Final Report:

Environmental Management Plan – Bald Hill Reserve, Kyneton

Prepared by Atlas Ecology

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Environmental Management Plan
Bald Hill Reserve, Kyneton

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Photography: All photos taken by Matt Aquilina, Bianca Aquilina, Eliza Watters (Atlas Ecology), except:

Paul Gray (Front cover – Purple Coral-pea *Hardenbergia violacea*, Spotted Pardalote *Pardalotus punctatus;* Plate 14- Twining Fringe-lily *Thysanotus patersonii*; Plate 15- Pink Fingers *Caladenia carnea*, Nodding Greenhood *Pterostylis nutans*, Wax-lip Orchid *Glossodia major*; Page 28- Clover Glycine *Glycine latrobeana*; Plate 25- Quarry; Plate 31- Bike Trail; Plate 34- Sawn logs).

Gayle Osborne (Plate 19- Grassy Woodland).

Front cover photos taken within reserve (L to R)*:* Purple Coral-pea *Hardenbergia violacea*; cultural heritage on site; stag and woody debris within Narrow-leaf Peppermint *Eucalyptus radiata* subsp. *radiata* forest; Brush-tailed Phascogale *Phascogale tapoatafa*; Spotted Pardalote *Pardalotus punctatus*.

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

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1 VISION

Bald Hill Reserve is valued by the community of Kyneton as an ecologically, geologically and culturally significant location.

Bald Hill Reserve is actively managed through an integrated approach to conserve and enhance its biodiversity values that include national and state significant species.

Opportunities for local residents to learn and engage with grassy woodland and valley grassy forest environments are provided at Bald Hill Reserve through interpretive signage and informal trails.

Bald Hill Reserve provides low impact, passive tourism opportunities for bird watching, photographers, naturalists and education and science opportunities for local and regional students, with the resulting economic benefits provided to Kyneton and the wider Macedon Ranges.

Bald Hill 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

Bald Hill Reserve ('the reserve') is a 96 hectare forest, woodland and grassland reserve owned and managed by the Macedon Ranges Shire Council. Previously known as the Kyneton Rifle Range, the reserve is located approximately three kilometres east of Kyneton and is bordered to the south by Pipers Creek Road, to the north by Baynton Road, to the east by Mount St Mary's Lane and to the west by private allotments (see Figure 1 below).

The reserve features a rich diversity of indigenous flora and fauna including state and nationally significant species and supports the largest and most intact area of native vegetation within the Kyneton region. The vegetation consists of several species of eucalypts over a ground layer of native grasses, herbs, lilies and orchids.

Two peaks within the reserve form a prominent feature of the surrounding Kyneton landscape, providing a junction between granitic and basaltic geologic formations. Drainage lines flow west into Post Office Creek, which joins the Campaspe River west of Kyneton (Figure 1).

Bald Hill is a place of shared cultural significance. Sites of indigenous cultural importance have been identified alongside a strong Australian military history, with the reserve having served as a Department of Defence testing and training site between 1906 and 1986.

Located close to the township of Kyneton, the reserve provides local residents with recreational and leisure opportunities. Informal paths traverse the site, providing bushwalkers with good access. The Kyneton Gun Club is located in the south-east corner of the reserve and hosts monthly meetings.

2.2 Regional Context

The reserve is located within a landscape largely cleared for agriculture, grazing, agistment and housing. The township of Kyneton is located three kilometres west with a public golf course approximately one kilometre west.

Vegetation surrounding the reserve is highly modified, fragmented and limited to small patches in private farms. Single paddock trees are common in surrounding farms, while Baynton Road and Mount St Mary's Lane roadsides contain remnant vegetation of varying quality. Areas of significant vegetation located close to Bald Hill include the Cobaw State Forest, approximately 8.5 kilometres to the east and the smaller Black Hill Reserve, approximately 4.9 kilometres to the north (Figure 1).

2.3 Zones and Overlays

The reserve is zoned Public Park and Recreation Zone (PPRZ) and is covered by six overlays. Land to the east of the reserve is zoned Farming (FZ), with Rural Living (RLZ2) to the north, west and south.

Public Park and Recreation Zone (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.

Environmental Audit Overlay (EAO)

The purpose of this overlay is to ensure that potentially contaminated land is suitable for a use which could be significantly adversely affected by any contamination.

Environmental Significance Overlay (ESO4)

The purpose of this overlay is to identify areas where development of land may be affected by environmental constraints and ensure that development is compatible with identified environmental values.

Significant Landscape Overlay (SLO1)

The purpose of this overlay is to identify significant landscapes and to conserve and enhance the character of significant landscapes.

Bushfire Management Overlay (BMO)

The purpose of this overlay is to assist to strengthen community resilience to bushfire; identify areas where the bushfire hazard requires specified bushfire protection measures for subdivision and buildings and works to be implemented; ensure that the location, design and construction of development considers the need to implement bushfire protection measures; and ensure development does not proceed unless the risk to life and property from bushfire.

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 and ending near Bright.

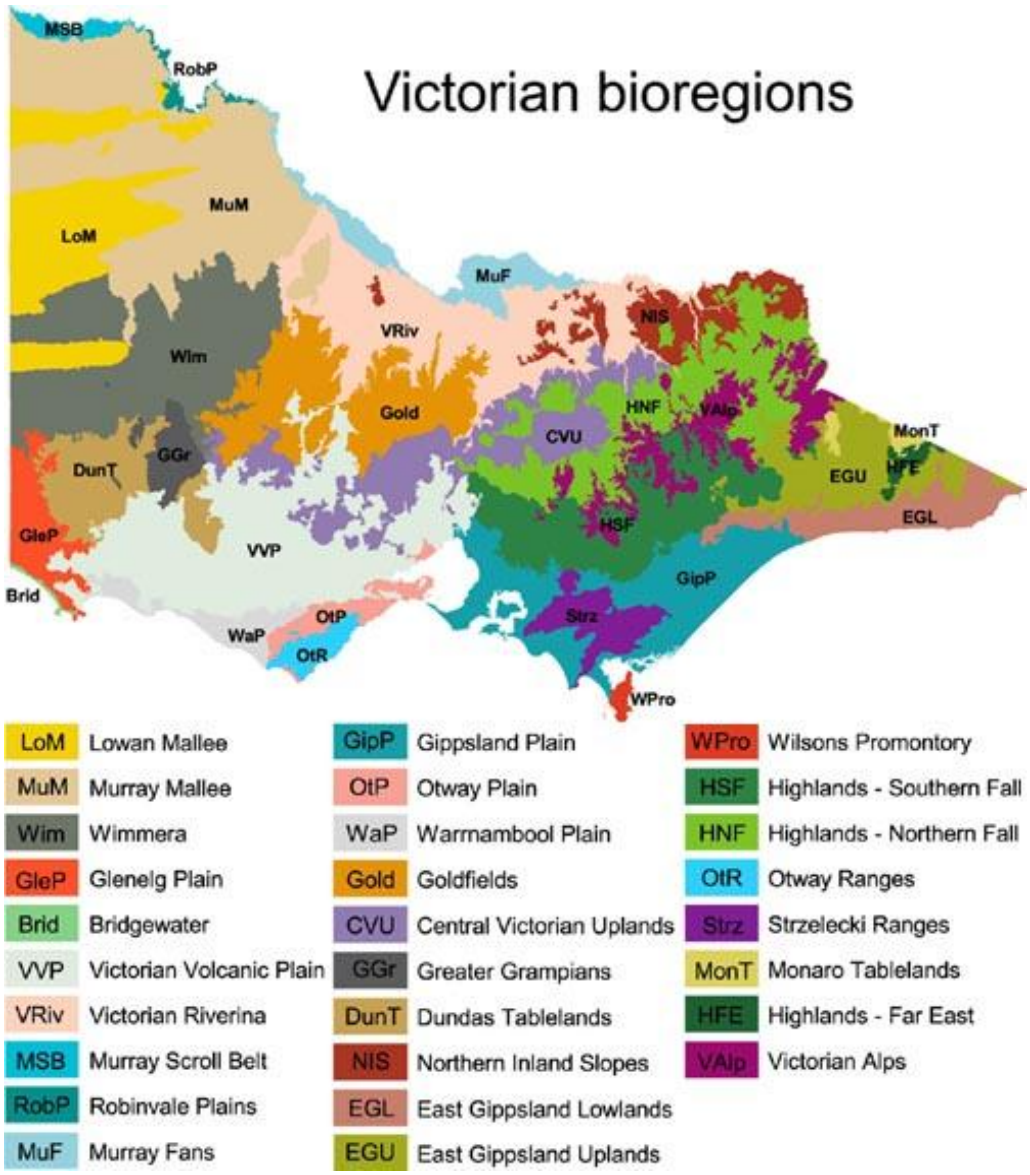
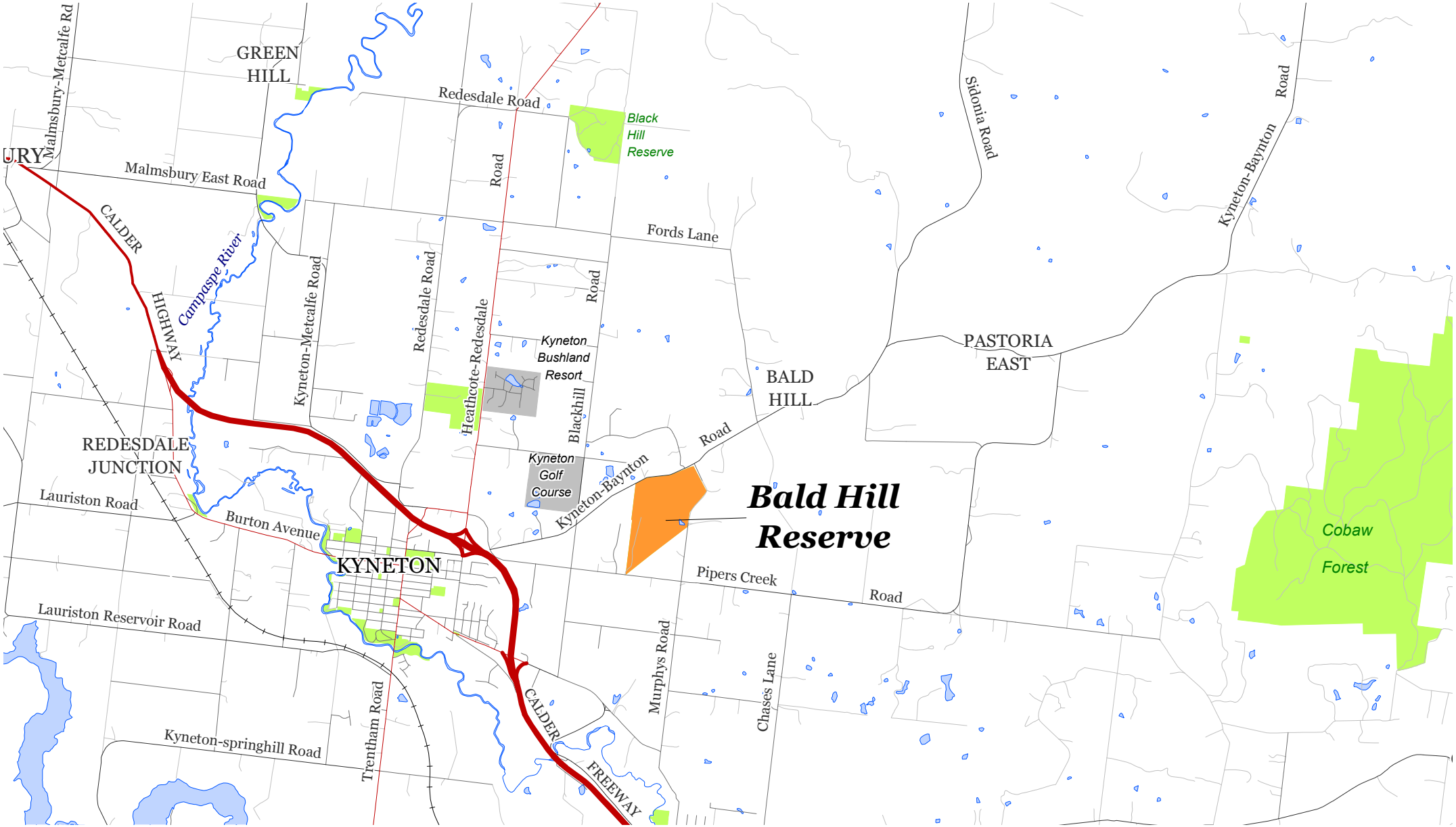


Figure 1 - Location of Bald Hill Reserve



Bald Hill Reserve

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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, moisture levels in soil, slope and altitude (such as mountains, plains and foothills), aspect (such as north or south) and type of canopy (such as 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.

Three EVCs were recorded within the reserve based on current on-ground observations, previous on-ground vegetation mapping, and extant and pre-1750 vegetation mapping (DSE 2012): Grassy Woodland (EVC 175_61), Granitic Grassy Woodland (EVC 175_62) and Valley Grassy Forest (EVC 47). The location of the EVCs is shown in Figure 2.

Grassy Woodland (Basalt)

Grassy Woodland occurs on moderately fertile soils on plains or undulating hills (DSE 2004a) and typically comprises open eucalypt woodland to 15 metres tall over a diverse understorey of grasses and herbs. The shrub component is usually sparse (DSE 2004a).

Grassy Woodland (on basalt) occurs within the north-western corner of the reserve surrounding the Bald Hill volcanic cone (Figure 2). The EVC is represented by Manna Gum *Eucalyptus viminalis* in the overstorey over a ground layer rich with native grasses, herbs and lilies combined with introduced pastoral species. The shrub layer is relatively sparse. A more detailed description is provided below in Section 3.1.3.

Grassy Woodland has a Bioregional Conservation Status of Endangered within the Central Victorian Uplands Bioregion.

Granitic Grassy Woodland

Granitic Grassy Woodland typically occurs on moderately fertile soils on plains or weathered granitic hills in areas with moderate rainfall (DSE 2004a). The EVC typically comprises an open eucalypt woodland or forest to 15 metres tall over a distinct large to medium-sized shrub layer (DSE 2004a). The understorey typically comprises a diverse array of grasses and herbs (DSE 2004a).

Granitic Grassy Woodland occurs within the north-eastern section of the reserve surrounding the granite outcrop and extends to the south and west, merging with Valley Grassy Forest (Figure 2). The EVC is similar in composition to the adjacent Grassy Woodland on basalt, with an overstorey of Manna Gum and a ground layer diverse with grasses, herbs and lilies. The shrub layer is likewise relatively sparse. A more detailed description is provided below in Section 3.1.3.

Granitic Grassy Woodland has a Bioregional Conservation Status of Endangered within the Central Victorian Uplands Bioregion.

Valley Grassy Forest

Valley Grassy Forest occurs on gently undulating lower slopes and valley floors on fertile, well-drained soils in areas with moderate rainfall (DSE 2004a). The EVC typically comprises a eucalypt forest to 25 metres tall with a sparse shrub mid-layer and an understorey rich in herbs, lilies, grasses and sedges (DSE 2004a). In drier areas the understorey may be sparser and less diverse (DSE 2004a).

Valley Grassy Forest occurs within the southern section of the reserve (Figure 2) and is dominated by an overstorey of Narrow-leaf Peppermint *Eucalyptus radiata* subsp. *radiata*. The shrub layer is minimal in cover and the understorey supports a variety of herbs, lilies and grasses. A more detailed description is provided below in Section 3.1.3.

Valley Grassy Forest has a Bioregional Conservation Status of Vulnerable within the Central Victorian Uplands Bioregion.

