliminary research showing that habitat ranges are presently being affected (State Government of Victoria 2011).

Despite the increasing certainty of climate change predictions, it is not possible to precisely identify the impact on the reserve from a changing climate. There are, however, a number of likely threats and impacts that may arise such as:

- Species distribution and abundance: a reduction in the number of some indigenous flora and fauna species, while other indigenous species will disappear, be unaffected or prosper as temperatures rise and rainfall decreases;
- The appearance of new invasive flora and fauna species, while other pest species might prosper, disappear or be unaffected;
- An increasing vulnerability for aquatic species as rain events become less frequent but more severe; periodic inundation of the reserve to become less frequent but more severe;
- An increasing frequency and severity of fire events.

Consideration and reference to the objectives and outcomes of the Macedon Ranges Shire Council's *Climate Change Risk Assessment and Early Adaptation* project should be made in developing an adaptive management framework for the reserve.

Actions:

- *Implement an adaptive management framework that increases the resistance and resilience of the reserve to the impacts of climate change*. A robust management framework, action and monitoring plan that addresses potential impacts such as the appearance of invasive pest plants and animals, the decline of some indigenous plant and animal species and new fire regimes is required under a changing climate scenario. This management framework should recognise that natural assets are not static systems but undergo change, which is likely to accelerate under a warming climate.
- *Adopt a landscape scale approach to management of the reserve*. A landscape scale management approach provides better options for species distribution and abundance. The location of the reserve, within the Macedon Ranges, provides good management opportunities for connectivity and ecosystem resistance and resilience to extreme climatic events.
- *Integrate conservation aims and programs between the various authorities and community groups*. Measures by the Macedon Ranges Shire Council to improve the resilience of the reserve on a landscape scale approach requires effective cooperation, communication and integration with the various authorities and community groups including Parks Victoria, the catchment management authority and local Landcare/Friends groups.

4.5 Cultural Management

Objective: *Explore further partnership opportunities with traditional owners.*

The reserve is located within the traditional land of the Wurundjeri. Under the Victorian *Aboriginal Heritage Act 2006*, Aboriginal people are recognised as the primary guardians, keepers and knowledge holders of Aboriginal Cultural Heritage. At a local level, the Wurundjeri Tribe Land and Compensation Cultural Heritage Council (WTLaCCHC) is the registered Aboriginal party responsible for the management of Aboriginal Cultural Heritage. The WTLaCCHC provide advice on applications for Cultural Heritage Permits, decisions about Cultural Heritage Agreements and advice or application for interim or on-going Protection Declarations.

Sites of cultural heritage importance have been located within the Barringo Recreation Reserve.

Actions:

- *Through discussion with the Wurundjeri (WTLaCCHC), explore potential partnership approaches.* Partnership opportunities between the WTLaCCHC and Macedon Ranges Shire Council range from informal 'in principal' documents such as a memorandum of understanding or statement of intent through to formal, legally binding agreements such as a Cultural Heritage Agreement.

4.6 Recreation Management

Objective*:* *Limit recreational impacts to the reserve.*

Encourage low impact, passive recreation opportunities.

Opportunities for low impact engagement with the ecological values of the reserve should be encouraged. This engagement will appeal to bush walkers, bird watchers, photographers, naturalists and students of science. Such interactions are aimed at informing and educating visitors on the values of valley grassy and heathy dry forest communities. It is hoped that this engagement will increase visitor appreciation and, ultimately, awareness and action that results in the protection and conservation of these fragile and diminishing environmental assets.

Measures aimed at encouraging recreational access to the reserve need to be undertaken in a cautionary and sensitive manner. The presence of state significant species and a rich diversity of indigenous flora and fauna species require careful management to ensure these values are conserved and not damaged through visitor interaction.

4.6.1 Visitor impacts

***Objective**: limit impacts through the management of visitor activities.*

Visitor impacts vary in their significance across the reserve and are magnified in the Pony Club area (see below). Impacts to the conservation area are relatively minor and include track creation (see 4.6.2 below). A small amount of litter and dumped rubbish was observed (see Plate 39). It is unclear if mountain biking occurs within the reserve as there is no evidence of their activities. A single marked tree was located within the conservation area, and it is unclear if this marker has been placed for cyclists or horse riders (see Plate 40).

Plate 39. Rubbish in the conservation area

Plate 40. Tree marker

Pony Club

Designating a section of the reserve to the Pony Club has resulted in a range of obvious ecological impacts. Vegetation clearance, low indigenous species diversity, soil compaction and nutrient loadings have contributed to the relatively degraded space that the Pony Club occupies. Litter was observed in the licence area (Plate 41), as was the collection of logs and organic matter (Plate 42).

Despite these ecological impacts, the Pony Club area appears to be very well managed, as required under their licence conditions. Little to no evidence of horse dung was observed, and weeds such as Blackberry and Sweet Briar have been controlled and are less of a threat here than in the conservation area (see Section 4.3.1). Intrusion into the conservation area by riders is an obvious and on-going threat, however there was little evidence to confirm whether this was occurring or not.

Plate 41. Dumped rubbish in the licenced area

Plate 42. Gathered logs and organic matter

Actions:

- *Ensure the licence agreement with the Pony Club continues to be adhered to including exclusion of horse riders from the conservation area.*

4.6.2 Track access

Objectives: *Encourage low impact visitation through a centralised track system.*

The Heathy Dry Forest community within the conservation area is criss-crossed by a large number of narrow, informal tracks that are steep in sections. Use of these tracks by walkers causes soil compaction, erosion, trampling and the introduction of weed seed. As discussed in Section 4.3.3, walkers on these tracks are contributing to the spread of *Phytophthora cinnamomi* throughout the reserve.

Walkers and naturalists are, at present, requiring to walk through the Pony Club area to access the conservation area. An alternative access point and track into the conservation area should be planned for the reserve to avoid the need to walk through the Pony Club area.

Within the Pony Club area, larger formal tracks direct riders through bushland areas and the various obstacles that have been placed here. It was observed that a large number of smaller, informal tracks have been created by riders that contribute to the further erosion of bushland values within this area.

Actions:

- *Designate a formal walking track through the conservation area.* A formal track system would limit issues caused by erosion, soil compaction, trampling and the spread of *Phytophthora cinnamomi.* As discussed in Section 4.3.3, formal tracks should direct walkers away from grass trees, with signs directing visitors to stay on the track at all times.

- *Designate a formal walking track from the far eastern pedestrian access point (Figure 2) to the conservation area.* A formal track from this entrance point, beyond the bollards, to the conservation area will avoid the need for walkers and naturalists to walk through the Pony Club area.

- *Encourage the Pony Club to restrict the creation of new tracks and for riders to remain on the formal tracks.*

- *Due to the fragility of this environment, allow only pedestrian access to the conservation area of this reserve.*

4.6.3 Reserve entrance and parking

Objective: *Provide a weed free access point for passive recreational visitors*

The main entrance point into the reserve is from a locked gate on Shannons Road that leads vehicles towards the Pony Club (Plate 43). Vehicle access is restricted to Council staff and members of the Pony Club, who can park their vehicles in grassed areas within the reserve. Other visitors to the reserve must access via a walk in point which is located directly beside the Shannons Road entrance (Plate 44). Visitors arriving by vehicle are required to park at the picnic grounds opposite the reserve, where ample parking is provided (Plate 45).

Another vehicle entrance point and walk in point is located off Shannons Road (see Figure 2). This locked access point is utilised by Council staff and emergency vehicles, however regrowth around this access point suggests it is seldom used (Plate 46). A third access point is located at the far eastern extent of the reserve along Shannons Road (see Figure 2). This entrance is for pedestrians only.

Actions:

- *Ensure the entrance point is weed free and maintained*. This entrance point should be managed as part of the reserve's weed control and maintenance duties.
- *Encourage walkers and naturalists visiting the Grasstree Nature Conservation Area to enter the reserve via the far eastern pedestrian access point* (Figure 2). Signage could assist here to direct walkers to this entrance point.