3.1.2 Previous Flora Surveys

Two surveys previously conducted within the reserve help inform the flora values identified in this Management Plan. The surveys provide a valuable data set detailing the condition, diversity and distribution of species identified in the reserve. Both surveys note a significant diversity of native flora, with over 110 indigenous flora species recorded. A summary of each survey is provided below.

Davidson *et al.* (1995) undertook a survey to identify present flora and fauna species, their significance and recommendations in relation to their conservation. Commissioned by the Macedon Ranges Shire Council, the survey identified four main vegetation communities and species found within each community; Manna Gum Woodland, Peppermint Woodlands, Wetlands and Grasslands. The survey notes;

> *Noticeable features of flora communities include extensive weed invasion, coppice regrowth of Narrow-leaved Peppermints (Eucalyptus radiata), and a lack of understorey species. Old growth Narrow-leaved Peppermints were sparsely distributed,*

> *while old growth Manna Gums (Eucalyptus viminalis) were common (Davidson et al. 1995, p.9).*

This survey noted an array of wildflowers that included the Clover Glycine *Glycine latrobeana*, listed as rare and vulnerable in Victoria at the time but now considered a species of national significance.

Foreman and Diez undertook a preliminary survey and follow up spring and summer surveys in 1995. In their report, titled *The Flora of the Kyneton Rifle Range*, it is noted:

> *The area contains a relatively large stand of grassland and grassy woodland vegetation of varied quality which is becoming increasingly rare in Victoria and south eastern Australia. Although it is difficult to precisely classify the vegetation present and attach a conservation code, such vegetation is widely regarded as threatened and should at least be considered of state significance (Foreman and Diez 1995, p.5).*

Broad vegetation types were identified on the basis of structure, composition, geology and past land use. These types include: *Eucalyptus radiata* Grassy Forest, *Eucalyptus viminalis* Grassy Woodland, *Eucalyptus viminalis/Eucalyptus radiata* Grassy Woodland, Grassland, drainage line and dams. The presence of rare or threatened species include the nationally significant Matted Flax-lily *Dianella amoena,* and state significant Clover Glycine *Glycine latrobeana* (now of national significance). Foreman and Diez (1995) note an outstanding collection of orchid flora within the reserve which is uncommon for this region.

3.1.3 Current Vegetation Condition

The majority of the reserve is well-vegetated with remnant eucalypts over a ground layer of native grasses, herbs, lilies and orchids. Three vegetation communities (or EVCs, Section 3.1.1 above) occur which are distinctly segregated according to geology, aspect, altitude, species composition and past land use (Figure 2). All of these factors contribute to the distribution and condition of these vegetation communities. Introduced flora species, both within the mid-storey and ground layer, are dominant features and are considered the primary threat to the ecological values present.

A total of 130 indigenous species and 44 introduced species have been recorded in the reserve. This figure includes 110 indigenous flora species identified through previous formal surveys (Section 3.1.2 above). All of these species, together with their significance rating or status, are listed in Appendix 1.1.

The dominant volcanic crater of Bald Hill and its adjoining granite outcrop are the key geological features of the northern half of the reserve (Figure 2). This area consists of a combination of volcanic and granite-derived soils which influence the overlaying vegetation composition and structure. The southern half of the reserve consists of granite-derived soils.

Grassy Woodland (Basalt)

The Bald Hill volcanic crater and its outflows immediately surrounding the crater support a Grassy Woodland dominated by an open overstorey of Manna Gum (Figure 2). The southern slopes of the crater support particularly large tall Manna Gums (Plate 1), whilst the crater and northern slopes support a more stunted, twisted form (Plate 2). Eucalypt regeneration is present but not prolific.

Plate 1. Manna Gum on southern slopes of volcanic crater

Plate 2. Manna Gum on northern slopes of volcanic crater

Mid-storey components are largely absent, except for small discrete areas that support mature and regenerating Silver Wattle *Acacia dealbata*, Black Wattle *Acacia mearnsii* and Blackwood *Acacia melanoxylon* (Plate 3). Two remnant Cherry Ballart *Exocarpos cupressiformis* (Plates 3 and 4) and a single Tree Violet *Melicytus dentatus* (not previously recorded at reserve) are present. This lack of mid-storey cover is reflective of the entire reserve. Benchmarks for all three EVCs on-site suggest that shrubs and understorey trees should ideally be at 20-25% cover (DSE 2004a); which is considerably more than their current cover. Neighbouring properties and the wider region are however relatively clear of mid-storey components, and as such it is unclear as to the extent to which the region once supported a mid-storey cover.

Plate 3. Black Wattle and Cherry Ballart on western volcanic slope

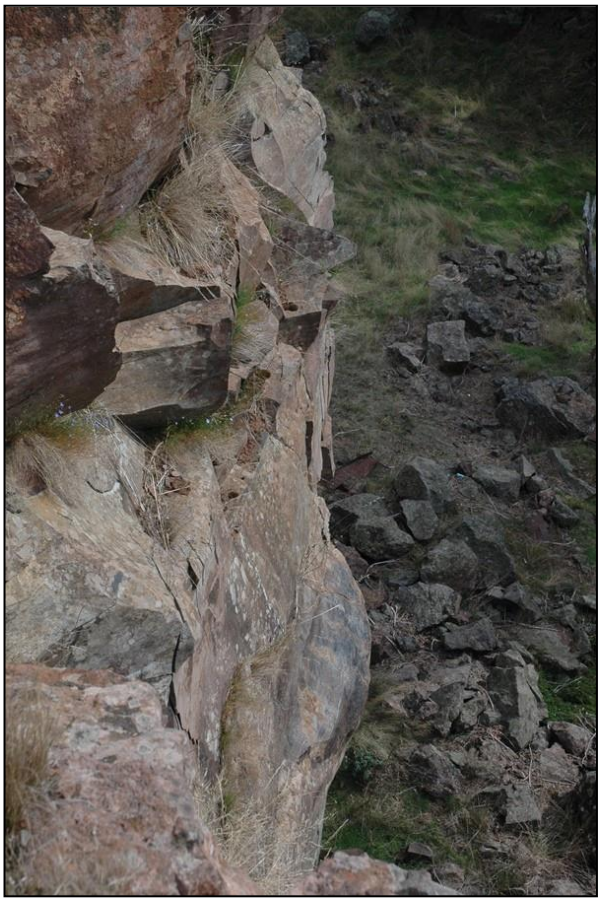
Plate 4. Single Cherry Ballart on northern volcanic slope

The ground layer supports a diverse cover of indigenous grasses and herbs with dominant grasses including Common Wheat-grass *Elymus scabrus*, Weeping Grass *Microlaena stipoides*, Common Tussock-grass *Poa labillardierei*, Kangaroo Grass *Themeda triandra* and a variety of Wallaby Grasses *Rytidosperma* spp. and Spear Grasses *Austrostipa* spp. Of particular note is the variation in the plant community which is evident between the northern and southern slopes of the crater. Spear Grasses and Wallaby Grasses dominate the ground layer to the north and east of the crater, whilst Common Tussock-grass and the herbs Bidgee-widgee *Acaena novae-zelandiae* and Stinking Pennywort *Hydrocotyle laxiflora* dominate the moister steep southern slope (see Plate 1). Common herbs, lilies and orchids within this vegetation community include Scaly Buttons *Leptorhynchos squamatus*, Variable Plantain *Plantago varia*, Bulbine Lily *Bulbine bulbosa* and Common Onion-orchid *Microtis uniflora*.

The quarry to the north of the crater (Figure 2, Plate 5) harbours species not observed elsewhere within the reserve, such as Necklace Fern *Asplenium flabellium* and Fuzzy New Holland Daisy *Vittadinia cuneata* var. *cuneata* (Plate 6) (both previously not recorded at reserve). The top of the Bald Hill crater is largely devoid of trees and is dominated by exotics such as Horehound *Marrubium vulgare* (see Figure 3) and Sweet Vernal-grass *Anthoxanthum odoratum* (Plate 7). The nationally significant Matted Flax-lily *Dianella amoena* has previously been recorded in this area (Figure 2).

Plate 5. Old quarry site on northern slope

Plate 6. Left- Steep quarry escarpment protects native Bluebells *Wahlenbergia* and Necklace Fern. Right- Fuzzy New Holland Daisy in seed



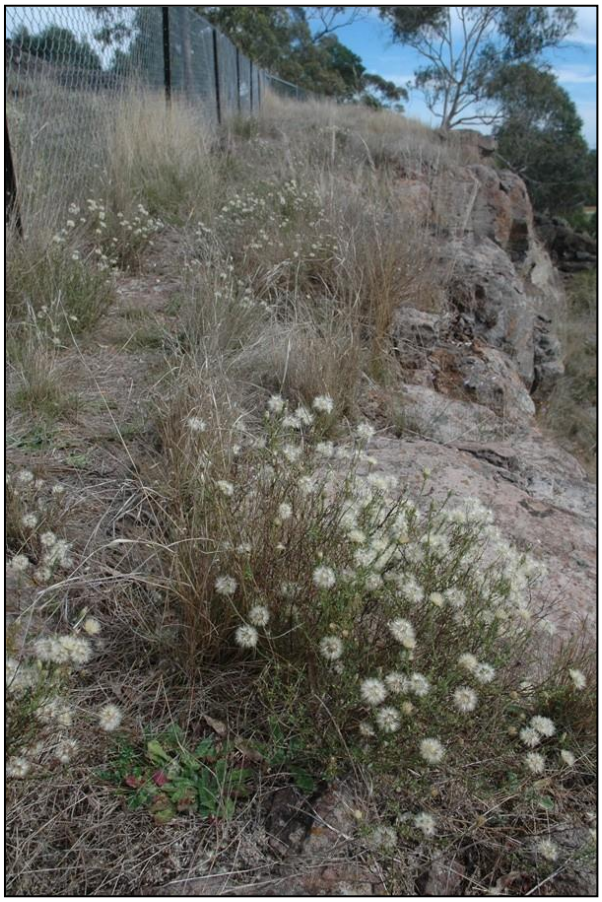


Plate 7. Top of Bald Hill volcanic crater

The dominant introduced species include Brown Top-bent *Agrostis capillaris*, Sweet Vernal-grass and Large Quaking-grass *Briza maxima* which are persistent across most of the reserve. These species may have been introduced through past grazing uses when exotic pastoral species were sown and soils were 'improved' with rich fertilisers (Davidson *et al.* 1995).

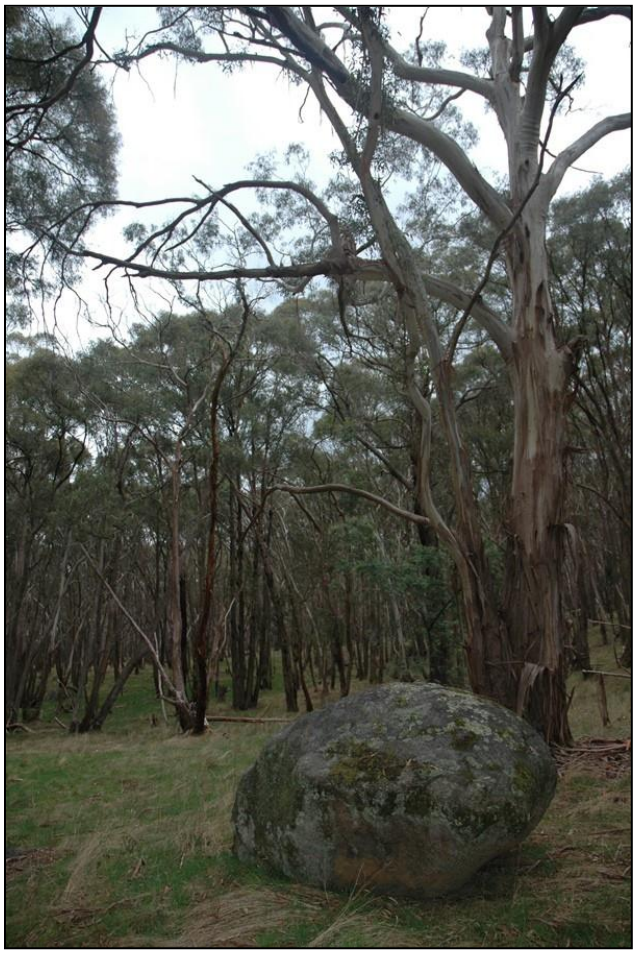
The northern slopes of the crater support scattered populations of noxious weeds including Spear Thistle *Cirsium vulgare*, Hawthorn *Crataegus monogyna* and Sweet Briar *Rosa rubiginosa* (see Figure 3) (Hawthorn and Sweet Briar have previously not been recorded in the reserve). The main populations of these three species are within this area of the reserve. Gorse *Ulex europaeus* occupies discrete parts here (Figure 3) and is the dominant woody weed within the wider reserve (Figure 3).

Grassy Woodland (Granite)

Granitic Grassy Woodland is recorded to the east and south of the volcanic crater (Figure 2) and supports similar vegetation to the volcanic Grassy Woodland, however it sits on more free-draining granite-derived soils. Manna Gum dominates the overstorey (Plates 8 and 9) and is intermingled with Narrow-leaf Peppermint at its southern extent (merging into Valley Grassy Forest).

Plate 8. Manna Gum amongst granite boulders

Plate 9. Large granite boulders are a striking feature within the northern section of reserve



Mid-storey trees and shrubs are largely absent which might be due to persistent kangaroo, wallaby and rabbit grazing and past land practices such as cattle grazing and vegetation removal. Mid-storey trees and shrubs that do persist (albeit in small areas) include Cherry Ballart, Black Wattle, Silver Wattle and Blackwood.

Large protruding granite boulders amongst a ground layer of native and exotic species are a striking feature of this area (Plates 8 and 9). Native grasses include Kangaroo Grass, Common Wheat-grass, Wallaby Grasses, Velvet Tussock-grass *Poa morrisii* and Soft Spear-grass *Austrostipa mollis*. Common herbs and lilies include Magenta Stork's-bill *Pelargonium rodneyanum* (Plate 10), Chocolate Lily *Arthropodium strictum*, Common Raspwort *Gonocarpus tetragynus*, Kidney Weed *Dichondra repens* and Small Poranthera *Poranthera microphylla*. Brown Top-bent and Sweet Vernal-grass are dominant, together with the introduced annual Large Quaking-grass. Gorse cover is minor; however drainage lines and the southern slopes support some Gorse stands (Figure 3, Plate 11).

Plate 10. Magenta Stork's-bill

Plate 11. Gorse stand on southern slope of granite peak

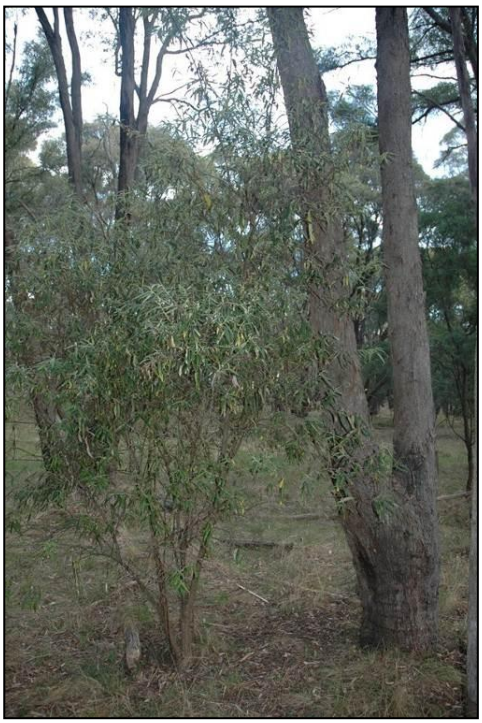
The nationally significant herb species Clover Glycine *Glycine latrobeana* has previously been recorded scattered across this granite outcrop (Figure 2).

Valley Grassy Forest

The southern portion of the reserve supports Valley Grassy Forest dominated by a homogenous overstorey of multi-stemmed Narrow-leaf Peppermint (Plate 12, Figure 2). Past logging practices have resulted in the coppicing of eucalypt shoots and the multi-stemmed nature of today's mature forest. The mid-storey layer is generally absent, however small discrete areas support Blackwood, Black Wattle and Silver Wattle. One single Common Cassinia *Cassinia aculeata* and Snowy Daisy-bush *Olearia lirata* (Plate 13) were recently observed, which have not previously been recorded here. Snowy Daisy-bush typically prefers damp forest environments at altitude and none have previously been recorded within the wider Kyneton region.

Plate 12. Multi-stemmed Narrow-leaf Peppermints

Plate 13. Left- Common Cassinia, Right- Snowy Daisy-bush



The ground layer is rich with a diversity of grasses, herbs, lilies and orchids. Grasses include Grey Tussock-grass *Poa sieberiana*, Weeping Grass and Common Wheat-grass. Herbs and lilies include Common Raspwort, Milkmaids *Burchardia umbellata*, Blue Pincushion *Brunonia australis*, Twining Fringe-lily *Thysanotus patersonii* (Plate 14) and Button Everlasting *Helichrysum scorpioides*. Orchid species including Caladenia *Caladenia* spp., Sun-orchids *Thelymitra* spp., Greenhoods *Pterostylis* spp. and Diuris *Diuris* spp. are a key characteristic of this vegetation community (Plate 15).

Plate 14. Twining Fringe-lily

Plate 15. Orchids - Pink Fingers *Caladenia carnea*; Nodding Greenhood *Pterostylis nutans*; Wax-lip Orchid (White form) *Glossodia major*

Large Manna Gums occupy low-lying areas and drainage lines that flow through this vegetation community (Plate 16, Figure 2). The native Cluster-headed Mat-rush *Lomandra longifolia* subsp. *exilis* and the noxious weed Gorse are conspicuous along these drainage lines.

Plate 16. Large Manna Gums along drainage line

Grasslands and Drainage lines

Grassland areas are not represented by a native vegetation community (Figure 2) as they have been subjected to intensive pasture improvement in past times (Davidson *et al.* 1995) and persistent vegetation removal. This is reflected in the generally poor vegetation quality of these cleared grassland areas. Introduced pastoral species including Brown Top-bent and Sweet Vernal-grass dominate these areas (Plate 17), however isolated patches of native Kangaroo Grass and Spear Grasses are present (Plate 18).

Plate 17. Open grassland along drainage lines in the south

Plate 18. Kangaroo Grass dominates isolated patches within open grassland areas

Drainage lines are similarly dominated by introduced pastoral species, however several native aquatic and semi-aquatic species persist within and along the fringes of waterbodies such as: Water Ribbons *Triglochin procera*, Swamp Daisy *Allitia cardiocarpa*, Swamp Isotome *Isotoma fluviatilis* and a variety of Rush *Juncus* species. Gorse occupies large areas within the moister drainage line and grassland areas and along the fringes of waterbodies (Figure 3).

See Appendix 5 for definitions of vegetation condition.

3.1.4 Significant Flora Species

National Significance

Two flora species of national significance are present within the reserve – the endangered Matted Flax-lily *Dianella amoena* and the vulnerable Clover Glycine *Glycine latrobeana*.

Other significant species recorded within the local area are listed in Appendix 1.2.

Matted Flax-lily *Dianella amoena*

Two Matted Flax-lily plants were recorded at the summit of the Bald Hill volcanic crater in 1995 (Foreman and Diez 1995). A further eight plants were recorded downslope to the south in 2005 (FIS 2012) (see Figure 2). The closest record of the species is approximately 23 kilometres east on the eastern edge of the Cobaw Range (FIS 2012).

Matted Flax-lily is a tufted perennial lily that can grow up to 90 centimetres tall and form mats up to five metres wide (DSE 2005a). The plant's natural habitat includes grasslands, woodlands and grassy wetlands (DSE 2005a) but it is known to occur amongst dense introduced grasses in highly modified environments (pers.observ.).

Matted Flax-lily

Matted Flax-lily is a nationally significant species listed as endangered on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Matted Flax-lily is listed as threatened under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and endangered under the Department of Sustainability and Environment's (DSE) *Advisory List of Rare or Threatened Plants in Victoria- 2005* (DSE 2005b).

Clover Glycine *Glycine latrobeana*

At least 50 Clover Glycine individuals have previously been recorded scattered across the granite outcrop in the north-east (Figure 2). Clover Glycine has been recorded at the reserve in 1995 and 2005 (FIS 2012), and this find on granite is considered unusual for central Victoria (Foreman and Diez 1995). The closest record of the species is approximately 12 kilometres north at the Emberton Flora Reserve in Metcalfe (FIS 2012).

Clover Glycine is a low-growing perennial herb that grows up to 10 centimetres tall and is part of the pea family (Fabaceae). In Victoria the species is found in grasslands and grassy woodlands across western Victoria, the central highlands, the Melbourne area and north-eastern Victoria in the Alps (DSE 2005c).

Clover Glycine – photo taken at reserve in 2011

Clover Glycine is a nationally significant species listed as vulnerable on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Clover Glycine is listed as threatened under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and vulnerable under DSE's *Advisory List of Rare or Threatened Plants in Victoria- 2005* (DSE 2005b).

Regional Significance

Sixty four of the 130 flora species recorded at the reserve 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.

An unusual form of Pale Vanilla-lily *Arthropodium milleflorum* was recorded at the reserve in 1995 (Foreman and Diez 1995). A small discrete population was found growing amongst dense Common Tussock-grass underneath tall Manna Gum on the southern slopes of the volcanic crater. This form is considered more robust than the typical Pale Vanilla-lily with a multi-branched inflorescence and frequently growing to greater than 1.2 metres tall (Foreman and Diez 1995). Whilst this form of Pale Vanilla-lily is not considered taxonomically distinct, and does not fall under any Commonwealth or state protective legislation, it is a 'noteworthy and interesting atypical form of Pale Vanilla-lily that further adds to the overall biological significance of the area' (Foreman and Diez 1995).

3.1.5 Significant Vegetation Communities

Vegetation communities recorded within the reserve (Figure 2) are not listed under Commonwealth or state environmental legislation. It is, however, worth noting the current status of the vegetation communities (or EVCs) present.

Grassy Woodland (both on basalt and granite) is regarded as an endangered vegetation community within the Central Victorian Uplands bioregion (NCCMA 2005). Approximately 20% of the community's original pre-European extent still remains within the bioregion; only 1% of this is currently protected in conservation reserves whilst the remaining 19% is located on private land (NCCMA 2007).

Valley Grassy Forest is regarded as a vulnerable vegetation community within the Central Victorian Uplands bioregion (NCCMA 2005). Approximately 43% of the community's original pre-European extent still remains within the bioregion; with 9% of this currently protected in conservation reserves and 34% located on private land (NCCMA 2007).

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

3.2 Fauna

3.2.1 Previous Fauna Survey

A fauna survey of the reserve was undertaken by Davidson *et al.* (1995). A total of 40 fauna species were recorded, comprising seven native mammals, 28 native birds, three native reptiles and two native frogs. Most of these species are common throughout the local area, however two, Brush-tailed Phascogale and Koala, are significant at a state level. Survey results indicated that the reserve was likely to provide habitat for a diversity of native fauna species.

Informal surveys and incidental sightings of fauna within the reserve since that time have added additional species to the list of fauna previously recorded at the reserve (Paul Gray, pers.comm., 2011/12). The results of the initial fauna survey, together with additional incidental records, are provided in Appendix 2.1.

3.2.2 Fauna Species at the Reserve

A fauna survey was conducted by Atlas Ecology for the Macedon Ranges Shire Council during 2011/12. This survey resulted in 87 fauna species recorded, comprising 17 mammals (11 native and six introduced), 46 birds (44 native and two introduced), five native reptiles, five native frogs and 14 invertebrates (12 native and two introduced) (Atlas Ecology 2012). In

addition to those species listed in Appendix 2.1, several unidentified invertebrate species were observed but not recorded foraging in vegetation throughout the reserve.

3.2.3 Fauna Habitat

The reserve currently supports habitat for a range of fauna species. This habitat consists primarily of remnant valley grassy forest and grassy woodland, with modified grassland in cleared areas. An ephemeral drainage system runs through the southern slopes of the site, consisting of three waterbodies joined by ephemeral marshes and drainage lines (Figure 2).

Overall, this habitat is of moderately high quality. Many floristic and structural components and habitat elements still exist within the reserve despite its history of modification. Two significant fauna species reside on site and there is potential habitat for several others. Whilst the reserve is largely surrounded by agricultural land, there are linkages to other remnant patches of habitat throughout the local landscape, primarily via adjoining road reserves.

There is a need for sensitive and holistic management of this habitat, to protect and improve its ecological values. In particular, the reserve supports a population of the state significant Brush-tailed Phascogale. Phascogale habitat needs to be conserved and managed on site, with a concurrent improvement in connectivity throughout the local landscape, for this population to continue to be viable.

See Appendix 4 for definitions of habitat quality.

Arboreal Habitat: Trees and Shrubs

Arboreal habitat within the reserve consists of remnant valley grassy forest and grassy woodland (Plate 19) (Section 3.1.1, Figure 2). This habitat is of moderately high quality for fauna. Remnant trees and shrubs provide a diversity of habitat niches that are likely to be used by a variety of native birds, reptiles and arboreal mammals for nesting, roosting, foraging and shelter. Eucalypts and understorey plants provide foraging sites for insectivorous and nectar-feeding birds such as treecreepers, wattlebirds, parrots and rosellas. Shrubs and dense areas of cover are likely to be used by several smaller passerine birds, such as wrens, thornbills and fantails, for nesting and foraging purposes. Mature trees provide perching and hunting sites for birds of prey, foraging and shelter for arboreal mammals, and dispersal habitat for many other fauna species.

Many native animals, such as possums, parrots and owls, are dependent upon mature hollow-bearing trees to provide shelter and breeding sites. Tree hollows of various sizes and configurations were observed throughout the reserve. Small hollows, fissures, spouts and tree bark provide important roosting sites for a number of smaller fauna, including microbats. In addition, the coarse woody debris and leaf litter found beneath undisturbed trees provide shelter and foraging habitat for small mammals, reptiles and insectivorous birds. There is a substantial level of coarse woody debris found throughout the valley grassy forest and grassy

woodland areas of the reserve, especially in comparison with that found in other nearby reserves (e.g. Black Hill Reserve – Paul Gray, pers.comm., 2011). Removal of these habitat elements would lead to a reduction in the population of fauna species dependent upon them.

Much of the arboreal habitat on site consists of mature and regenerating trees, with only a sparse shrub layer. Dense patches of introduced Gorse currently fulfil the structural role that indigenous shrubs once provided in this area. Gorse can provide useful habitat for native fauna (e.g. Carlos and Gibson 2010), despite its status as a noxious weed. During the recent fauna assessment, a Swamp Wallaby was observed sheltering within a dense Gorse stand, and many small woodland birds were seen in the vicinity (e.g. Eastern Yellow Robin, Grey Fantail, Superb Fairy-wren and White-eared Honeyeater). Gorse is, however, a well-known harbour for introduced pests such as foxes, rabbits and possibly cats, as well as introduced birds (White *et al.* 2005).

Plate 19. Arboreal habitat within the reserve: Grassy woodland (left) and valley grassy forest (right).

Most of the fauna recorded on site were seen in the remnant valley grassy forest and grassy woodland habitat. Marsupials seen in this habitat include possums, gliders and phascogale. Birds recorded foraging or perching in the trees and shrubs include parrots, honeyeaters, wattlebirds, thornbills and fairy-wrens. Other birds recorded on site that use this habitat include chough, cockatoo, currawong, kingfisher, kookaburra and owls. Many fauna species in an open treed environment will utilise both arboreal and terrestrial habitat throughout the course of the day, e.g. using trees for shelter and foraging on the ground.

The arboreal habitat within the reserve is an important habitat element. It forms critical linkages to other remnant patches of habitat throughout the local landscape, particularly on private land and via adjoining road reserves to Black Hill Reserve and Cobaw State Forest.

Terrestrial Habitat: Modified Grassland

Terrestrial habitat on site consists of two distinct zones. The first occurs within the remnant grassy woodland and valley grassy forest communities and provides higher quality fauna habitat. The ground layer here supports a diverse cover of indigenous flora, as well as some introduced species. Ground debris, such as leaf litter, rocks, boulders and course woody debris is prevalent. The second zone consists of patches of modified grassland, occurring primarily in the southern half of the reserve (Figure 2). Introduced pastoral grasses and discrete patches of woody weeds dominate these areas (Plate 20). The significant disturbance that has occurred in these patches reduces the availability and quality of habitat for native fauna, particularly for rare and less robust species.

Plate 20. Modified grassland habitat at Bald Hill Reserve

Native grassland supports a wide range of fauna species, including mammals, birds, reptiles, frogs and invertebrates. It provides opportunities for grazing (e.g. macropods), foraging (e.g. insectivorous birds and invertebrates), hunting (e.g. raptors); shelter (e.g. lizards and snakes), breeding (e.g. invertebrates and ground-nesting birds) and other fauna requirements.

In its current state, the modified grassland on site provides moderately low quality habitat for fauna. It supports relatively few native species, none of which are dependent on it. Whilst the modified native grassland does not provide ecologically important habitat for fauna *per se*, it still provides foraging, hunting, breeding and shelter and provides dispersal opportunities for fauna into higher quality habitats within the local area.

A few species typical of open grassy environments were recorded in this habitat, including magpie, raven, lapwing and raptors. All of the fauna species recorded in the grassland area

are common species typical of open terrestrial environments. Many of these species, particularly birds, are likely to utilise arboreal habitat within the reserve and its immediate surrounds.

Wetland Habitat

An ephemeral drainage system runs through the southern slopes of the site, consisting of two dams and a wetland joined by ephemeral marshes and drainage lines (Figure 2). The southern dam closest to the gun club was constructed for use by local wildlife with the northern dam constructed 20 years ago (Jason Sonneman, pers.comm., 2012) (see Figure 2). These dams are typical 'farm dams' with some emergent and floating vegetation and low quality turbid water (Plate 21) and are located in the modified grassland area (Figure 2). The natural wetland to the north (northern-most waterbody in Figure 2) is filled with organic matter and tannin-stained water and is surrounded by remnant vegetation. The land throughout this ephemeral drainage system is slightly boggy although mostly dry at the time of this assessment. There appears to be some pock-marking of the soil in some of these areas, which is likely the result of horses.

The wetland habitat on site, although degraded, has the potential to provide breeding, foraging and refuge habitat for several native fauna species including waterbirds, frogs and some ground-dwelling mammals. Potential Water-rat runs were found near the southern-most dam. Wetland-dependent bird species that were recorded either flying over the reserve or foraging in waterbodies included ducks, herons, cormorant and ibis. Common frog species were heard calling from all three waterbodies and were observed on a number of occasions. The waterbodies provide habitat for a host of freshwater invertebrates, including macroinvertebrates such as yabbies.

Plate 21. One of the two built dams at the reserve

3.2.4 Significant Fauna Species

Brush-tailed Phascogale *Phascogale tapoatafa*

Brush-tailed Phascogale (Plate 22 and front cover) were recorded on site using a hollow in a mature eucalypt close to the southern-most dam (Figure 2). They have previously been observed at the reserve near the Mount St Marys Lane access gate, with two dead specimens found nearby on Baynton Road (Paul Gray, pers.comm., 2011). Whilst the reserve provides optimal habitat for a viable population of Brush-tailed Phascogale, population density is likely to be quite low due to their need for large home ranges (Soderquist 2004). Individuals are likely to utilise tree hollows throughout the forested areas of the reserve and population density may in part be restricted by access to suitable hollows.