Plate 43. Main entrance point off Shannons Road

Plate 44. Walk in access point

Plate 45. View across Shannons Road to parking area and picnic ground

Plate 46. Minor access point off Shannons Road

4.6.4 Signage

Objective: *Raise awareness amongst the local community of the reserve.*

Consider interpretive signage to inform visitors of the reserve's ecological and geological significance.

Signage at the Shannons Road entrance point welcomes both Pony Club members and walkers (Plate 47). An ageing and non-descript Barringo Reserve sign is located here (Plate 48), however no information is provided on the high biodiversity values present. A new street front sign at the entrance to the reserve could be placed to inform visitors of the reserve. Directional signage could be of use to walkers, who must first cross through the Pony Club grounds to access the conservation area. Further, Council should consider informing visitors of the reserve's ecological significance through interpretive signage at this entrance point.

Consideration should be given to placing signage where the conservation area commences. This signage would be placed alongside the track, and provide interpretive information on the reserve's flora, fauna and geology.

Actions:

- *Install a new street front sign at the entrance on Shannons Road.*
- *Install signage directing walkers and naturalists to the pedestrian access point in the east, which leads walkers to the conservation area.*

- *Consider placing interpretive signage at the Shannons Road entrance, eastern entrance and at the beginning of the conservation area*. Detailed information could be provided on the resident flora, fauna and geology. Visitors should be reminded to stay on the track at all times to prevent trampling and the spread of *Phytophthora*. If signage is installed, use non-fade material and ensure signage areas are weed free and maintained.

- *Inappropriate activities may be highlighted on signage*. Inappropriate activities within the reserve such as trail bikes, rubbish dumping, camping and seed and flower collecting should be noted. Access by foot only within the conservation area of the reserve should be noted on this signage.

Plate 47. Signage, Shannons Road entrance

Plate 48. Ageing signage, Shannons Road entrance

4.6.5 Low Impact, Passive Tourism

Objective: *Encourage low impact, passive tourism within the reserve.*

The biodiversity values present at the reserve heightens its appeal as a destination for low impact, nature-based tourists including bushwalkers, bird watchers, photographers, naturalists and students of science and education. Such interactions are aimed at informing and educating visitors on the values of this diverse vegetation community. It is hoped that this engagement will increase visitor appreciation and, ultimately, awareness and action that results in the protection and conservation of these fragile and diminishing environmental assets.

Promotion of the reserve and its conservation and geological values aligns with the vision of the Macedon Ranges as a destination that delivers excellence in nature-based tourism (Macedon Ranges Shire Council 2011). Nature based visitors may also deliver significant economic benefits to Gisborne and the wider Macedon region.

i. Bushwalkers, Birdwatchers, Photographers, Naturalists

Objective: *Increase the awareness of the reserve as a destination for bushwalkers, bird watchers, photographers and naturalists.*

Promotion of the reserve and its geology will attract low impact visitors interested in bushwalking, photography, bird watching and ecology.

Actions:

- *Promote the values of the reserve to bushwalkers and naturalists* via Council's website, Landcare email broadcast and other promotional methods to members of the Field Naturalists Club of Victoria, Indigenous Flora and Fauna Association, Birds Australia, Landcare, Nature Share etc.
- *Consider an interpretive 'walk and gawk' tour in cooperation with a local Landcare group.*

ii. Education and Science

Objective: *Increase the awareness of the reserve as a destination for science and education.*

Promotion of the reserve's ecological values will likely attract local secondary and regional tertiary institutions across a diverse field of studies that includes ecology, biology, botany, zoology and geology.

Actions:

- *Promote the values of the reserve to local and regional schools and tertiary institutions* via Council's website, Landcare email broadcast and other promotional methods.
- *Consider an interpretive 'walk and gawk' tour in cooperation with a local Landcare group.*

4.7 Adjoining Uses

Objective: *Ensure that adjoining properties do not impact on the reserve's biodiversity values.*

Engage landholders in measures to enhance and conserve the reserve.

4.7.1 Private property – Shannons and Barringo Road

To the north-east of the reserve on Shannons Road and to the west on Barringo Road are private properties that have been partially cleared of vegetation. Horses roam the property on Shannons Road and many of the properties in the surrounding area. Pasture grasses and other weeds were observed looking into these properties from the reserve. Bluebell Creeper is entering the reserve from the Shannons Road property (see Section 4.3.1).

4.7.2 Private property – east of the reserve

To the east of the reserve is a large property that is well vegetated and generally in excellent condition, however parts appear grazed given the quality of ground layer vegetation and absence of mid-storey. A number of entrance points into the reserve from this property were observed along a fence line that is broken in sections (see Section 4.3.7).

4.7.3 Private property – south of the reserve

To the south of the reserve are vegetated properties, some of which support Heathy Dry Forest communities in excellent condition. Spanish Heath was observed to be entering the reserve from at least one of the properties on the southern boundary along the gully line (see Section 4.3.1).

Actions:

- *Ensure the eastern boundary fence line is repaired where it is broken.*

- *Encourage adjoining landholders to undertake weed control measures on their property to prevent weeds spreading into the reserve* (see Section 4.3.1).

- *Encourage adjoining landholders to retain and improve remnant vegetation patches on their properties.*

- *Provide information to adjoining landholders on the values of the reserve and potential impacts from adjoining uses including invasive plants and animals.* This information could be provided via the production of a 'Good Neighbour' brochure (see Frankston City Council 'Good Bushland Neighbour' guide).

- *Ensure adjoining landholders know their responsibilities regarding pet animals to prevent them from entering the reserve at all times.*

- *Encourage adjoining landholders to sign up with local Landcare/Friends of group.*

- *Encourage adjoining landholders to act as champions for the reserve by reporting any illegal activities occurring within the reserve.*

4.8 Monitoring

Management actions implemented at the site and outlined within this management plan require monitoring to determine whether they are achieving their stated objectives. Monitoring should generally assess current site values, changes, issues, improvements and the appropriateness of management actions being undertaken. Monitoring should be undertaken by an experienced council officer, bushland management contractor, ecologist or Landcare/Friends of group members (under supervision) at biennial intervals, and should be undertaken within the same period (i.e. spring) of each monitoring year in order to provide comparative results. The following actions should be undertaken as part of the monitoring process, with results provided within a brief letter report to the Macedon Ranges Shire Council:

- *An assessment of management actions undertaken and outlined within this plan.* Objectives and actions outlined in this plan need to be formally assessed and documented. This should include whether they have/have not been undertaken on-site or are in progress, and how objectives are/are not being met. Appendix 5 summarises the plan's management actions and can be used as a check list.

- *Establishment of permanent 10m x 10m quadrats within the reserve.* Quadrats should be strategically placed within areas subject to weed control (i.e. Sweet Vernal-grass areas where they intersect with Heathy Dry Forest, gullies with Blackberry, Spanish Heath area). The number of quadrats required will need to be tailored to the area targeted for management, however, as a guide; a minimum of three quadrats should be established in the reserve. Areas selected should ideally represent differing reserve characteristics. The corners of these quadrats should be marked discreetly in

the ground (i.e. soil pins or nails with flagging tape) so that the quadrat can be identified on-site by the assessor without being visible to the wider community. Each corner is to be marked with a GPS with the coordinates provided to Council. Species cover and diversity is to be assessed within each quadrat using the Braun-Blanquet scale (or similar). The same quadrats should be assessed biennially to determine any changes, issues or improvements to the quadrat areas. The quadrats should be assessed prior to any works being undertaken in order to provide comparative results. The following needs to be assessed and recorded for each quadrat:

  - All introduced species to be recorded with their % cover;
  - All native species to be recorded with their % cover;
  - Bare earth % cover;
  - Height of tallest plant in quadrat;
  - List of native species successfully recruiting or regenerating;
  - Organic litter % cover;
  - Works undertaken (i.e. weed control).