Plate 22. Brush-tailed Phascogale

Brush-tailed Phascogale are small carnivorous marsupials, with grey fur on their backs and cream to white fur on their belly, large naked ears and a distinctive black “bottle brush” tail. They are nocturnal, spending most of their lives foraging in the treetops and sleeping in a nest inside a tree hollow. Large tree cavities with small secure entrances are preferred (Soderquist 2004). The species was formerly distributed throughout the dry sclerophyll forests and woodlands of temperate and tropical Australia, with a preference for open forest with sparse ground cover (Soderquist 2004). As much of this habitat has been and continues to be cleared since European settlement, their range has contracted as their habitat has become increasingly fragmented, with many populations now isolated and at risk of local extinction.

Bald Hill Reserve, as the largest and most intact area of native vegetation within the Kyneton region, is likely to act as a ‘source’ population of Brush-tailed Phascogale, sending individuals out into the wider landscape.

Brush-tailed Phascogale are considered near threatened at a national level (Maxwell *et al.* 1996). DSE consider their status as vulnerable in Victoria (DSE 2009) and they are listed under the FFG Act.

Koala *Phascolarctos cinereus*

Koalas (Plate 23) were heard calling from the central region of the reserve on two occasions. Suitable habitat is found on site, especially in the north of the reserve where Manna Gum predominates. Manna Gum is a preferred food species for Koala in Victoria (Martin and Handasyde 2004). Population density is likely to be quite low, given the fragmented nature of the local landscape. Population density on site is most likely restricted by access to preferred food trees.

Plate 23. Koala

Koala are iconic arboreal marsupials, with grey-brown woolly fur on their back, cream to white fur on their belly and around their ears, and a vestigial tail. Koalas occupy a vast but fragmented range in eastern Australia. They are closely associated with eucalypt forests, which provide their only food source. Koala populations are widespread, but are often beset by management problems.

Koalas are considered common in Victoria and lower risk (near threatened) at a national level (Maxwell *et al.* 1996). Although their conservation status has recently been upgraded by the Threatened Species Scientific Committee, there is no change of threat status in Victoria.

3.3 Geology

Bald Hill Reserve lies on the junction of two types of igneous rock; granitic formations and basalt rock associated with more recent volcanic activity (Foreman and Diez 1995). The dominant Bald Hill in the north west of the reserve is a remnant of a volcano (Foreman and Diez 1995), composed of Pliocene olivine basalt (Davidson *et al.* 1995). Flows from Bald Hill were directed west and north with only a minor portion of the reserve containing volcanic soils (Figure 2- Grassy Woodland [Basalt]). The adjoining north eastern peak and the entire southern half of the reserve contain Devonian granodiorite (Davidson *et al.* 1995). The soil here contains well drained, coarsely textured granite derived soils (Foreman and Diez 1995) (Figure 2- Grassy Woodland [Granite] and Valley Grassy Forest).

3.4 Shared Cultural Heritage

3.4.1 Indigenous

The traditional owners of this region are the Jaara Jaara, who belong to the Dja Dja Wurrung language group. While little is known of the Aboriginal use of the reserve, sites of indigenous cultural importance have been identified within the reserve and on adjoining road reserves.

3.4.2 European

The reserve was developed by the Commonwealth Government's Defence Department in 1906 for use as a rifle range and military training site. From this time until 1986 the reserve was utilised by the Defence Department as a weapons testing site that included a one mile shooting range. Evidence of these activities can still be found within the reserve (Plate 24, Figure 2). Whilst not confirmed, the reserve may have been utilised by the original Mounted Rifle Brigade, who were the forebears to the Australian Light Horse Brigade (Jason Sonneman, pers.comm., 2012). A search of the archival records of the Kyneton and Woodend Historical Societies and Public Records Office Victoria failed to reveal detail on the military presence here, and time limitations prevented a search of the Australian National Archives.

Aside from its military history, the reserve has at times provided various natural and geological resources for the local community and the wider area. Timber was harvested from the 1930's to provide fuel for boilers at the Kyneton Hospital. Professional cutters operated here until the 1960's (Davidson *et al.* 1995), resulting in the high number of coppiced trees found in the reserve (see Plate 12). Grassland resources within the reserve were leased to local graziers, resulting in periodic pasture improvement and broad-scale fertiliser application (Davidson *et al.* 1995).

Minor quarrying took place on the north-west basalt slopes (see Plate 25, Figure 2). Although it is not clear as to what the stone was used for, it is possible that some of the stone may have been used in local bluestone buildings (Davidson *et al.* 1995).

Plate 24. Old military shooting targets

Plate 25. Quarry, north-west basalt slopes

3.5 Recreation

Bald Hill provides an important recreation destination for local residents given its size, landscape character and close proximity to Kyneton. The reserve has a long history of recreational events and functions. Prior to its acquisition by the Department of Defence in 1906, the reserve provided a popular annual picnic site for Kyneton residents, drawn to its open spaces and landscape (Jason Sonneman, pers.comm., 2012). At various times this site has hosted Scout Jamborees, police and military functions, pony club events and many other forms of passive recreation (Davidson *et al.* 1995).

Three formalised entrance points into the reserve are located on Pipers Creek Road, Baynton Road and Mount St Mary's Lane (Figure 2). All entrance points provide a locked gate for vehicle access and walk-in entry, with only the Mount St Mary's Lane entrance providing an external, informal car park with space for two to three vehicles. A vehicle access path runs north-south from the Pipers Creek Road to the Baynton Road entrance points (Plate 26, Figure 2). This path serves as the main drive-in access point for members of the Kyneton Gun Club.

Plate 26. Vehicle access path

3.5.1 Current uses

Bush walking is a popular activity at the reserve and the system of informal tracks provides a good opportunity for the visitor to interact with the diverse flora and fauna present (Figure 2). The tracks vary from wide, open paths through to narrow, single track paths (Plate 27).

Plate 27. Informal walking trail

The system of tracks are well utilised by mountain bike cyclists for recreational riding, and a number of single track paths appear to have been created by mountain bike cyclists. Although a prohibited activity, horse riders use the informal tracks and the wider reserve for recreational rides (see section 4.5.1 Visitor Impacts).

3.5.2 Kyneton Gun Club

With its strong military connection, it is perhaps not surprising that the Kyneton Gun Club is based in the south-eastern corner of the reserve (Plate 28). The Club operates under a licence agreement with the Macedon Ranges Shire Council and will celebrate 40 years at the reserve in 2012 (Peter McKenzie, pers.comm., 15 March 2012). Full bore shooting at the reserve ceased in 1986, with clay target shooting events currently held every month. Warning signs within the southern portion of the reserve alert visitors to the presence of a shooting range (Plate 29).

Activities at the Kyneton Gun Club can pose negative impacts if not managed responsibly. Intentional or accidental harm to fauna and flora and carelessness with litter are potential concerns. Site visits to the Gun Club, however, indicate a responsibly managed operation that is cognisant and appreciative of the reserve's ecological values. No litter was observed, and members' contact with the local fauna was seen to be raising their appreciation and understanding of ecological management issues.

Plate 28. Kyneton Gun Club

Plate 29. Warning signs

4 MANAGEMENT ISSUES, THREATS AND ACTIONS

4.1 Management Objectives

The key management objectives for the reserve are to:

- Maintain and secure existing conservation values and biodiversity
- Restore and enhance native vegetation communities and improve their resilience to potential impacts
- Mitigate and, where possible, eliminate identified impacts and threats
- Ensure any adjacent development or use does not compromise the ecological or cultural values of the reserve
- Increase community awareness and interest in the reserve's ecological, geological and cultural significance
- Improve the opportunities for low impact, passive recreation
- Conduct and facilitate appropriate monitoring and continued assessment of the site
- Monitor, identify and manage new threats that may arise.

4.2 Biodiversity Management

4.2.1 Invasive Plants

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

A total of 44 weed species have been identified from previous surveys and through recent incidental observations. Appendix 1.1 contains a list of all recorded weed species. Several of these species (see below) are considered high-threat to the conservation values of the reserve.

An integrated, planned and well-timed weed control response is required to successfully eradicate or control these high-threat 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 grooming; and
- Fire.

Weed control works aim to reduce or eliminate weed populations and assist native species to re-establish and thrive. Weed control works will, in time, increase native species cover, improve the ecological value of the site, strengthen corridors and provide habitat for native fauna species. These outcomes can only be achieved through an on-going commitment by the land manager to reduce weed cover.

Recommended weed control strategies and timing for target species within the Reserve are tabulated below in Table 1.

The locations of target weeds are indicated within Figure 3.

A Timeline and Checklist for Management Actions table is provided in Appendix 6 which outlines control actions in chronological order. This should be used as a guide and checklist for the actions listed below.

Gorse:

Gorse is the dominant woody weed within the reserve and is concentrated along drainage lines and low-lying areas subject to increased levels of moisture (Figure 3). The largest stands occur along the southern boundary adjacent to the main drainage line, with cover gradually decreasing further away from these low-lying areas (see Figure 3). Smaller patches of Gorse occurs upslope on the outer edges of the volcanic crater and granite peak.

Gorse is a dense spiny shrub that was introduced from Europe for hedging purposes (Muyt 2001). It grows two to four metres tall and wide, can form impenetrable thickets and can live for up to 29 years (Muyt 2001). Gorse is a prolific seeder; seeding twice a year in spring-summer and autumn, dispersing seed up to five metres from the parent plant, and has a hard-coated seed able to lie dormant in the soil for up to 30 years (Muyt 2001). Up to 10,000 seeds per square metre can be found underneath well-established stands (Muyt 2001). Gorse excludes all native vegetation once established and can affect native plant regeneration through altering soil nutrient composition. Gorse is a well-known harbour for introduced pests such as fox and rabbits, whilst the prevalence of introduced bird species is often closely associated with introduced plant species (White *et al.* 2005) (Section 3.2.3).

Gorse can provide habitat for some native fauna, despite its status as a noxious weed. Gorse is a dense and prickly shrub, and it is this structure, and the shelter and protection from predators that it provides, that gives it value. Its use is restricted to fauna that would normally rely on native vegetation with a similar structure and function. The value of introduced vegetation as habitat increases as the cover of indigenous flora with a similar structure and function decreases.

Eradication of Gorse, a declared noxious weed within the catchment and a Weed of National Significance, will require a long-term outlook, an integrated strategic approach and lasting commitment and resources to ensure success.

Actions:

Total Gorse removal is the ultimate aim; however removal should be prioritised in the following order:

- *Small outlying patches:* These patches of Gorse are generally small (i.e. less than 10m x 10m area) and are outliers either upslope near Bald Hill and the granite outcrop or at the top of drainage line catchments (see Figure 3). These patches are to be removed either through cut and paint and foliar spray methods (as deemed appropriate). These patches generally occur within areas supporting moderate to high quality vegetation, therefore the cut and paint method is preferable to avoid off-target damage to native vegetation. Follow-up spraying and monitoring of these patches is to occur *at least once a year*. Natural regeneration of surrounding species will likely occur if all Gorse re-growth and new seedlings are targeted on a regular basis.

- *Larger patches upslope:* Larger patches of Gorse upslope towards Bald Hill and the granite outcrop and at the top of drainage line catchments (see Figure 3) require careful removal. These patches are typically greater than 10m x 10m and are located within areas of high quality vegetation. These patches should be removed using cut and paint or foliar spray methods (as deemed appropriate), however the cut and paint method is preferable to avoid off-target damage to native vegetation. Follow-up spraying and monitoring of these patches is to occur *at least once a year*. Natural regeneration of surrounding species will likely occur if all re-growth and new seedlings are targeted on a regular basis. Fenced regeneration/revegetation plots are to be established nearby to replace Gorse habitat and to introduce indigenous mid-storey species which are currently minimal in cover (see Section 4.2.3 for more details on these plots).

- *Larger patches downslope:* Larger patches of Gorse further downslope closer to drainage lines (see Figure 3) are larger than 10m x 10m in area and generally occur within areas of native vegetation. These patches should be removed using cut and paint and foliar spray methods, however the cut and paint method is preferable to avoid off-target damage to native vegetation. Follow-up spraying and monitoring of these patches is to occur *at least once a year*. Natural regeneration of surrounding species will likely occur if all Gorse re-growth and new seedlings are targeted on a regular basis. Fenced regeneration/revegetation plots may be established nearby to replace Gorse habitat and to introduce indigenous mid-storey species which are currently minimal in cover (see Section 4.2.3 for more details on these plots).

- *Large patches of Gorse along main drainage line and within grassland:* These are large connected areas of Gorse that are readily spreading within low-lying open grassland areas or on the fringes of native vegetation (Figure 3). These areas are concentrated along or near the southern boundary (Figure 3) and are large, dense and impenetrable. Effective control in these areas will be the most difficult to achieve

and will be time and labour intensive. Mechanical clearing within open grassland areas is recommended using an excavator or groomer to remove above-ground biomass. This will need to be undertaken in sections beginning from the upstream end. Care will need to be taken to avoid harming resident fauna during the clearing process. If any salvage of native fauna is required during mechanical clearing, this salvage must be undertaken by a suitably qualified and experienced person with the appropriate permits and approvals. Follow-up control with foliar spray will then be required over consecutive seasons to target regrowth and new seedlings. Follow-up spraying and monitoring of these patches is to occur *at least once a year*.

- *Wet areas* (such as around waterbodies and in drainage lines) and areas near native vegetation are not to be mechanically cleared. Heavy machinery in these areas will compact and disturb soil and impact on native vegetation. Foliar sprays are recommended in these areas.

- *Yearly Gorse Control:* During the course of primary Gorse removal works, established patches of Gorse must not be allowed to further spread. Yearly monitoring and control of emerging seedlings outside of established mature stands must be carried out *at least once a year* together with monitoring of recently cleared areas of Gorse. This will ensure larger patches do not further spread and create a larger patch to contend with when primary removal is to occur.

- Control of Gorse will minimise wildfire risk within the reserve. Gorse is highly flammable, and given its proximity to surrounding native vegetation, should be controlled as a fire hazard measure.

- The Timeline and Checklist for Management Actions table (Appendix 6) provides a chronological guide to the actions listed above.

Other high-threat weeds:

Other woody weeds scattered within the reserve include Hawthorn, Sweet Briar and several non-indigenous garden escapes (i.e. Sticky Wattle *Acacia howittii*). Hawthorn and Sweet Briar populations are greatest in number within the north-west corner of the reserve (Figure 3), however individuals are scattered elsewhere. Cover is currently minimal and eradication is achievable. Spear Thistle populations are concentrated within the north-west corner (Figure 3). Hawthorn, Sweet Briar and Spear Thistle are all declared noxious weeds within the North Central Catchment and have the ability to spread and displace native vegetation.

Actions:

- *Target parent populations of Hawthorn, Sweet Briar and Spear Thistle* in the north-west corner using the cut and paint method for woody weeds and targeted spot spray for Spear Thistle. See Table 1 below for control methods and timing. The

area will need to be monitored for new germinants *at least once a year*. Primary removal should be undertaken within the first year.

Ground cover weeds:

Introduced pastoral species are widespread as a result of past grazing practices and weed seeds introduced by horses. Sweet Vernal-grass and Brown Top-bent are the dominant species and a long-term approach will be required to minimise their cover. Whilst Gorse is easy to identify and target in the field, pastoral grasses readily intermingle with native ground layer species, making it more difficult to identify and control. Sweet Vernal-grass, for example, appears similar to the native Reed Bent-grass *Deyeuxia quadriseta*. Pastoral grass species, if allowed to set seed and spread, can greatly devalue a natural forest environment and rapidly displace native species. Sweet Vernal-grass releases a chemical which alters soil composition and inhibits native plant growth. Only reputable contractors with excellent plant identification skills who can identify Sweet Vernal-grass when not in flower are to undertake pastoral grass control works.

Actions:

- *Open grassland areas* (see Figure 2) are ideal areas to undertake mosaic burning for weed control purposes in conjunction with follow-up control and a natural regeneration and/or direct seeding program. See Section 4.2.2 'Fire Management' for more information. Open grassland areas left unburnt in any given season can be slashed prior to flowering to prevent seed set and spread.

- *Spot spray Sweet Vernal-grass and other high-threat ground layer weeds* such as Brown-top Bent and Flatweed, beginning from the most southerly point of Valley Grassy Forest and moving upslope. This should be undertaken in conjunction with a burn/direct seed regime within the open grassland areas. Valley Grassy Forest supports the highest quality vegetation within the reserve and should be prioritised for introduced grass control. One strategy to employ could be spot spraying a 10 metre wide strip along the southern edge of Valley Grassy Forest, and gradually moving upslope. The reserve could also be divided into sections, delineated by existing trails (see Figure 2), with each section targeted (spot sprayed) during the control season of late winter to summer. Spot spraying actively growing plants during this period is recommended to avoid off-target damage to surrounding native vegetation.

- Dense infestations can be slashed prior to flowering if spraying is not feasible.

- Investigate current and emerging control and eradication methods.

General:

- Liaise with neighbouring landholders (particularly on the southern side) regarding Gorse control on their property. Dense infestations of Gorse occur within this property adjacent to the reserve. Neighbour input and action will be required for the Gorse control program to be successful (Section 4.6, Adjoining Uses).

- Weed control works need to continue on roadside reserves along Pipers Creek Road, Mount St Marys Lane and Baynton Road.

- Investigate opportunities to undertake weed control works with the assistance of a local Landcare group. The creation of a Friends group for the reserve could act as a catalyst for involving the local community.

- Ensure weed control works are undertaken by qualified and experienced contractors with all of the appropriate licenses and permits. They must be aware of the objectives of this management plan and should be sensitive to the ecological values of the area. 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 within the sites must take into account the proximity of native vegetation and protective measures must be incorporated accordingly. Ensure the right type of herbicide is used for the conditions and vegetation to be targeted, avoiding off-target damage as much as possible. Herbicide run-off should not be allowed to enter into any drainage lines.

- Large stands of Gorse should be left after being sprayed and allowed to gradually break down. These stands will provide valuable fauna habitat until other native shrubs become established. Retention of large stands of sprayed shrubs will reduce further soil disturbance and subsequent weed invasion.

- 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.

- Ensure all vehicles, machinery and equipment are clean of soil and plant material/seeds when entering and exiting the reserve. Any residue soil or debris collected during weed control works should be cleaned off at the site of infestation.

Table 1. High threat weeds for control within reserve

Botanical Name	Common Name	Location	Timing	Control Method*	Comments
TREES & SHRUBS					
Ulex europaeus	Gorse	Throughout (see Figure 3)	Early spring and early autumn	CP, FS, SL with FS (dependent on location & severity, see above)	See 'Gorse' section above
Crataegus monogyna	Hawthorn	North-west corner, scattered elsewhere	Any time	CP	See 'Other High-threat Weeds' section above
Rosa rubiginosa	Sweet Briar	North-west corner, scattered elsewhere	Any time	CP	See 'Other High-threat Weeds' section above
-	Ornamental garden escapes such as Sticky Wattle	Along western boundary, near shooting targets and along minor drainage lines	Any time	CP	See 'Other High-threat Weeds' section above
HERBS					
Hypochaeris radicata	Flatweed/Cat's Ear	Scattered	Winter-spring	SS	Spot sprayed at rosette stage
Cirsium vulgare	Spear Thistle	North-west corner, scattered elsewhere	Winter-spring	SS	Spot sprayed at rosette stage
GRASSES					
Anthoxanthum odoratum	Sweet Vernal-grass	Throughout	Winter-spring	SL, SS, BN	Grassland areas to be burnt or slashed. Plants within native vegetation areas to be spot sprayed, prioritising areas from the southern end and moving upslope
Agrostis capillaris	Brown Top-bent	Throughout	Winter-spring	SL, SS, BN	Grassland areas to be burnt or slashed. Plants within native vegetation areas to be spot sprayed, prioritising areas from the southern end and moving upslope
Dactylis glomerata	Cocksfoot	Scattered	Winter-spring	SL, SS, BN	Grassland areas to be burnt or slashed. Plants within native vegetation areas to be spot sprayed, prioritising areas from the southern end and moving upslope
Holcus lanatus	Yorkshire Fog Grass	Scattered	Winter-spring	SL, SS, BN	Grassland areas to be burnt or slashed. Plants within native vegetation areas to be spot sprayed, prioritising areas from the southern end and moving upslope
Briza maxima	Large Quaking-grass	Scattered	Winter-spring	SS, BN	Grassland areas to be burnt or slashed. Plants within native vegetation areas to be spot sprayed, prioritising areas from the southern end and moving upslope

* HP = Hand Pull; CP = Cut & Paint with herbicide; FS = Foliar spray; SS = Spot spray with herbicide; SL = Slash or Brushcut; DF = Drill and fill; BN = Burn

4.2.2 Fire Management

***Objective**: Reduction in introduced species cover in open grassland areas through a mosaic burning approach.*

There are no recent records of fire activity within the reserve. It is unlikely that any regular fire regime was implemented prior to European settlement, given the topography of the site and its heavily-vegetated nature. Fire, nevertheless, can be a useful tool for controlling introduced species within the open grassland areas (see Figure 2). These open areas are dominated by pastoral species such as Sweet Vernal-grass and Brown Top-bent, and fire is a tool that can be used to remove their biomass. Open areas support minimal native vegetation therefore follow-up control after fire, direct seeding and planting is required to compete with the guaranteed pastoral grass regrowth. Burning and follow-up control on its own will not assist with natural regeneration if the native seedbank is depleted. In addition, Sweet Vernal-grass alters the chemical composition of the soil, inhibiting the growth of native species. Fire can assist to reduce these chemical levels.

Actions:

- *Each open grassland area is to be divided into thirds* (Figure 2 identifies the location of open areas). One third is to be burnt each season. A smaller area should be burnt within the first season as a 'trial area' for follow-up control, direct seeding, planting and natural regeneration.
- *Fire should not be allowed to enter into the valley grassy forest or grassy woodland habitat*. Only the open grassland area is to be burnt.
- *Schedule burns, where possible, during the autumn period* to reduce fire intensity and impact on flowering species and active wildlife. Ensure soils at the reserve are dry enough prior to the burn to avoid compaction through vehicle movement.
- *Burns are to be undertaken by the local CFA* under the direction of the Macedon Ranges Shire Council in discussion with the Department of Sustainability and Environment (DSE).
- *Minimise fire break areas to three metres in width*. Fire breaks are not to be ploughed or graded but rather cut by a brushcutter or slasher/mower. Fire breaks should be moved slightly each year to avoid repeated slashing in the one location.
- *Fire breaks should be wetted down prior to lighting*. No chemicals or fire retardants are to be used at any stage within the fire break.
- *The precise timing of burns will be determined by the local CFA*. Climatic factors such as temperature, humidity and wind direction and speed will be taken into

account. Nearby residences are to be notified of the burn and traffic along Pipers Creek and Baynton Roads to be alerted to possible heavy smoke in the area.

- *Scan burnt areas* immediately after a burn for any injured wildlife. If burnt or injured wildlife are observed, they should be carefully and safely transported to the nearest veterinary clinic for treatment (e.g. Kyneton). If this is not possible, Wildlife Victoria should be contacted immediately.

- *Ensure follow up weed control is undertaken in burnt areas within four to six weeks post-burn*. Fire breaks will require follow-up treatments. Fire is likely to trigger germination of both native and non-native species. Non-native species (i.e. weeds) should be identified by an experienced and qualified weed control contractor with excellent flora identification skills, and spot sprayed whilst at the seedling stage. Gorse may germinate on a large scale as fire is known to trigger its stored seed. Introduced pastoral species are likely to germinate on a mass scale and this should be assessed after the burn to determine the best follow-up response. Areas that germinate native species should be spot sprayed, whilst larger areas that purely germinate introduced species can be blanket-sprayed or boom-sprayed.

- *Records must be kept* indicating the area burnt, the date and any issues encountered during the burn.

- *Each area burnt will require at least one to two seasons of follow-up weed control* prior to any direct seeding or planting. Natural regeneration of native species is, however, preferable and should be monitored prior to any direct seeding or planting program. Weed control works must not impact on any naturally regenerating species. Direct seeding is recommended within open grassland areas with minimal native germination. Direct seeding should only be undertaken if the site is adequately prepared prior and must only be undertaken by a specialised contractor (i.e. Flora Victoria specialises in direct seeding within grassland areas). Direct seeding, and the corresponding site preparation and follow-up control required, is time and resource intensive. Adequate resources must be allocated to ensure its success.

4.2.3 Natural Regeneration and Revegetation

Objective: *Increase native tree and shrub cover in the mid-storey.*

Gorse is the dominant mid-storey species within the reserve. Native understorey trees and shrubs provide less than 5% cover and include Silver Wattle, Blackwood, Black Wattle and Cherry Ballart. One plant each of Tree Violet, Common Cassinia and Snowy Daisy-bush were observed. The mid-storey layer was presumably greater in cover prior to European settlement and prior to the logging and grazing practices that ensued. Continuous grazing (by both native and introduced animals) and vegetation removal in the past is likely to have significantly reduced the mid-storey layer. See Section 4.2.5 for information on native grazers

at the reserve. It is unclear, however, as to just how well-represented the mid-storey component once was within the landscape (see pg. 16). Consequently, a program to encourage and introduce mid-storey species, whilst necessary, should be undertaken with the intent of replacing Gorse cover and not creating a densely vegetated landscape. Only indigenous species are to be used which should be planted sparsely within fenced plots in conjunction with a concerted Gorse control effort (see Section 4.2.1). Gorse control needs to be undertaken whilst natural regeneration and/or revegetation are conducted. Such a program will minimise displacement of native fauna that rely on Gorse as habitat in the absence of native species. Increasing mid-storey cover will improve ecological values by re-instating some of the mid-storey component and providing greater resilience in the face of climate change (see Section 4.3 below). Revegetation works should not, however, aim for a mid-storey that is dense in cover.

Council should investigate the use of the reserve for collective, over-the- counter offsets. Under Victoria's *Native Vegetation Management – A Framework for Action* (the Framework), 'offsets' are regarded as an existing area of native vegetation or proposed revegetation area that is protected and managed in perpetuity to compensate for the permitted loss of native vegetation through clearing (DSE 2006). As the final option in the three-step net gain approach, offsets may be pursued by Council as a means of achieving its goals for both improving the quality and quantity of vegetation within the reserve.

Collective offset schemes have been proposed by both the Victorian Bushfire Royal Commission (VBRC) and Victorian Competition and Efficiency inquiry into environmental regulation (VCEC inquiry) as a means of making it simpler and quicker for permit holders to meet their offset obligations, and as a means of creating a larger scale offset with improved biodiversity value. Under a collective offset scheme, individual permit holders purchase offset credits to meet their offset requirements. 'Over-the-counter' programs have been identified as a suitable mechanism to provide collective offsets.

Actions:

- *A combination of fenced regeneration plots and fenced revegetation plots are to be strategically placed within the reserve* (see Figure 4). These locations are close to existing larger patches of Gorse that currently provide fauna habitat. Regeneration plots are somewhat experimental at this stage to observe which native species, if any, naturally regenerate with the exclusion of grazing macropods. Regeneration plots should be established as a priority for ongoing monitoring prior to the establishment of fenced revegetation plots.

- Each plot is to be 10 metres x 10 metres in area. This small size is required in order to deter macropods who don't like confined spaces.

- Fences should be 1-1.5 metres tall using chicken wire and at least two wire strands at the top. The top wire strand should be white (using poly-piping) for visibility. Star pickets to be used at each corner.
- Only indigenous species to be planted within revegetation plots. Species list and numbers are provided below.
- Each plot is to be monitored biennially or as required (see 'Monitoring' Section 4.7). If regeneration plots are deemed unsuccessful after two years, revegetation should be the focus within the remainder of the reserve.
- Investigate the potential for the reserve to be utilised for an over-the-counter offset scheme.
- A Timeline and Checklist for Management Actions table is provided in Appendix 6. This should be used as a guide and checklist for the actions listed above.

Table 2. Suggested species for revegetation within fenced plots

Botanical Name*	Common Name
GRANITIC GRASSY WOODLAND	
UNDERSTOREY TREES	
Acacia mearnsii	Black Wattle
Acacia melanoxylon	Blackwood
Acacia implexa	Lightwood
Acacia pycnantha	Golden Wattle
MEDIUM SHRUBS	
Acacia paradoxa	Hedge Wattle
Cassinia arcuata	Drooping Cassinia
Cassinia aculeata	Common Cassinia
GRASSY WOODLAND (BASALT)	
UNDERSTOREY TREES	
Acacia mearnsii	Black Wattle
Acacia dealbata	Silver Wattle
Acacia melanoxylon	Blackwood
Allocasuarina littoralis	Black Sheoak
Acacia pycnantha	Golden Wattle
MEDIUM SHRUBS	
Acacia paradoxa	Hedge Wattle
Cassinia arcuata	Drooping Cassinia
Melicytus dentatus	Tree Violet
VALLEY GRASSY FOREST	
UNDERSTOREY TREES	
Acacia mearnsii	Black Wattle
Acacia dealbata	Silver Wattle
Acacia melanoxylon	Blackwood
MEDIUM SHRUBS	
Acacia paradoxa	Hedge Wattle
Cassinia aculeata	Common Cassinia
Daviesia leptophylla	Narrow-leaf Bitter-pea

*Note: all shrubs to be planted in clusters within fenced areas

Revegetation should follow the relevant EVC benchmark as a guide for species selection and density.

4.2.4 Pest Animal Management

Objective: *Reduce the number of invasive pest animals within the reserve through an integrated habitat removal program.*

Ten introduced fauna species were recorded at the reserve during the recent fauna survey: Black Rat, Cat, European Hare, European Rabbit, House Mouse, Red Fox, Common Blackbird, Common Starling, European Honey Bee and Portuguese Millipede.

Rabbits and Hares have the potential to cause significant environmental damage through the suppression of indigenous plant regeneration, competition with native wildlife for food resources and provide a ready food source for feral cats and foxes. Although Rabbit numbers do not appear particularly high on site, several burrows were found throughout the reserve during the recent fauna assessment (e.g. on the upper southern slope of Bald Hill and immediately west of the Mount St Marys Lane access gate). Rabbits were observed running through the grassland habitat on site with small amounts of scat identified. One Hare was observed on site. Unlike the Rabbit, Hares do not burrow and are predominantly confined to modified environments (Jarman 2004). Both the European Rabbit and European Hare are declared Established Pest Animals under the *Catchment and Land Protection Act 1994* (CALP Act). Competition and land degradation caused by rabbits is listed as a Potentially Threatening Process under the FFG Act. Reduction in biomass and biodiversity of native vegetation through grazing by rabbits is a listed as a Key Threatening Process under the EPBC Act.

Foxes were identified on a number of spot lit surveys the recent fauna assessment with a small amount of scat recorded. A den was found on the south-eastern slope of Bald Hill, with bones and feathers observed nearby. Foxes have a varied diet and are known to prey upon rabbits as well as many smaller native mammals, birds, reptiles and frogs. They will eat insects, fruit and other vegetable matter as well as carrion. The Red Fox has been declared an Established Pest Animal under the CALP Act, whilst predation by foxes is listed as a Threatening Process under both the FFG Act and the EPBC Act. Predation by foxes has been identified as a known or perceived threat to 34 native species in threat abatement plans provided under the EPBC Act (Seebeck and Friend 2002).