- *Establishment of one photopoint within each quadrat*. One corner of each quadrat is to form a photopoint to visually document changes that occur in the reserve. The photopoint should aim to capture the landscape and ideally incorporate trees, shrubs and weeds. The photopoint GPS coordinate and direction of photo should be documented and provided to Council.

- *Assessment of areas infected with Phytophthora and their rate of spread*. The number of individual plants affected by the pathogen to be recorded, together with the estimated area (m x m) affected. General notes about plant or vegetation community condition should be taken. Photopoint to be established at each site. The same areas need to be monitored at regular intervals in order to provide comparative results. Additional management actions may need to be factored into this plan depending on monitoring results.

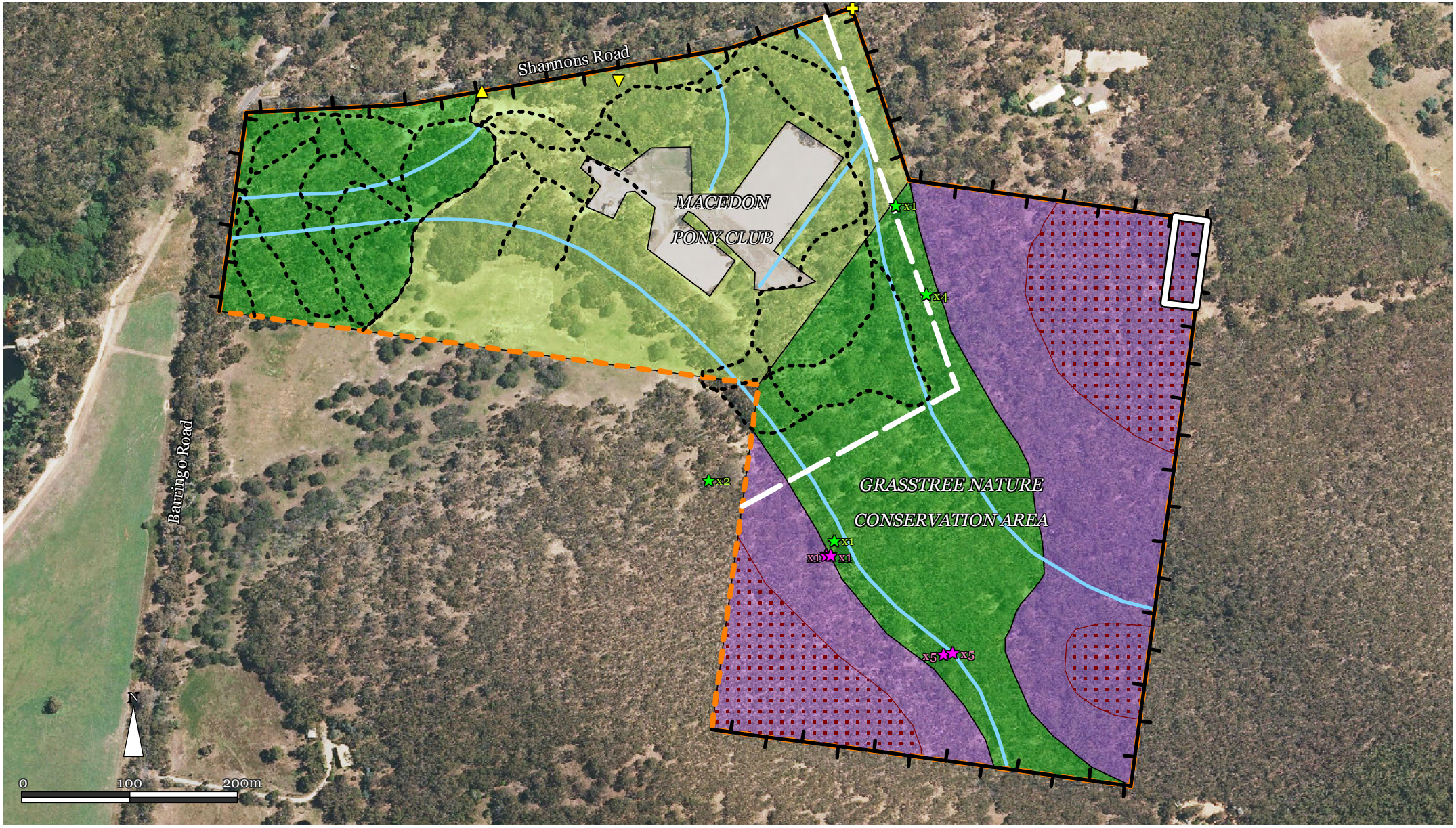
- *Further recommendations or changes to be provided* if the desired results or objectives are not on the way to being achieved.

- *Documentation of any changes or new threats to the reserve not outlined within this management plan.* Any new threats or changes need to be incorporated into this management plan as required.

- *This management plan is an adaptable document which needs to be reviewed and modified where necessary in accordance with these monitoring results.* New priorities, issues and management requirements that become apparent may need to

be factored into this plan. Monitoring methodology should be reviewed and changed if required.

Figure 2 - Features of Barringo Recreation Reserve



Heathy Dry Forest

Valley Grassy Forest

- Higher quality
- Lower quality

- Dwarf Silver Wattle (State significant)
- Large-leaf Cinnamon-wattle (State significant)
- Hairy-leaf Triggerplant (State significant)

- Main entrance
- Access gate
- Pedestrian access
- Offset site

- Horse riding trail
- Fence
- Gullies and drainage lines
- Reserve

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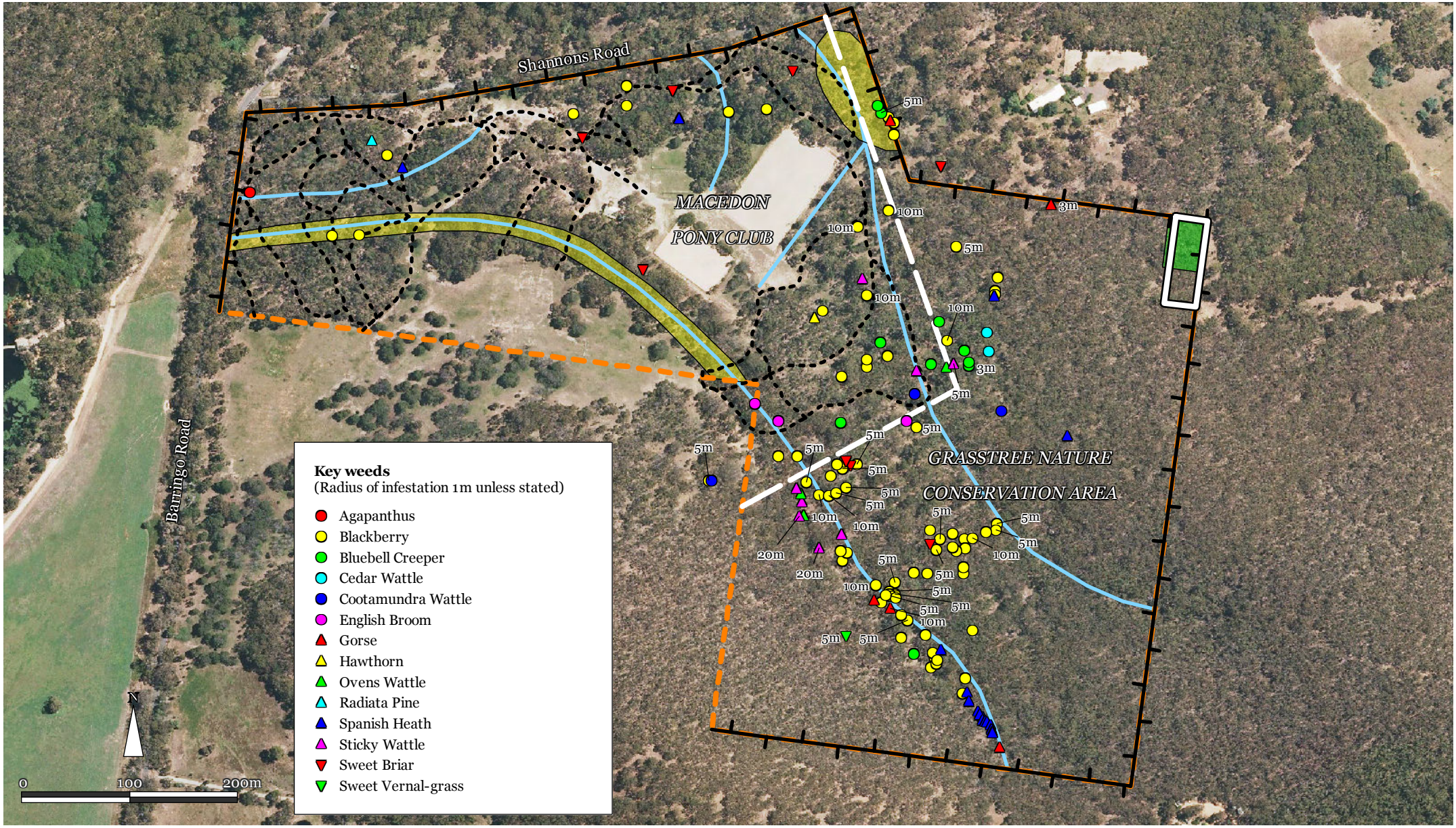
Note: Map features are approximate and are to be used as a guide only.