Cat hair was identified in several hair tubes during the recent fauna assessment. 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.

The House Mouse, abundant in modified agricultural and urban environments, is one of Australia's major pest animals (DEWR 2007). It is known to eat young birds and eggs and the seeds of native vegetation and agricultural crops.

Black Rats utilise most habitats, but appear to prefer drier environments. They are omnivores and opportunistic feeders that utilise a diverse range of food sources to facilitate colonisation of different environments. They prey primarily on birds, eggs, small mammals, lizards, large insects, snails, fungi and plant seeds and seedlings.

Mice and Rats directly impact native fauna through predation, and indirectly through competition with native rodents and as carriers of disease (TSSC 2006; Crowley 2011). Despite their status as pest animals, neither the House Mouse nor Black Rat is listed under the CALP Act, FFG Act or EPBC Act.

Introduced bird species are particularly common in disturbed and developed landscapes, where habitat for indigenous species has been highly modified. Both the Common Blackbird and Starling, recently recorded within the reserve, are prevalent throughout Victoria, being found in cities, towns and gardens, agricultural land, open woodland and scrub. Introduced birds compete with native species for nesting hollows, food resources and shelter sites. However, the effective long-term control of introduced birds is very difficult, and resources may be better spent managing habitat in a way that renders it less suitable for introduced species (e.g. increased planting of indigenous flora, thereby reducing areas of disturbed and weed-dominated habitat).

The introduced European Honeybee and Portuguese Millipede can produce both positive and negative effects on native plants and animals. Honeybees are known to visit the flowers of at least 200 Australian plant genera and may enhance the seed production of a number of native plants whose indigenous pollinators have undergone decline (Paton 1996). However, they can also reduce the seed production of some native plants and compete with honeyeaters for nectar resources. Numbers of native bees may decline following influxes of Honeybees into an area, but data on this relationship is equivocal (Paton 1996). Millipedes may play an important role in soil formation, breaking down leaf litter and enriching the soil. They, however, compete with native millipedes and other invertebrates for food and habitat resources. Whilst neither the European Honeybee or Portuguese Millipede are listed under the CALP Act, threats to native flora and fauna arising from the use by feral Honeybees of nesting hollows and floral resources have been listed as a Potentially Threatening Process under the FFG Act.

Woody weed species such as Gorse, Hawthorn and Sweet Briar are found throughout the reserve (Figure 3). These species all provide suitable habitat for fauna pests. Pest animal management on-site should focus on removing harbour for introduced species both within and immediately surrounding the reserve. The replacement of this introduced vegetation with indigenous species will create a less favourable environment for introduced fauna, whilst providing improved habitat and linkages for native species.

The impact of works to reduce pest animals will be maximised through a coordinated and integrated approach involving Landcare, the North Central Catchment Management Authority (NCCMA), and neighbouring private properties. This coordinated approach will seek to remove suitable harbour from within the reserve and adjoining properties.

Actions:

- *An integrated pest animal management approach incorporating a number of measures, including warren, burrow and harbour destruction, warren and burrow fumigation, poisoning (e.g. 1080) and shooting should be implemented.* Optimum control is best achieved by integrating more than one control method (DPI 2007). However, the potential for adverse impacts upon other values and uses of the reserve need to be taken into account. For example, soil disturbance by warren destruction may lead to increased weed cover, and poisoning may affect non-target species (e.g. pet dogs). Management actions at the reserve should concentrate upon the destruction of pest animal harbour. This can be supported by a well-organised shooting regime, conforming to relevant firearm legislation, under guidance from the Department of Primary Industries and police.

- *Weed control works are to be undertaken according to recommendations in Section 4.2.1.* Works should target woody weeds and pest animal harbour such as Gorse, Hawthorn and Sweet Briar as part of the general weed control program.

- *Liaise with the local Landcare group, the NCCMA, and nearby landholders* to determine opportunities and resources available to target established introduced flora species within the reserve and adjoining properties. Alternatively, the formation of a Friends group for the reserve could act as a catalyst for involving the local community and providing a volunteer labour force.

- Significant areas both within the reserve and adjoining properties support dense and well-established stands of introduced flora and pest animal harbour. Gradual removal and replacement of these stands will require a long-term commitment from all stakeholders together with intensive long-term resourcing.

4.2.5 Native Fauna Management

Objective: *To retain and enhance habitat for the indigenous fauna population whilst not compromising the ecological values of the reserve*

There are two facets to the management of native fauna. The first concerns the management of uncommon and threatened species, whilst the second concerns the management of potentially over-abundant species.

The management of uncommon and threatened species is focussed upon the alleviation of factors restricting population growth. This primarily involves the creation of habitat and reduction in the number of introduced predators and/or competitors. For example:

- Coarse woody debris, such as fallen branches, bark, logs and stumps, are important structural components of many forest and woodland ecosystems and has a role in a number of aspects of ecosystem functionality. Woody debris can be sites for seedling establishment and create habitat for many types of native vertebrates, invertebrates, fungi, and microorganisms (Woldendorp *et al.* 2002). E.g. Studies carried out on lizard populations in areas where debris has been removed compared to areas where the litter and woody debris has been retained found 210 lizards per hectare opposed to 1500 lizards per hectare respectively (Paul Gray, pers.comm., 2011). Ground feeding birds, reptiles, frogs plus 20% of native mammals require coarse woody debris and leaf litter for shelter, refuge, foraging and basking (BRGCMA 2008).
- Bald Hill Reserve currently supports a high level of coarse woody debris; very few areas within the local area contain this amount and size of fallen timber (Paul Gray, pers.comm., 2011). The size of fallen timber ranges from small twigs to large branches and entire fallen trees. Leaf litter and twigs aid in retaining soil temperature and water retention. This in return reduces areas of soil erosion, weed invasion, compaction and loss of soil moisture. Weather, fungi and termite activity breaks down this material returning nutrients to the soil.
- Fallen trees may contain hollows, fissures and spouts that supply important fauna habitat, in much the same way as similar resources in standing trees, both living and dead (stags).
- The availability of tree hollows is often a limiting factor in the abundance and distribution of fauna populations. Approximately 31% of native mammals, 15% of birds, 10% of reptiles and 13% of frogs may at some time use tree hollows for shelter and breeding purposes (Gibbons and Lindenmayer 2000). This includes the state significant Brush-tailed Phascogale, which is totally dependent upon hollows.

The management of potentially over-abundant species is focussed upon population control in order to reduce adverse impacts upon the environment. For example:

- Eastern Grey Kangaroos were the most common terrestrial fauna recorded on site during the recent fauna assessment. It would appear that there is at least one (or possibly two) mobs resident within the Reserve, utilising both the grassland and forested areas (Atlas Ecology 2012). Swamp Wallabies were recorded on site, but at much lower densities. Mid-storey trees and shrubs are largely absent on site due to previous land uses and persistent grazing. Macropods, such as Eastern Grey Kangaroo and Swamp Wallaby, may present a grazing threat to the ecological values of the reserve, by preventing regeneration and revegetation of indigenous flora. In particular, wallabies, as browsers, may have a bigger impact than thought on the regeneration of the shrub layer. Overgrazing can have a profound impact on ground

cover, modifying habitat that is critical for other species and causing soil erosion and a decline in water quality.

Actions:

- *Weed control works (Section 4.2.1), in combination with indigenous flora regeneration and revegetation (Section 4.2.3) and management of pest animals (Section 4.2.4), will help in the creation of habitat and reduction in the number of introduced predators and/or competitors.*

- *Coarse woody debris must be left where it has fallen as it provides critical habitat for a range of flora and fauna species*. The most common argument for removing woody debris is the potential for increased fire risk. Scheduled burns within the modified grassland areas and removal of Gorse will help to reduce the overall fire risk within the reserve without destroying this significant habitat resource.

- *Nest boxes suitable for the suite of fauna species found on site should be installed.* Whilst many tree hollows of various sizes and configurations were observed throughout the reserve, hollows large enough to be used by vertebrates take between 80 to 100 years to form and are thus considered a limiting resource. Artificial nest boxes can help reduce competition amongst individuals and species for native hollows and thus help to increase local fauna populations (Plate 30). Nest boxes come in many shapes and sizes, depending on the species being targeted, and may be sourced from a variety of suppliers including local indigenous nurseries or Birds Australia. A good example is the La Trobe Wildlife Sanctuary indigenous plant nursery, which can build and install over 10 different types of nest box (www.latrobe.edu.au/wildlife/nursery). Nest boxes should be placed at least three metres off the ground and located in a sheltered position. They should be monitored on a regular basis (e.g. once or twice a year) and repaired as necessary. As this task can be undertaken by volunteers (e.g. a Friends group), this will provide opportunities for community involvement in the reserve. The Organ Pipes National Park is an example of a successful, long-term community breeding box program.

Plate 30. Brush-tailed Phascogale using a nest box

- Eastern Grey Kangaroo populations have the potential to reach very high densities in suitable environments. Within the reserve, they may present a grazing threat to ecological values, by preventing regeneration and revegetation of indigenous flora. Methods for specifically managing kangaroo population growth must be based on best available science, effectiveness, humaneness, cost-effectiveness and safety. There are two approaches for potential kangaroo control that are deemed suitable: fertility control, which may be costly and labour-intensive; and environmental modification (Parks, Conservation and Lands, 2010). Given the connectivity of grassland habitat within the reserve to surrounding open land, kangaroo movement is not restricted and animals may move off-site to graze. Active control measures may therefore not be required. Instead, the fencing of regeneration and revegetation plots until such time that protected flora can withstand some grazing pressure should be sufficient to address this issue.

4.2.6 Habitat Connectivity

Objective: *To protect and further improve habitat connectivity with the reserve.*

The local landscape was once covered by a mosaic of several different habitat types, including Valley Grassy Forest, Grassy Woodland, Plains Grassy Woodland and Granitic Hills Woodland, with Grassy Dry Forest and Herb-rich Foothill Forest found on nearby high ground, and Damp Sands Herb-rich Woodland and Swamp Scrub found in adjacent low-lying areas (DSE 2012). This mosaic supported many different fauna species that bred, foraged and dispersed throughout their territories and beyond. Over time, disturbance and clearing of native vegetation resulted in only isolated fragments and patches of vegetation being left in an otherwise cleared or modified landscape. Native fauna species are less able to move across this changed landscape and are therefore more vulnerable to local extinction and loss of genetic diversity. Local incidents of fire or disease can devastate populations that exist in remnant patches of vegetation, with species less able to recolonise the area as they once had.

The reserve is located within a highly fragmented and degraded landscape. Connectivity to other bushland areas is limited by surrounding agricultural land. Linkages to other remnant patches of habitat still exist, primarily via adjoining road reserves. The narrow width of road reserves and the danger posed by vehicles to wildlife are, however, obvious limitations to linkages via road reserves. The arboreal habitat on site forms links to other remnant patches of habitat throughout the local landscape, particularly on private land as well as public land including the Black Hill Reserve and Cobaw State Forest. Given the limitations of linkages via road reserves, opportunities to connect habitat across private and public land must be prioritised.

Improving habitat connectivity between the reserve and the surrounding local area will link areas of remnant vegetation within an otherwise cleared or modified landscape. Vegetation corridors allow the movement of wildlife between remnant patches of native vegetation while providing fauna habitat, effectively reversing habitat fragmentation in the local area.

Mammals, birds, reptiles, amphibians and invertebrates otherwise 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, or to escape disease or fire (See also Section 4.3). It allows animals to respond to population pressure, e.g. move 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.

A longer-term aim of Council and the NCCMA should be to engage with local landholders and the wider community to continue regeneration and revegetation works, both within the reserve and throughout the local area. This 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:

- *A general reduction of introduced and invasive plant species and replacement with indigenous species*, both within the reserve and in the surrounding area, combined with sensitive management of recreational uses, will increase fauna habitat availability and connectivity.
- *Determine opportunities and resources available to target established introduced species both within and around the reserve*. Works to improve habitat connectivity within the reserve and throughout the surrounding area need to involve an integrated and coordinated approach involving Council, Landcare, NCCMA, and private landholders. The gradual removal and replacement of larges stands of exotic vegetation with indigenous species will require a long-term commitment from all stakeholders together with intensive long-term resourcing.

4.2.7 Soil Contamination

Objective: *Ensure awareness of soil contamination issues on site and prevent further contamination from occurring.*

The former Shire of Kyneton commissioned an environmental audit by Camp Scott Furphy Pty. Ltd at the Kyneton Rifle Range in December 1990 (Paul Gray, pers.comm., 2011). The audit was to investigate the extent, if any, of lead contamination due to previous and current uses. An investigation into ground water contamination was not included in the study brief.

Samples were divided into three main types of lead: Particulate (>2mm), fine particulate (<2mm) and decomposed lead. Soil samples were taken from three sections: Rifle range target and stop butts; rifle range (general) and clay target range. Elevated levels of lead

contamination were found in both the rifle range and clay target ranges areas. Of the eighteen sample sites thirteen recorded levels above those of the Australian and New Zealand Environment Conservation Council (ANZECC) draft guidelines recommended safe levels.

The study found that a total of 4500 cubic meters of soil would be required to be removed with 4250 cubic meters from the clay target range alone. The removal of 150mm of topsoil would have significant environmental impacts including the loss of vegetation. It is in an area that will not be developed and therefore should have no detrimental impacts on human settlement.

In July 1993 it was recommended that council request the Kyneton Gun Club to change over to steel shot. It was understood at the time that the clay target shooting club was in the process of changing from lead shot to another material (Paul Gray, pers.comm., 2011).

Lead shot may potentially accumulate in soil, mud, ephemeral wetlands and dams. Although it has been 18 years since lead shot was last used within the reserve, lead may remain in the environment for thousands of years (Rooney, undated). If this lead is ingested by fauna (e.g. by birds foraging in wetland margins), poisoning and death may occur. It should be noted, however, that although this is a possibility, the likelihood of it occurring is very low.

Actions:

- *Kyneton Gun Club should continue to use steel shot.*
- *Lead contamination can be removed from the environment via phytoremediation* (i.e. using plants to remove lead from soil). Plants from the following families have been used for this purpose: Brassicaceae, Euphorbiaceae, Asteraceae, Lamiaceae, and Scrophulariaceae. However, given the potential costs of this method compared to the low likelihood of significant benefits, this is not recommended.
- If an animal is found that appears to be ill or suffering the effects of heavy metal poisoning (e.g. head tilt, tremors, emaciation, blindness, altered breathing), it should be carefully and safely transported to the nearest veterinary clinic for treatment (e.g. Kyneton). If this is not possible, Wildlife Victoria should be contacted immediately.

4.2.8 Further Surveys

Objective: *To better understand the ecological dynamics of the reserve and to enable the incorporation of adaptive practices into reserve management.*

A total of 313 flora species have been recorded within a 10-kilometre radius of the reserve in the past 100 years (FIS 2012). Two formal flora surveys have been undertaken within the reserve (both in 1995) and the results of these surveys, together with recent observations, are listed in Appendix 1.1.

The level of documented fauna survey effort in the local area over the past 100 years has been quite low, with only 111 fauna surveys or incidental records of individual species occurring within a ten kilometre radius centred on the study site (AVW 2012). From this data there have been approximately 123 individual species documented, with a high survey sample of birds and a moderate number of species recorded from other fauna groups. Overall, there is a reasonable amount of fauna data available on the AVW for most fauna groups, with the exception of invertebrates. Prior to the recent fauna assessment conducted by Atlas Ecology, only one formal fauna survey had previously been undertaken (1995), as well as a number of informal surveys and incidental sightings of fauna since that time.