Figure 3 - Key Weeds within Barringo Recreation Reserve



Blackberry (Patch)

Sweet Vernal-grass (Patch)

Fence

Horse riding trail

Gullies and drainage lines

Offset site

Reserve

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Note: Map features are approximate and are to be used as a guide only.

Glossary

Arboreal: living in or among trees

Avifauna: birds of a specific region or period

Bioregion: an area representing a natural ecological community with characteristic flora, fauna, and environmental conditions

Boughs: a tree branch, especially a large or main branch

Canopy: the cover of foliage of a plant

Ecological Vegetation Class (EVC): groups of plants which commonly occur together within a recognisable environmental niche

Habitat: the environment in which a plant or animal lives

Herbs: a plant that produces a fleshy rather than woody stem

Indigenous: native to a particular area, not introduced

Insectivorous: feeding on insects

Invertebrates: lacking a backbone or spinal column, for example insects

Neogene: geological time period between 23.03 ± 0.05 to 2.58 million years ago. It follows the PaleogenePeriod and is followed by the Quaternary Period

Macropods: a marsupial family that includes kangaroos and wallabies

Miocene: geological epoch of the Neogene Period

Paleozoic: geological time period between 541 to 252.2 million years ago

Passive recreation: non-competitive and unorganised recreational activities

Prostrate: a plant that grows close to the ground

Remnant: areas or patches of vegetation that remains after land has been cleared or altered

Resilience: the ability of systems or landscapes to recover from disturbance events such as drought, floods and fire

Silurian: geological time period between 443.4 ± 1.5 to 419.2 ± 3.2 million years ago

Stag: dead standing trees

Vegetation community: different species of plants growing together in a particular habitat

Appendix 1.1 – Flora Species Recorded Within Reserve

Table A1.1. Flora species recorded within reserve – 1983-2012

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Acacia dealbata subsp. *dealbata*	Silver Wattle	Local
Acacia gunnii	Ploughshare Wattle	Regional
Acacia leprosa var. *uninervia* ***r***	Large-leaf Cinnamon-wattle	**State**
Acacia mearnsii	Black Wattle	Local
Acacia melanoxylon	Blackwood	Local
Acacia nano-dealbata ***r***	Dwarf Silver Wattle	**State**
Acacia verticillata subsp. *verticillata*	Prickly Moses	Local
Acaena novae-zelandiae	Bidgee-widgee	Local
Acaena ovina	Australian Sheep's Burr	Regional
Acrotriche prostrata	Trailing Ground-berry	Regional
Acrotriche serrulata	Honey-pots	Local
Allocasuarina littoralis	Black Sheoak	Regional
Amyema pendula subsp. *pendula*	Drooping Mistletoe	Local
Arthropodium strictum	Chocolate Lily	Local
Asperula scoparia subsp. *scoparia*	Prickly Woodruff	Regional
Astroloma humifusum	Cranberry Heath	Local
Austrostipa rudis	Veined Spear-grass	Regional
Billardiera mutabilis	Common Apple-berry	Regional
Bossiaea decumbens	Matted Bossiaea	Regional
Bossiaea prostrata	Creeping Bossiaea	Local
Brunonia australis	Blue Pincushion	Local
Bulbine bulbosa	Bulbine Lily	Regional
Burchardia umbellata	Milkmaids	Local
Bursaria spinosa subsp. *spinosa*	Sweet Bursaria	Local
Caesia parviflora	Pale Grass-lily	Regional
Caladenia carnea	Pink fingers	Regional
Caladenia clavigera	Plain-lip Spider-orchid	Regional
Calochilus robertsonii	Purplish Beard-orchid	Regional
Carex appressa	Tall Sedge	Local

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Cassinia aculeata	Common Cassinia	Local
Cassinia arcuata	Drooping Cassinia	Local
Cassinia longifolia	Shiny Cassinia	Regional
Cassytha glabella	Smooth Dodder-laurel	Regional
Chiloglottis valida	Common Bird-orchid	Regional
Clematis aristata	Mountain Clematis	Local
Comesperma volubile	Love Creeper	Regional
Coprosma quadrifida	Prickly Currant-bush	Regional
Coronidium scorpioides	Button Everlasting	Local
Corunastylis despectans	Sharp Midge-orchid	Regional
Cotula australis	Common Cotula	Regional
Crassula decumbens	Spreading Crassula	Regional
Crassula sieberiana	Sieber Crassula	Regional
Cymbonotus preissianus	Austral Bear's-ears	Local
Daviesia leptophylla	Narrow-leaf Bitter-pea	Local
Deyeuxia quadriseta	Reed Bent-grass	Regional
Dianella admixta	Black-anther Flax-lily	Local
Dianella tasmanica	Tasman Flax-lily	Local
Dichondra repens	Kidney-weed	Local
Dillwynia cinerascens	Grey Parrot-pea	Local
Dillwynia sericea	Showy Parrot-pea	Local
Dipodium roseum	Pink Hyacinth-orchid	Regional
Diuris pardina	Leopard Orchid	Regional
Diuris sulphurea	Tiger Orchid	Regional
Drosera peltata	Tall Sundew	Local
Epacris impressa var. *impressa*	Common Heath	Local
Eucalyptus dives	Broad-leaved Peppermint	Local
Eucalyptus goniocalyx	Bundy	Local
Eucalyptus obliqua	Messmate Stringybark	Local
Eucalyptus ovata var. *ovata*	Swamp Gum	Local
Eucalyptus radiata subsp. *radiata*	Narrow-leaf Peppermint	Local
Eucalyptus viminalis subsp. *viminalis*	Manna Gum	Local
Euchiton japonicus	Creeping Cudweed	Local

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Exocarpos cupressiformis	Cherry Ballart	Local
Geranium solanderi	Austral Cranesbill	Local
Glossodia major	Wax-lip Orchid	Regional
Glycine clandestina	Twining Glycine	Local
Gonocarpus humilis	Shade Raspwort	Regional
Gonocarpus tetragynus	Common Raspwort	Local
Goodenia ovata	Hop Goodenia	Regional
Grevillea alpina	Cat's Claw Grevillea	Regional
Hakea decurrens subsp. *physocarpa*	Bushy Needlewood	Regional
Hardenbergia violacea	Purple Coral-pea	Local
Helichrysum luteoalbum	Jersey Cudweed	Regional
Hovea heterophylla	Common Hovea	Local
Hydrocotyle laxiflora	Stinking Pennywort	Local
Hypericum gramineum	Small St John's Wort	Local
Isolepis fluitans	Floating Club-sedge	Regional
Isolepis marginata	Little Club-rush	Regional
Juncus holoschoenus	Joint-leaf Rush	Regional
Juncus pallidus	Pale Rush	Local
Juncus planifolius	Broad-leaf Rush	Regional
Juncus subsecundus	Finger Rush	Local
Kennedia prostrata	Running Postman	Local
Lagenophora stipitata	Common Bottle-daisy	Local
Lepidosperma laterale	Variable Sword-sedge	Local
Leptorhynchos tenuifolius	Wiry Buttons	Regional
Leptospermum continentale	Prickly Tea-tree	Local
Leucopogon virgatus	Common Beard-heath	Local
Lomandra filiformis subsp. *coriacea*	Wattle Mat-rush	Local
Lomandra longifolia subsp. *exilis*	Cluster-headed Mat-rush	Local
Luzula meridionalis var. *flaccida*	Common Woodrush	Local
Lythrum hyssopifolium	Small Loosestrife	Regional
Microlaena stipoides var. *stipoides*	Weeping Grass	Local
Microseris sp. 3	Yam-daisy	Regional
Microtis unifolia	Common Onion-orchid	Regional

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Monotoca scoparia	Prickly Broom-heath	Local
Montia australasica	White Purslane	Regional
Myriophyllum crispatum	Upright Water-milfoil	Regional
Olearia argophylla	Musk Daisy-bush	Regional
Olearia lirata	Snow Daisy-bush	Regional
Olearia erubescens	Moth Daisy-bush	Regional
Opercularia ovata	Broad-leaf Stinkweed	Local
Oxalis perennans	Grassland Wood-sorrel	Local
Ozothamnus ferrugineus	Tree Everlasting	Regional
Ozothamnus obcordatus	Grey Everlasting	Local
Pimelea humilis	Common Rice-flower	Local
Pimelea linifolia	Slender Rice-flower	Local
Plantago varia	Variable Plantain	Local
Platylobium montanum subsp. *prostratum*	Prostrate Mountain Flat-pea	Regional
Poa sieberiana	Grey Tussock-grass	Local
Podolobium procumbens	Trailing Shaggy-pea	Regional
Polytrichum juniperinum	"Juniper Moss"	Regional
Pomaderris aspera	Hazel Pomaderris	Regional
Pomaderris racemosa	Cluster Pomaderris	Regional
Poranthera microphylla	Small Poranthera	Local
Prostanthera lasianthos	Victorian Christmas-bush	Regional
Pteridium esculentum	Austral Bracken	Local
Pterostylis melagramma	Tall Greenhood	Regional
Pterostylis nutans	Nodding Greenhood	Regional
Pultenaea daphnoides	Large-leaf Bush-pea	Local
Pultenaea humilis	Dwarf Bush-pea	Local
Rytidosperma caespitosum	Common Wallaby-grass	Local
Rytidosperma erianthum	Hill Wallaby-grass	Regional
Rytidosperma pallidum	Silvertop Wallaby-grass	Local
Rhytidosporum procumbens	White Marianth	Regional
Rumex brownii	Slender Dock	Local
Schoenus apogon	Common Bog-sedge	Local

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Senecio linearifolius var. *linearifolius*	Fireweed Groundsel	Regional
Senecio microbasis **r**	Slender Fireweed	**State**
Senecio minimus	Shrubby Fireweed	Local
Senecio phelleus	Fireweed	Local
Solanum laciniatum	Large Kangaroo Apple	Regional
Stackhousia mongyna	Creamy Stackhousia	Regional
Stellaria pungens	Prickly Starwort	Local
Stuartina muelleri	Spoon Cudweed	Regional
Stylidium armeria subsp. *armeria*	Common Trigger-plant	Regional
Stylidium armeria subsp. *pilosifolium* ***e, FFG Act***	Hairy-leaved Trigger-plant	**State**
Thelymitra carnea	Pink Sun-orchid	Regional
Thelymitra ixioides	Spotted Sun-orchid	Regional
Thelymitra pauciflora	Slender Sun-orchid	Regional
Themeda triandra	Kangaroo Grass	Local
Thysanotus patersonii	Twining Fringe-lily	Local
Thysanotus tuberosus	Common Fringe-lily	Regional
Triglochin procera	Water Ribbons	Regional
Veronica gracilis	Slender Speedwell	Regional
Veronica plebeia	Trailing Speedwell	Regional
Viola betonicifolia	Showy Violet	Regional
Viola hederacea	Ivy-leaf Violet	Local
Wahlenbergia stricta subsp. *stricta*	Tall Bluebell	Local
Wurmbea dioica	Common Early Nancy	Local
Xanthorrhoea australis	Austral Grass-tree	Local
Xerochrysum viscosum	Shiny Everlasting	Regional

e = endangered in Victoria (DSE 2005), FFG Act = listed as threatened under Victoria's *Flora and Fauna Guarantee Act 1988*

r = rare in Victoria (DSE 2005)

INTRODUCED SPECIES		
Botanical Name	**Common Name**	**Declared Noxious Weed ***
Acacia baileyana #	Cootamundra Wattle	-
Acacia elata #	Cedar Wattle	-

INTRODUCED SPECIES		
Botanical Name	**Common Name**	**Declared Noxious Weed ***
Acacia howittii #	Sticky Wattle	-
Acacia floribunda #	White Sallow Wattle	-
Acacia pravissima #	Ovens Wattle	-
Acetosella vulgaris	Sheep Sorrel	-
Agapanthus praecox subsp. *orientalis*	Agapanthus	-
Agrostis capillaris	Brown-top Bent	-
Aira spp.	Hair Grass	-
Anthoxanthum odoratum	Sweet Vernal-grass	-
Billardiera heterophylla	Bluebell Creeper	-
Briza maxima	Large Quaking-grass	-
Briza minor	Lesser Quaking-grass	-
Carduus tenuiflorus	Winged Slender-thistle	Regionally controlled
Centaurium spp.	Centaury	-
Cirsium vulgare	Spear Thistle	Regionally controlled
Conyza spp.	Fleabane	-
Crataegus monogyna	Hawthorn	Regionally controlled
Cytisus scoparius	English Broom	Regionally controlled, WON
Ehrharta erecta var. *erecta*	Panic Veldt-grass	-
Erica lusitanica	Spanish Heath	-
Galium aparine	Cleavers	-
Genista monspessulana	Montpellier Broom	Regionally controlled, WON
Hypochaeris glabra	Smooth Cat's-ear	-
Hypochaeris radicata	Flatweed	-
Medicago polymorpha	Burr Medic	-
Pinus radiata	Radiata Pine	-
Plantago lanceolata	Ribwort	-
Rosa rubiginosa	Sweet Briar	Regionally controlled
Rubus fruticosus spp. agg.	Blackberry	Regionally controlled, WON
Ulex europaeus	Gorse	Regionally controlled, WON

= Native to Victoria or Australia but not indigenous to the local area

*= Declared noxious weed within the Port Phillip and Westernport catchment under the *Catchment and Land Protection Act 1994 (*CaLP Act*)*. Declared noxious weeds cause environmental or economic harm or have the potential to cause such harm (DPI 2012).

Noxious weeds are categorised into one of four categories:
State Prohibited Weeds: These invasive plants either do not occur in Victoria but pose a significant threat if they invade, or are present, pose a serious threat and can reasonably be expected to be eradicated. If present, infestations of a State prohibited weed are relatively small.

Regionally Prohibited Weeds: Regionally prohibited weeds are not widely distributed in a region but are capable of spreading further. It is reasonable to expect that they can be eradicated from a region and they must be managed with that goal. Land owners, including public authorities responsible for crown land management, must take all reasonable steps to eradicate regionally prohibited weeds on their land.

Regionally Controlled Weeds: These invasive plants are usually widespread in a region. To prevent their spread, ongoing control measures are required. Land owners have the responsibility to take all reasonable steps to prevent the growth and spread of regionally controlled weeds on their land.