Actions:

- *Flora:* incidental records of any new flora species at the reserve should be documented and provided to local council, the Flora Information System (FIS) or any other relevant database systems available at the time. New species have been recorded during the development of this management plan, and it is likely that there may be more species to document. Local council officers, ecologists, on-ground contractors and the community have a responsibility to positively identify any potentially new species for the reserve and to document accordingly. This will increase our current knowledge of what is present within the reserve which will in turn further inform management practices.

- *Matted Flax-lily and Clover Glycine:* targeted surveys for these two nationally significant species are recommended within the vicinity of the Bald Hill volcanic crater (Matted Flax-lily) and the granite outcrop (Clover Glycine). Specific locations and population numbers have not been provided with previous surveys. Each individual plant, or patch, should be recorded with a GPS and notes taken (i.e. evidence of flowering or fruiting material, size of patch, number of individuals, number of tillers and threats). Biennial monitoring of these populations is advised after this baseline data has been recorded. See 'Monitoring' Section 4.7.

- *Fauna:* Incidental records of any new fauna species at the reserve should be documented and provided to local council, the Atlas of Victorian Wildlife (AVW), or any other relevant database systems available at the time. Local council officers, ecologists, on-ground contractors and the community have a responsibility to positively identify any potentially new species for the reserve and to document accordingly. This will increase our current knowledge of what is present within the reserve which will in turn further inform management practices.

- Investigate opportunities to partner with local, state and commonwealth educational organisations to conduct further studies and surveys.

- Encourage local educational institutions to utilise the reserve as an outdoor classroom for environmental studies.

4.3 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 Kyneton region, are for drier and hotter conditions under climate change scenarios. By 2030 a temperature increase of 0.9°C is predicted, while a temperature increase of between 1.4° C and 2.8° C can be expected by 2070. Less rainfall events are likely, 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 given the reserve's relatively small size and limited connectivity with other bushland areas, which limits the ability for species migration and distribution, reduces ecosystem resistance and resilience and may intensify potential impacts such as:

- Changes to 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 not be affected;
- An increasing vulnerability for aquatic species as rain events 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 (currently in progress) 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 address 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 management approach*. The relatively small size of the reserve and the considerable distance from other core bushland areas presents challenges to increasing resilience to potential disturbance events. A landscape scale approach that considers connectivity to adjoining bushland areas through private property will provide better options for species distribution and abundance (see section 4.2.6). Properties between the reserve and Cobaw State Forest and Black Hill Reserve could be targeted for measures that assist in creating vegetation corridors such as incentives for revegetation, fencing, stock exclusion and protection covenants. This approach aligns with the aims of the Cobaw Biolink, contained in Schedule 8 to the Vegetation Protection Overlay in the Macedon Ranges Planning Scheme. Schedule 8 states;

  > *'Council's vision for the area between the Macedon and Cobaw Ranges is establishing a biolink between these areas of significant vegetation. Any existing native vegetation is valuable for its contribution of mature vegetation to this corridor.'*

- *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 the Catchment Management Authority and Landcare.

4.4 Shared Cultural Heritage

Objective: *Identify potential partnership opportunities with traditional owners and explore pathways that identify the reserve's cultural heritage.*

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 Dja Dja Wurung Clans Aboriginal Corporation (DDWCAC) is the registered Aboriginal party responsible for the management of Aboriginal cultural heritage. The DDWCAC provide advice on applications for Cultural Heritage Permits, decisions about Cultural Heritage Agreements and advice or application for interim or on-going Protection Declarations.

Actions:

- *Through discussion with the DDWCAC, identify a preferred partnership approach to ensure culturally significant sites are conserved and protected from potential impacts*. Partnership opportunities between the DDWCAC and Macedon Ranges Shire Council should be considered given the presence of culturally significant sites and their relative fragility. Partnership opportunities include informal 'in principal' documents such as a memorandum of understanding or statement of intent. Formal, legally binding agreements such as a Cultural Heritage Agreement, enforceable under the *Aboriginal Heritage Act 2006,* should be investigated as a potential partnership approach.

- *Investigate potential funding opportunities to carry out a detailed Aboriginal Cultural Heritage survey*.

- *Investigate potential funding opportunities to carry out a detailed European Heritage survey*.

4.5 Recreation Management

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

Opportunities for low impact engagement with the ecological and geological values of the reserve should be encouraged. This engagement will appeal to bush walkers, bird watchers, photographers, naturalists, geologists and students of science. Such interactions are aimed at informing and educating visitors on the values of grassy woodland and valley grassy 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 and tourism access to the reserve need to be undertaken in a cautionary and sensitive manner. The presence of nationally and state significant species, a rich diversity of indigenous flora and fauna species, sites of cultural significance and geological value require careful management to ensure these values are conserved and not damaged through visitor interaction. This managed approach is especially important when considering the relatively small size of the reserve, the lack of connectivity

with adjoining bushland environments and close proximity to the Kyneton township, which makes it particularly susceptible to visitor impacts.

4.5.1 Visitor impacts

***Objective**: minimise visitor impacts through the management of activities and the promotion of prohibited activities.*

Visitor impacts within the reserve are relatively minor. Tracks, including walking paths and single track mountain bike trails, are established and well utilised, limiting intrusion by visitors into significant and sensitive areas. The potential, however, for visitor's to negatively impact on the reserve's ecological and aesthetic appeal is significant and requires an appropriate management framework.

Mountain Bike Riders

Informal tracks within the reserve are suited to single cyclists and small groups that minimise ecological impacts and the potential for safety issues with walkers. Large groups of cyclists and competition events are not appropriate activities within the reserve. The effects of mountain biking can be readily seen within the reserve, with the compaction and erosion of some tracks evident (Plate 31). The creation of new informal trails into ecologically sensitive areas is an ever-present threat. Cyclists must be reminded to ride only along the existing track network at a speed that does not pose safety concerns for other users or wildlife.

Plate 31. Scuffed mountain bike track

Trail markers which have likely been placed by mountain bike cyclists, were located at a number of sites, usually nailed into trees or branches (Plate 32). The placement of informal markers is a prohibited activity within the reserve that can be prevented through placing formalised trail markers at designated spots.

Plate 32. Trail marker

Horse Riders

Horse riding within the reserve is a prohibited activity. Horse riding is a threatening ecological process that can result in weed introduction and infestation, increased nutrient loading, soil compaction and grazing of significant flora species. Riders are likely to stray from established tracks and venture into sensitive and significant areas (Plate 33). Horse riding on narrow paths can pose significant safety concerns for horse riders and for other users of the reserve, including bushwalkers. The interaction of bushwalkers and their domestic dogs with horses can lead to safety issues from animals being spooked and from potentially aggressive behaviour.

The Shire of Macedon Ranges provides horse riders with considerable opportunities to ride within other reserves and organised clubs. The exclusion of this reserve will not impact significantly on horse riding opportunities within the local area.

Plate 33. Horse-riders stray from established trails (right edge of plate)

Timber Collection

The collection of fallen timber and trees for wood heating is an on-going threat to habitat values. Trees that had been sawn for firewood were evident at a number of sites within the reserve (Plate 34).

Plate 34. Sawn logs for firewood

Rubbish Dumping

A minor amount of litter was seen in the reserve, however no evidence of rubbish dumping was found. Mount St Mary's Lane is a site of occasional rubbish dumping (Jason Sonneman, pers.comm.).

Actions:

- *Install interpretive signage that highlights prohibited and inappropriate activities within the reserve including horse riding, timber collection and rubbish dumping* (see section 4.5.3, Interpretive Signage).

- *Install interpretive signage that encourages mountain bike riders to stay within the established track system and to travel at low speed* (see section 4.5.3, Interpretive Signage).

- *Encourage neighbouring landholders to report to Council any prohibited activities such as horse riding, timber collection or rubbish dumping* (see section 4.6, Adjoining Uses).

4.5.2 Reserve Access

Objectives: *Encourage low impact visitation through an informal track network that limits impacts to the reserve's values.*

A series of connecting informal tracks currently provide the visitor with access to a wide cross-section of the reserve. These tracks vary in width and condition from informal vehicular access paths through to narrow, single track mountain bike paths. No other visitor infrastructure is present aside from facilities at the Kyneton Gun Club which include a locked toilet and various sheds. Access is via three walk in points along Mount St Mary's Lane, Pipers Creek Road and Baynton Road. These access points also have locked gates that allow vehicles to access, with the Pipers Creek Road access the entrance point for members of the Gun Club.

Actions:

Informal Tracks:

- *Prevent/limit any further informal track creation*. The current informal track network (Figure 2) provides visitors with good opportunities to access a large section of the reserve. Further access tracks are not required and may simply accelerate loss of the reserve's values. Signage indicating that visitors remain to on the tracks provided is recommended (see Section 4.5.2).

- *Maintain current track condition and system network*. The current track network is of varying width and condition, providing bushwalkers and cyclists with good conditions that should easily meet their needs. An informal path that runs from Baynton Road to Pipers Creek Road also permits vehicular access where required (Figure 2). It is not considered necessary to close or centralise the current track network as none threaten the reserve's values or present an unacceptable danger to visitors.

Access Points:

- *Identify a key entry point*. Visitors have walk in access points on Mount St Mary's Lane, Pipers Creek Road and Baynton Road (Figure 2). The Baynton Road entrance provides no car parking options for visitors and is located on a high speed road with no shoulder. Similarly, Pipers Creek Road provides no car parking option and is likely to be only accessed by members of the Gun Club and the occasional horse rider. The Mount St Mary's Lane access is the most popular entrance point, but provides limited car parking for two or three vehicles along a narrow dirt road intended only for local traffic (Plate 35).

  If visitor numbers are to remain at current levels, the Mount St Mary's Lane access point can comfortably accommodate car parking requirements. If, however, an increase in visitor numbers is expected then alternative options could be explored. These options can include an upgrade to the Mount St Mary's Lane entrance to accommodate more parking. Alternatively, a small formal or informal car park at the Pipers Creek Road entry could be investigated, preferably within the reserve on a patch infested with Sweet Vernal-grass.

Plate 35. Mount St Mary's Lane entrance and car park

- *Investigate the installation of an access gating system to allow ease of access for maintenance and emergency vehicles, Kyneton Gun Club participants and passive recreational uses.*

- *Install interpretive signage at the Mount St Mary's Lane and Pipers Creek Road entrance.* See Section 4.5.2 below.

- *Consider signage at the Pipers Creek Road access*. Signage advertising the Kyneton Gun Club is currently located along the Pipers Creek Road entrance. There is no signage

indicating that Bald Hill Reserve is located here and it is recommended that this be installed (Plate 36).

- *Ensure the access points are weed free and maintained.*

Plate 36. Pipers Creek Road entrance

4.5.3 Interpretive Signage

Objective: *Through information provided via interpretive displays at key access points, provide visitors with an opportunity to understand and engage with the ecological, geological and shared cultural heritage values of the reserve.*

There is currently no signage that indicates the presence of the reserve or its significant values. As a destination for passive recreation for visitors and tourists, the value of this signage is considerable and will greatly enhance the appreciation and understanding of the fragility and importance of the vegetation communities present.

Actions:

- *Install interpretive signage*. Information on the ecological, geological and shared cultural heritage values should be placed at the Mount St Marys Lane access point. Similarly, location signage indicating the presence of the reserve should be placed at the Pipers Creek Road access. Investigate and use material not subject to fade with interpretive signage.

- *Install wildlife danger sign on Baynton Road*. Signage warning drivers of crossing wildlife should be placed on Baynton Road, adjacent to the reserve. Vehicles drive here at high speeds along a narrow road with no road shoulder. Fauna mortality due to collision with cars is likely in this scenario (e.g. as evidenced by the presence of two dead Brush-tailed

Phascogale previously found by this roadside), with the potential to impact on human health and safety.

- *Highlight prohibited and inappropriate activities and relevant fines*. Prohibited activities within the Reserve such as horse riding, trail bikes, firewood collection, rubbish dumping, camping and seed and flower collecting should be noted at all entrance points. Visitors, especially mountain bike riders, should be reminded to remain within the established tracks at all times.

4.5.4 Low Impact, Passive Tourism

Objective: *Encourage low impact, passive tourism.*

Objective*: Communicate prohibited activities to users including trail bike and horse riding*.

The relative scarcity of intact grassy woodland and valley grassy forest communities greatly heightens their appeal as a destination for low impact, nature-based tourists such as bird watchers, photographers, naturalists and students of science and education. Promotion of the reserve and its conservation values aligns with the vision of the Macedon Ranges as a destination that delivers excellence in nature based tourism (Macedon Ranges Tourism Industry Strategic Plan 2011). Nature based visitors may also deliver significant economic benefits to Kyneton and the wider region.

i. Birdwatchers, Photographers, Naturalists

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

Promotion of the reserve as a remnant grassy woodland and valley grassy forest will attract low impact visitors interested in photography, bird watching and ecology. Promotion to members of groups such as the Field Naturalists Club of Victoria, Indigenous Flora and Fauna Association, Birds Australia, etc. will increase awareness and potential visitation including study groups to the reserve.

Actions:

- *Promote the reserve's values 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 Landcare.*

ii. Education and Science

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

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

Promotion of the reserve as a remnant grassy woodland and valley grassy forest will attract local secondary and regional tertiary institutions in the field of ecology, biology, botany and zoology.

Actions:

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

4.6 Adjoining Uses

Objective: *ensure that adjoining uses do not impact on the reserve's values.*

4.6.1 Deakin Court

Deakin Court, to the immediate west, contains a number of small acreage properties. These homes have been landscaped with planted ornamentals and other exotics that can easily escape to the neighbouring reserve. Domestic pets, such as cats and dogs, can have a severe impact on native fauna.

4.6.2 Pipers Creek Road, Mount St Mary's Lane and Baynton Road

Large acreage homes along Pipers Creek Road, Mount St Mary's Lane and Baynton Road provide an ever present weed threat. Large patches of Gorse, Thistle and Sweet Vernal-grass abound on neighbouring properties along Pipers Creek Road. Weed control works within the reserve will be significantly assisted by similar measures in adjoining properties. This will ensure the spread of weed seed and harbour for invasive animals is minimised.

4.6.3 Road Reserves

Similar to neighbouring properties, road reserves can introduce weed seed and provide harbour for invasive animals. This is especially true for Mount St Mary's Lane, which has large patches of Gorse growing on the western road reserve.

Actions:

- *Provide information to adjoining residents and members of the on-site Kyneton Gun Club on the values of the reserve and potential impacts including invasive plants and animals, firewood collection, the dumping of garden rubbish and litter.* This information could be provided via the production of a 'Good Neighbour' brochure (see Frankston City Council 'Good Bushland Neighbour' guide).

- *Encourage adjoining residents to plant indigenous species and to control pest plants such as Gorse and Thistle to stop them from spreading into the reserve.*

- *Ensure adjoining residents know their responsibilities regarding pet animals to prevent attack on native fauna* (e.g. keep dogs on lead whilst in the reserve; use a cat enclosure or enforce an overnight cat curfew). This will help to reduce the risk of predation on native fauna.

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

- *Encourage adjoining residents to act as champions for the reserve by reporting any illegal activities such as horse riding, firewood collection or rubbish dumping.*

- *Ensure the pest plant control program within the reserve is replicated with action along roadside reserves where pest plants are present.*

4.7 Monitoring

Objective: *Monitor management actions so that they achieve their stated objectives and allow for adaptation in the face of changing circumstances.*

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 or ecologist 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 6 summarises the plan's management actions and can be used as a check list.

- *Establishment of 10 (10 x 10) metre permanent quadrats.* These should be situated across the reserve and focussed on areas incorporating Gorse control and burning/direct seeding. Areas selected should represent differing reserve characteristics, i.e. within all four vegetation zones (including open grassland). 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 10 quadrats should be assessed biennially to determine any changes, issues or improvements to the quadrat areas. 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;
    - Height of tallest plant in quadrat;
    - List of native species successfully recruiting or regenerating;
    - Organic litter % cover;
    - Estimate of length of logs (woody debris greater than 10cm diameter).