Restricted: This category includes plants that pose an unacceptable risk of spreading in this State and are a serious threat to another State or Territory of Australia. Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited.

WON: Weed of National Significance

Appendix 1.2 – Significant Flora Species Previously Recorded in Local Area

Key

EPBC Act - *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
CR – Critically endangered
EN – Endangered
VU – Vulnerable
K – Poorly known

FFG Act - *Flora and Fauna Guarantee Act 1988* (Victoria)
L – Listed on the *FFG Act*

DSE - Advisory List of Threatened Flora in Victoria (DSE 2005)
x – Extinct
e – Endangered
v – Vulnerable
r – Rare
k – Poorly known

= Information derived from Flora Information System (FIS 2012)
* = EPBC Act Protected Matters Report (DSEWPC 2012)

Table A1.2. Significant flora species previously recorded within 5 kilometres of the reserve

Botanical Name	Common Name	Total number of records#	EPBC Act 1999	FFG Act 1988	DSE
NATIONALLY SIGNIFICANT SPECIES					
Ballantinia antipoda	Southern Shepherd's Purse	1	EN	L	e
STATE SIGNIFICANT SPECIES					
Geranium sp. 1	Large-flower Crane's-bill	2	-	-	e
Acacia leprosa var. *graveolens*	Common Cinnamon-wattle	1	-	-	k
Acacia leprosa var. *uninervia*	Large-leaf Cinnamon-wattle	1	-	-	r
Acacia nano-dealbata	Dwarf Silver Wattle	16	-	-	r
Calochilus imberbis	Naked Beard-orchid	3	-	-	r
Gentianella polysperes	Early Forest-gentian	1	-	-	r
Microseris scapigera s.s.	Plains Yam-daisy	1	-	-	v
Stylidium armeria subsp. *pilosifolium*	Hairy-leaf Triggerplant	6	-	L	e

Appendix 2.1 – Fauna Species Recorded within Reserve

Table A2.1. Fauna species recorded within Barringo Recreation Reserve

Data from five sources: A – current assessment conducted in November 2012. **B –** information from Barringo website, various dates (incorporates Parks Victoria land to the north)**. V** – Survey results from Blair Venn (2010a)**. M** – MRSC mammal survey 1985. Local reports from D Francis and R Best are detailed in the comments section of the table.

* denotes exotic or introduced species.

S – species seen. H – species heard. SC – scat observed only. HT – hair tube. X – no information supplied re type of sighting. 0 – species not observed. na – species not targeted during survey

Note: All species recorded in this table are classified as Common or Least Concern in State and Commonwealth legislation, with the exception of the Brush-tailed Phascogale, see comments for listing detail.

Common name	Species Name	A 2012	B 1985-present	V 2010	M 1985	Comments
BIRDS						
Black Swan	*Cygnus atratus*	0	X	0	na	
Pacific Black Duck	*Anas superciliosa*	0	X	0	na	
Australian Wood Duck	*Chenonetta jubata*	0	X	0	na	
Straw-necked Ibis	*Threskiornis spinicollis*	0	X	0	na	
Wedge-tailed Eagle	*Aquila audax*	0	X	0	na	
Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*	0	X	0	na	
Sulphur-crested Cockatoo	*Cacatua galerita*	S	X	X	na	
Long-billed Corella	*Cacatua tenuirostris*	S	-	0	na	

Common name	Species Name	A 2012	B 1985-present	V 2010	M 1985	Comments
Galah	*Cactua roseicapilla*	0	X	0	na	
Gang Gang Cockatoo	*Callocephalon fimbriatum*	0	X	0	na	
Crimson Rosella	*Platycercus elegans*	S	X	X	na	
Eastern Rosella	*Platycercus eximius*	0	X	0	na	
Common Bronzewing	*Phaps chalcoptera*	S	0	X	na	
Crested Pigeon	*Ocyphaps lophotes*	0	0	X	na	
Laughing Kookaburra	*Dacelo novaeguineae*	S	X	X	na	
Sacred Kingfisher	*Todirampus sanctus*	0	X	0	na	
Masked Lapwing	*Vanellus miles*	H	0	X	na	Heard during spotlighting
Southern Boobook	*Ninox novaeseelandiae*	S	X	X	na	Observed during spotlighting
Fan-tailed Cuckoo	*Cacomantis flabelliformus*	S	X	0	na	
Pallid Cuckoo	*Cuculus pallidus*	0	X	0	na	
Tawny Frogmouth	*Podargus strigoides*	S	X	0	na	Observed during spotlighting
Grey Fantail	*Rhipidura fuliginosa*	S	X	0	na	
Willie Wagtail	*Rhipidura leucophrys*	0	0	0	na	
Satin Flycatcher	*Myiagra cyanoleuca*	0	X	0	na	
Superb Fairy-wren	*Malurus cyaneus*	S	X	0	na	
White-browed Scrubwren	*Sericornis frontalis*	0	X	X	na	
Scarlet Robin	*Petroica boodang*	S	X	X	na	
Eastern Yellow Robin	*Eopsaltria australis*	0	X	0	na	
Rufous Whistler	*Pachycephala rufiventris*	S	X	X	na	
Golden Whistler	*Pachycephala pectoralis*	0	X	0	na	

Common name	Species Name	A 2012	B 1985-present	V 2010	M 1985	Comments
Crested Shrike-tit	*Falcunculus frontatus*	0	X	0	na	
Grey Shrike-thrush	*Colluricincla harmonica*	S	X	X	na	
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	S	0	0	na	
Spotted Pardalote	*Pardalotus punctatus*	S	X	0	na	
Striated Pardalote	*Pardalotus striatus*	S	X	0	na	
Striated Thornbill	*Acanthiza lineata*	S	X	0	na	
Brown Thornbill	*Acanthiza pusilla*	S	0	X	na	
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	0	X	0	na	
Yellow Thornbill	*Acanthiza nana*	0	0	X	na	5 individuals seen in HDF with very few wattles – possibly Striated Thornbill
Weebill	*Smicrornis brevirostris*	0	0	X	na	8 individuals seen in VGF and HDF – unusual habitat and numbers for Weebill– possibly Striated Thornbill
White-throated Treecreeper	*Cormobates leucophaea*	S	X	X	na	
Eastern Spinebill	*Acanthorhynchus tenuirostris*	0	X	0	na	
White-naped Honeyeater	*Melithriptus lunatus*	S	X	X	na	
Crescent Honeyeater	*Phylodonyis pyrrhoptera*	0	X	X	na	
Yellow-faced Honeyeater	*Lichenostomus chrysops*	S	X	0	na	
Red Wattlebird	*Anthochaera carunculata*	S	X	X	na	
New Holland Honeyeater	*Phylidonyris novaehollandiae*	0	X	0	na	
White-winged Chough	*Corcorax melanorhamphos*	S	X	X	na	
Magpie-lark	*Grallina cyanoleuca*	0	X	X	na	
Mistletoebird	*Dicaeum hirundinaceum*	0	X	0	na	

Common name	Species Name	A 2012	B 1985-present	V 2010	M 1985	Comments
Red-browed Finch	*Neochmia temporalis*	0	X	0	na	
Grey Currawong	*Strepera versicolor*	H	X	X	na	
Pied Currawong	*Strepera graculina*	0	X	0	na	
Australian Magpie	*Gymnorhina tibicens*	S	X	X	na	
Little Raven	*Corvus mellori*	S	X	0	na	
Australian Raven	*Corvus coronoides*	0	X	0	na	
Silvereye	*Zosterops lateralis*	0	X	0	na	
Bassian Thrush	*Zoothera lunulata*	0	X	0	na	
Common Blackbird*	*Turdus merula*	S	0	0	na	Observed in Valley Grassy Forest Gully vegetation
MAMMALS						
Eastern Grey Kangaroo	*Macropus giganteus*	S	S	S	X	
Black Wallaby	*Wallabia bicolour*	0	S	0	X	
Koala	*Phascolarctos cinereus*	S	S	SC	X	
Common Ringtail Possum	*Pseudocheirus peregrinus*	S	S	S	X	
Common Brushtail Possum	*Trichosurus vulpecula*	0	S	S	0	
Common Wombat	*Vombatus ursinus*	0	0	SC	X	
Brush-tailed Phascogale	*Phascogale tapoatafa*					Local reports from D Francis and R Best indicate sightings within the last five years on a property neighbouring Barringo Reserve. This species is Listed under the *Flora and Fauna Guarantee Act 1988* and is classified as Vulnerable.
Sugar Glider	*Petaurus breviceps*	0	S	S	0	
Greater Glider	*Petauroides volans*	0	0	0	X	Local reports from D Francis and R Best indicate sightings within the last five years in Barringo Valley and at top of

Common name	Species Name	A 2012	B 1985-present	V 2010	M 1985	Comments
						ranges.
Short-beaked Echidna	*Tachyglossus aculeatus*	S	S	SC	X	One seen inside reserve during current assessment. One also seen outside reserve, approx 10 m from eastern boundary
Agile Antechinus	*Antechinus agilis*	0	HT	X	X	
Bush Rat	*Rattus fuscipes*	0	0	0	X	
Feral Goat*	*Capra hircus*	0	na	0	X	
Brown Hare*	*Lepus capensis*	S	na	X	0	Pony club
Fallow Deer*	*Dama dama*					D Francis and R Best report that Fallow Deer are present in Barringo Reserve and surrounding areas.
European Rabbit*	*Oryctolagus cuniculus*	SC	na	X	0	Pony club
Red Fox*	*Vulpes vulpes*	0	na	X	X	
REPTILES						
Blotched Blue-tongue Lizard	*Tiliqua nigrolutea*	S	na	na	na	
Frog species	-	S	na	na	na	Tadpoles present in one of the small “chain of ponds” formations in the gully area.
INVERTEBRATES						
Satin-green Forester Moth	*Pollanisus viridipulverulenta*	S	na	na	na	
Bright Shield-skipper	*Signeta flammetata*	S	na	na	na	
Common Brown Butterfly	*Heteronympha merope*	S	na	na	na	

Appendix 2.2 – Significant Fauna Species Previously Recorded Within the Local Area

Table A2.2. Significant fauna species previously recorded within a 5 kilometre radius of the reserve

Sources used to determine species status:

EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FFG	*Flora and Fauna Guarantee Act 1988* (Victoria)
DSE	*Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007) and *Advisory List of Threatened Invertebrate Fauna in Victoria* (DSE 2009)

Conservation Status:

EX	Extinct
RX	Regionally Extinct
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
RA	Rare
DD	Data Deficient (Insufficiently or poorly known)
NT	Near Threatened
LR (NT)	Lower Risk (Near Threatened)
L	Listed as threatened under FFG Act

Common Name	Scientific Name	Most Recent Record (VBA)	Location (VBA)	Conservation Status		
				EPBC	FFG	DSE
NATIONAL SIGNIFICANCE						
Regent Honeyeater	*Anthochaera phrygia*	1/12/1975	Base of Mt Macedon	EN	CR	L
Growling Grass Frog	*Litoria raniformis*	17/09/1988	2km north of Dixon Field	EN	VU	L
STATE SIGNIFICANCE						
Powerful Owl	*Ninox strenua*	24/08/2008	Mt Macedon, Anzac Rd	-	L	VU
Brown Treecreeper	*Climacteris picumnus victoriae*	1/2/1977	Australian Counter Disaster College	-	-	NT
Mountain Galaxias	*Galaxias olidus*	26/07/2001	Off Wooling Rd, East of Macedon	-	L	VU
Brush-tailed Phascogale	*Phascogale tapoatafa tapoatafa*	04/01/1969	5 degree block containing Riddell	-	L	VU
Black Falcon	*Falco subniger*	1/12/1975	Australian Counter Disaster College	-	-	VU
Eastern Great Egret	*Ardea modesta*	26/12/1979	Australian Counter Disaster College	-	L	VU
Hardhead	*Aythya australis*	8/01/1978	Australian Counter Disaster College	-	-	VU
Australasian Bittern	*Botaurus poiciloptilus*	1/12/1975	Australian Counter Disaster College	-	L	EN

Common Name	Scientific Name	Most Recent Record (VBA)	Location (VBA)	Conservation Status		
				EPBC	FFG	DSE
Little Egret	*Egretta garzetta nigripes*	1/6/1978	Australian Counter Disaster College	-	L	EN
Nankeen Night Heron	*Nycticorax caledonicus hillii*	1/12/1975	Australian Counter Disaster College	-	-	NT
Baillon's Crake	*Porzana pusilla palustris*	1/12/1975	Australian Counter Disaster College	-	L	VU
Yellow-ochre Butterfly ^	*Trapezites lutea lutea*	-	Riddells Creek area	-	L	EN
Fiery Jewel ^	*Hypochrysops ignita ignita*	-	Riddells Creek area	-	L	VU
Amethyst Hairstreak #	*Jalmenus icilius*	-	Riddells Creek area	-	L	-

Sources: VBA 2010. Victorian Biodiversity Atlas © The State of Victoria, Department of Sustainability and Environment
^ Data obtained from the Victorian Butterfly Database (Museum Victoria)
# Data obtained from a local record

Appendix 3
Definitions of Ecological Significance

Based on *Standard Criteria for Sites of Biological Significance in Victoria* (Amos 2004)

Nationally Significant

Species of national significance are flora or fauna listed as Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable or Rare under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* or under the relevant National Action Plan. Relevant National Actions Plans include: Maxwell *et al.* (1996), Duncan *et al.* (1999), Lee (1995), Garnett and Crowley (2000), Cogger *et al.* (1993), Tyler (1997), Wagner and Jackson (1993) and Sands and New (2002).

Ecological Communities of national significance are those listed as Critically Endangered, Endangered or Vulnerable under the *EPBC Act*

Sites are considered nationally significant if they support:

- Known habitat for nationally significant species or communities.
- Areas with unusually high native species richness, vegetation, habitat types or communities that are exceptional when compared to sites nationally.
- Corridors or habitat components that are important at a national scale. i.e. forming a link with nationally significant vegetation such as a National Park, and/or Ramsar Wetlands.
- Breeding sites, nesting/roosting, nursery or other sites where individuals aggregate for a defined part of their life cycle which comprises ≥1% of the national breeding population of a species.
- Areas regularly used by migratory species which are nationally threatened, or used by ≥1% of the world or national population of a taxon.
- Known or potential feeding sites of a nationally significant nomadic, migratory or mobile species within the known range of a species which is known to be reliant on defined dispersed feeding sites and where the species is nationally Critically Endangered, Endangered or Vulnerable.

State Significant

Species of state significance in Victoria are flora or fauna listed as Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable or Conservation Dependent in the *Advisory List of Rare or Threatened Plants* (DSE 2005), the *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007), or the *Advisory List of Threatened Invertebrate Fauna in Victoria* (DSE 2009); species listed as Near Threatened, Conservation Dependent

or Least Concern under the *EPBC Act* or the relevant National Action Plan; and/or species listed under the Victorian *FFG Act*. Relevant National Actions Plans include: Maxwell *et al.* (1996), Duncan *et al.* (1999), Lee (1995), Garnett and Crowley (2000), Cogger *et al.* (1993), Tyler (1997), Wagner and Jackson (1993) and Sands and New (2002).

Ecological Communities of state significance in Victoria are those listed as threatened under the Victorian *FFG Act*.

Sites are considered to be of state significance if they support:

- Known habitat for state significant species or communities.
- Areas that support, or regularly support individuals of a state significant species or community.
- Vegetation which would have a vegetation significance rating of 'Very High' or 'High' if assessed using the DSE Vegetation Quality Assessment Manual (DSE 2004b).
- Areas with unusually high native species richness, vegetation, habitat types or communities that are exceptional when compared to sites on a statewide basis.
- Corridors or habitat components that are important at a state scale. i.e. forming a link with state significant vegetation such as State Parks and/or Flora and Fauna Reserves.
- Breeding sites, nesting or nursery or other sites where individuals aggregate for a defined part of their life cycle which comprises ≥1% of the state breeding population of a species.
- Areas regularly used by migratory species which are threatened in Victoria, or used by ≥1% of the state population of a taxon.
- Known or potential feeding sites of a nomadic, migratory or mobile species within the known range of a species which is known to be reliant on defined dispersed feeding sites and where the species is state Endangered, Vulnerable or Data Deficient.

Regionally Significant

Species of regional significance in the Central Victorian Uplands Bioregion are flora species considered rare by the authors or in any relevant regional Native Vegetation Plan, and fauna species considered rare by the authors or listed as Near Threatened or Data Deficient in the *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007) or the *Advisory List of Threatened Invertebrate Fauna in Victoria* (DSE 2009).

Ecological Communities of regional significance in the Central Victorian Uplands Bioregion are those listed as an Endangered, Vulnerable or Depleted ecological vegetation class within a particular bioregion in the relevant catchment Native Vegetation Plan.

Sites are considered to be of regional significance if they support:

- Known habitat for regionally significant species or communities.
- Areas that support, or regularly support individuals of a regionally significant species or community.
- Vegetation, which would have a vegetation significance rating of 'Medium' if assessed under the DSE Vegetation Quality Assessment Manual (DSE 2004b).
- Areas with unusually high native species richness, vegetation, habitat types or communities that are exceptional when compared to sites regionally.
- Corridors or habitat components that are important at a regional scale.
- Breeding sites, nesting or nursery or other sites where individuals aggregate for a defined part of their life cycle which comprises ≥5% of the bioregional breeding population of a species.
- Areas regularly used by migratory species which are declining in the bioregion, or used by ≥5% of the bioregional population of taxon.
- Known or potential feeding sites of a nomadic, migratory or mobile species within the known range of a species which is known to be reliant on defined dispersed feeding sites and where the species is regionally significant.

Locally Significant

All indigenous species and communities are considered locally significant within the Central Victorian Uplands Bioregion.

Sites are considered to be of local significance if they support:

- Vegetation which would have a vegetation significance rating of 'Low' if assessed under the DSE Vegetation Quality Assessment Manual (DSE 2004b).
- Corridors or habitat components important at a local scale.
- Breeding sites, nesting or nursery or other sites where individuals aggregate for a defined part of their life cycle which comprises ≥25% of the local breeding population of a species.
- Areas regularly used by migratory species which are locally declining, or use by ≥25% of local population of taxon.
- Known or potential feeding site of a nomadic, migratory or mobile species within the known range of a species which is known to be reliant on defined dispersed feeding sites and where the species utilises a feeding resource that is particularly limited in the local area.

Appendix 4
Definitions of Vegetation Condition

Good Condition

Vegetation in good condition supports a diverse range of native floristic and structural components and a low cover of introduced species. Ecosystem processes are likely to be intact.

Moderate Condition

Vegetation of moderate condition supports some range of floristic and structural components with greater than 25% cover of introduced species. Some ecosystem processes may be present or disrupted in some way.

Poor Condition

Vegetation of poor condition is likely to be dominated by introduced species with a low presence of native floristic and structural components. Relevant ecosystem processes are likely to be absent.

APPENDIX 5 – MANAGEMENT ACTIONS

Action #	Management Action	Refer to section within report	Who is involved in undertaking this action?	Description of works undertaken	Issues encountered	Works still to undertake
Immediate and/or ongoing planning and liaison actions						
1	Trust for Nature covenant registered on-title of reserve	Section 4.3.10	Council, TFN			
2	Implement an adaptive management framework that increases the resistance and resilience of the reserve to the impacts of climate change	Section 4.4	Council			
3	Liaise with adjoining landowners on northern and southern boundaries about weed issues	Sections 4.3.1. & 4.7. Figure 3	Council and contractors, adjoining landholders			
4	Liaise with Pony Club regarding *Phytophthora* issue in reserve	Section 4.3.3	Council. landholders			
5	Liaise with landholders to the east and west about constructing a wildlife-friendly fence and repair of existing fencing	Section 4.3.7 and 4.7	Council. landholders			
6	Determine opportunities to maintain/improve habitat connectivity with surrounding landholders and promote involvement with conservation programs such as Trust for Nature and Land for Wildlife	Section 4.3.8 and 4.7	Council. landholders			
7	Explore potential partnerships with the Wurundjeri	Section 4.5	Council, Wurundjeri (WTLaCCHC)			

8	Liaise with adjoining neighbours regarding invasive plants and animals, pet animals, protection and enhancement of native vegetation and revegetation on their properties	Section 4.3.8 and 4.7	Council, landholders			
9	Promote the values of the reserve to local and regional schools and tertiary institutions	Section 4.6.5 (ii)	Council			
Immediate and/or ongoing ecological management actions						
1	Council officers, local groups and individuals encouraged to submit new species sightings to council, state govt and biological databases	Section 4.3.9	Council, contractors, residents			
2	Retain all stags, logs and coarse woody debris	Section 4.3.6	Council			
3	Install educational signage about *Phytophthora* at main entrance points	Section 4.3.3	Council			
4	Establish footwear wash-down point at main entrance gate	Section 4.3.3	Council			
5	Consider using a biodegradable fungicide to reduce the impacts of *Phytophthora*	Section 4.3.3	Council			
6	Report any sightings of Fireblight Beetle or wattle defoliation to council and Riddells Creek Landcare	Section 4.3.2	Visitors			
7	Monitor presence and effects of Fallow Deer in reserve	Section 4.3.4	Council			
Immediate and/or ongoing recreation management actions						
1	Install a new street front sign at the entrance on Shannons Road and far eastern access point	Section 4.6.4, Figure 2	Council			

2	Install signage directing walkers and naturalists to the far eastern pedestrian access point	Section 4.6.4, Figure 2	Council			
3	Ensure entrance points are weed-free and maintained	Section 4.6.3	Council			
4	Restrict visitor access to more formal paths along gullies to avoid grass trees and other vegetation	Sections 4.3.3 & 4.6.2	Council			
5	Consider creating a formal path from far eastern access point into conservation area	Section 4.6.2	Council			
6	Ensure the licence agreement with the Pony Club continues to be adhered to, including exclusion of horse riders from conservation area	Section 4.6.1	Council			
7	Encourage Pony Club to stay on formal paths within Pony Club area and restrict creation of new tracks	Section 4.6.2	Council, Pony Club			
8	Consider placing interpretive signage at entrance points to reserve and entrance to conservation area	Section 4.6.4	Council			
9	Consider installing signage that directs visitors to stay on trails and highlights the *Phytophthora* issue. Inappropriate activities may also be highlighted	Section 4.6.4	Council			
10	Promote the values of the reserve to bushwalkers and naturalists	Section 4.6.5 (i)	Council			
11	Consider an interpretive 'walk and gawk' tour in cooperation with the local Landcare group	Section 4.6.5 (i)	Council			
Spring - Summer						
1	Treatment of Sweet Vernal-grass populations	Section 4.3.1. Table 1. Figure 3	Council and contractors			
2	Target Blackberry populations	Section 4.3.1. Table 1. Figure 3	Council and contractors			

3	Target other noxious and high-threat weeds (Gorse, Bluebell Creeper, Spanish Heath, Sweet Briar, English Broom, Hawthorn)	Section 4.3.1. Table 1. Figure 3	Council and contractors			
4	Target low-impact and isolated weed populations (Wattles x 5 species, Agapanthus, Radiata Pine)	Section 4.3.2. Table 1. Figure 3	Council and contractors			
5	Undertake comprehensive fauna survey in spring-summer- include targeted surveys for Brush-tailed Phascogale	Section 4.3.9	Council and contractors			
6	Monitoring (undertaken biennially)	Section 4.8	Council and contractors			

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