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

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

- *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.

- *Baseline data for Matted Flax-lily and Clover Glycine to be collected* (see Section 4.2.7). Further monitoring of these populations to be undertaken biennially using a format as shown below (or similar) in Tables 3 and 4.

- This management plan is an adaptable document which needs to be reviewed and modified where necessary in accordance with monitoring results. New priorities, issues and management requirements that may become apparent at the reserve may need to be factored into this plan. Monitoring methodology is to be reviewed and changed where required.

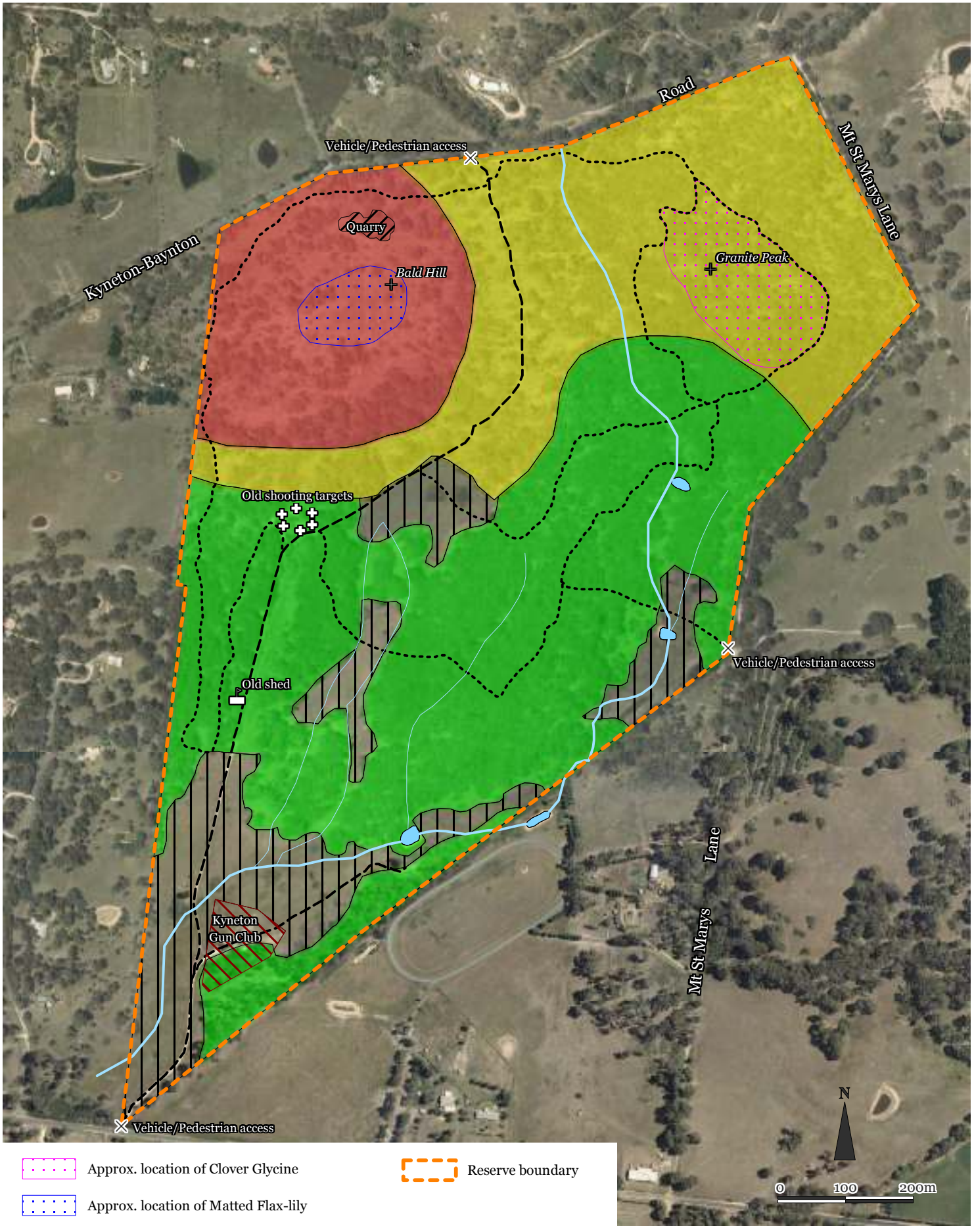
Table 3. Monitoring of existing and additional Matted Flax-lily plants within Reserve (example format)

Matted Flax-lily *Dianella amoena* populations within Bald Hill Reserve, Kyneton **Aim**: *To protect and manage Matted Flax-lily within Reserve*						
Plant Number (to correspond with numbered plants on a map)	**Dimensions if clump >30cm diameter**	**No. of leaves if clump <30cm diameter**	**Condition of leaves**	**Evidence of flowering**	**Surrounding impacts**	**Comments/ Recommendations**
1						
2						
3						

Table 4. Monitoring of existing and additional Clover Glycine plants within Reserve (example format)

Clover Glycine *Glycine latrobeana* populations within Bald Hill Reserve, Kyneton **Aim**: *To protect and manage Clover Glycine within Reserve*						
Patch/plant Number (to correspond with numbered patches on a map)	**Size of patch**	**Estimated number of plants**	**General condition of leaves**	**Evidence of flowering**	**Surrounding impacts**	**Comments/ Recommendations**
1						
2						
3						

Figure 2 - Features of Bald Hill Reserve



Approx. location of Clover Glycine

Approx. location of Matted Flax-lily

Reserve boundary

Vehicle/Pedestrian access

Old shed

Peaks

Old shooting targets

Main drainage line

Other drainage lines

Vehicle track

Informal track

Kyneton Gun Club

Quarry

Waterbodies

Grassy Woodland (Basalt)

Grassy Woodland (Granite)

Valley Grassy Forest

Grassland (previously cleared)

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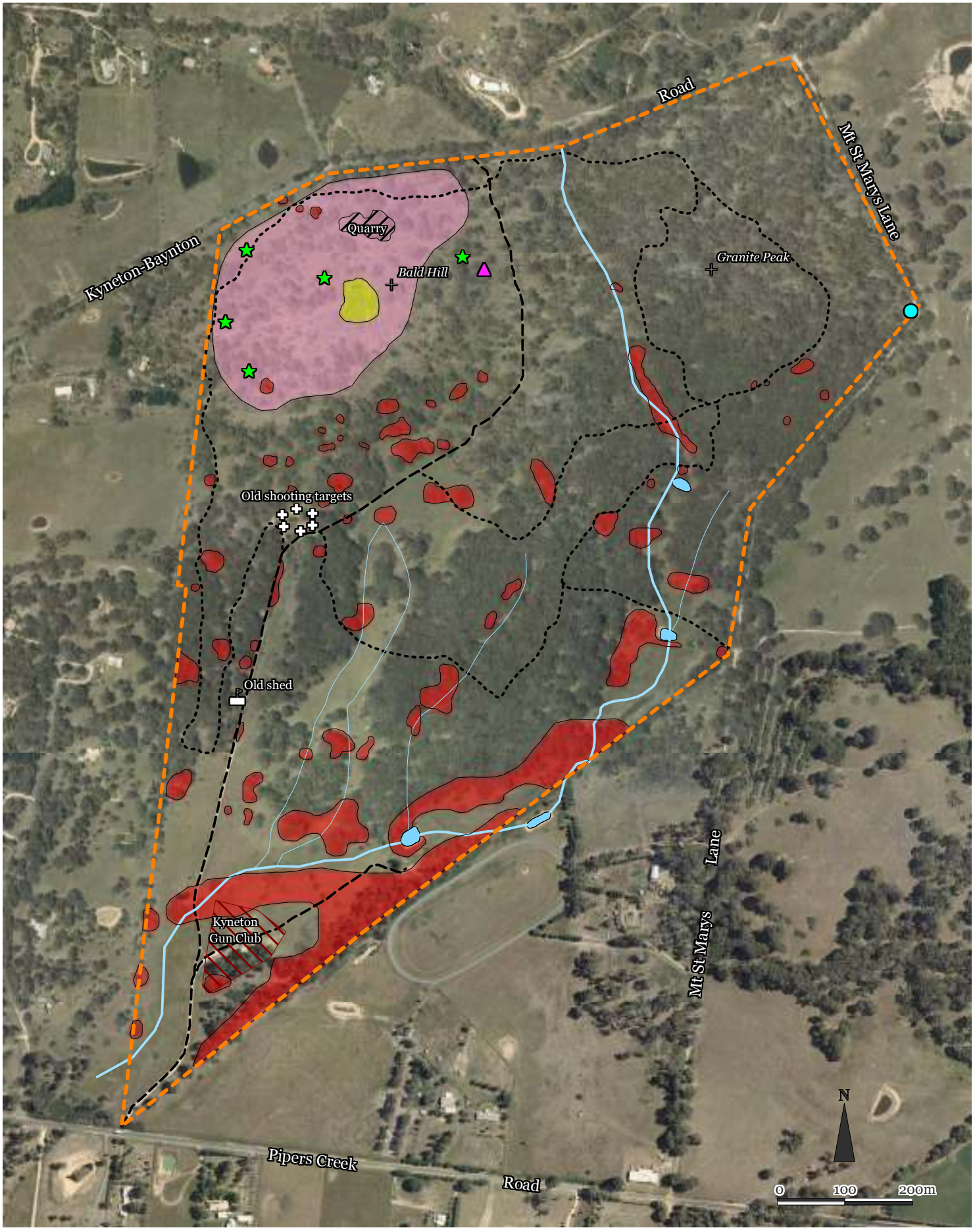
Note: Map features are approximate and are to be used as a guide only.

Figure 3 - Major Weeds within Bald Hill Reserve



Blue Periwinkle

Ornamental Scrambler

Spear Thistle

Reserve boundary

Gorse

Horehound

Scattered Hawthorn & Sweet Briar

Old shed

Peaks

Old shooting targets

Main drainage line

Other drainage lines

Vehicle track

Informal track

Kyneton Gun Club

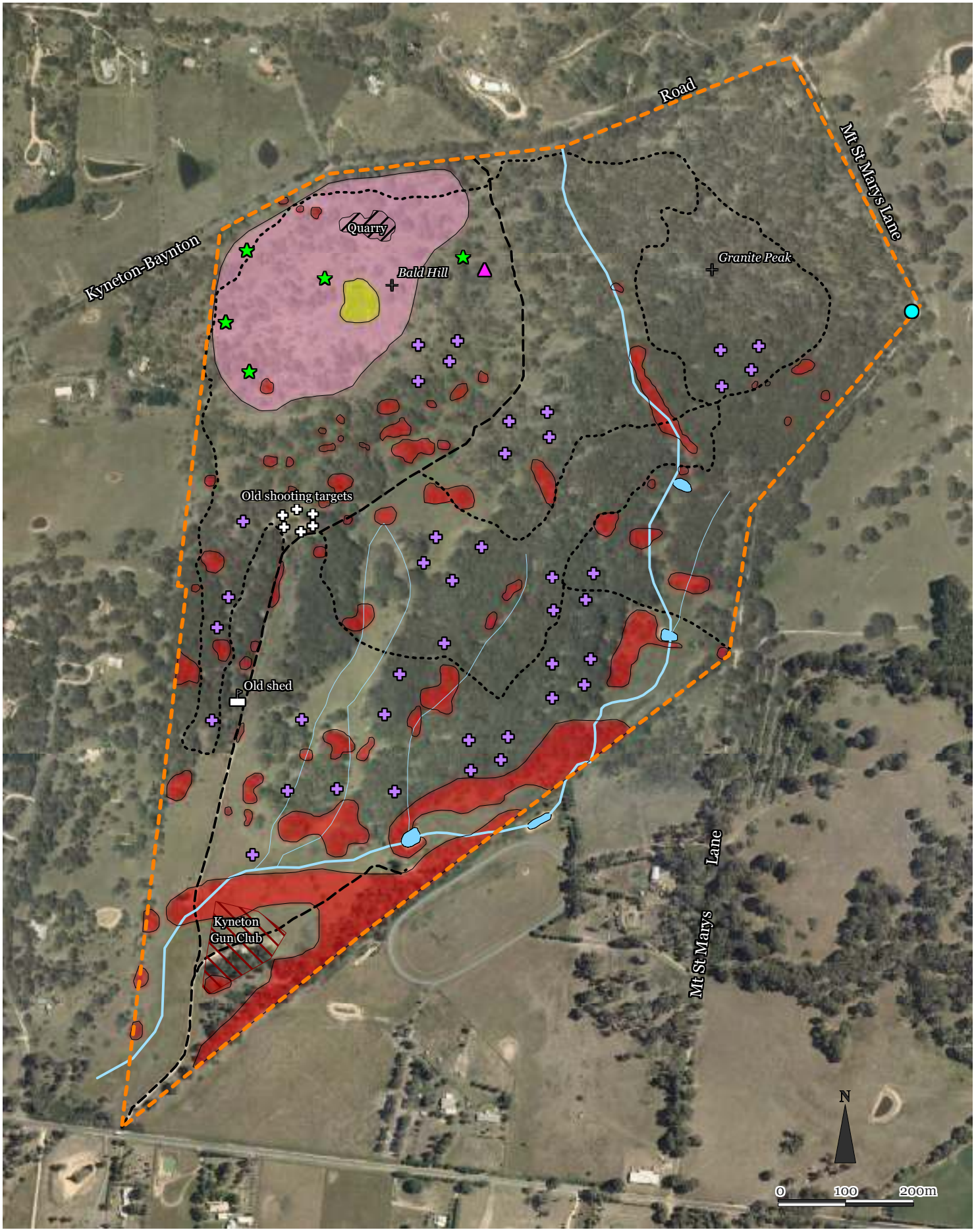
Quarry

Waterbodies

atlas ecology

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

Figure 4 - Suggested regeneration/revegetation plots



Blue Periwinkle

Ornamental Scrambler

Spear Thistle

Reserve boundary

Gorse

Horehound

Scattered Hawthorn & Sweet Briar

Suggested regeneration/ revegetation plots

atlas ecology

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

Basalt: volcanic, igneous rock that is fine grained and dark coloured

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

Canopy: the cover of foliage of a plant

Coppicing: a traditional method of woodland management where trees make new growth from the stumps or roots if cut down

Devonian: in the Palaeozoic era, about 400 million years ago

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

Exotic: a plant that is not native to the area it is growing in, used usually to describe a plant from a different country

Granite: intrusive igneous rock of mica, feldspar and quartz

Habitat: the environment in which a plant or animal lives

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

Igneous: rock that has solidified from lava or magma

Indigenous: native to a particular area, not introduced

Invertebrates: lacking a backbone or spinal column

Macropods: a marsupial family that includes kangaroos and wallabiesf

Mid-storey: contains all life-forms between the overstorey and plants one meter in height (forest/woodland)

Noxious weed: a weed that is required by law to be controlled

Overstorey: largest, taller plants in a plant community such as trees in a forest/woodland

Passive recreation: non-competitive and unorganised recreational activities

Pliocene: in the Cainozoic era, between 2-7 million years ago

Prostrate: a plant with horizontal growth close to the ground

Remnant: areas or patches of vegetation that remain after land has been cleared and/or altered. Can be a single tree

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

Riparian: an area along a creek, river, dam, wetland or other water body

Terrestrial: relating to living on or growing on land

Understorey: plants less than one metre in height (forest/woodland)

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

Volcanic plain: a surface formed by extensive lava or ash flows

Appendix 1.1 – Flora Species Recorded Within Reserve

Flora species recorded within reserve (1995) and present (2012)

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Acacia dealbata	Silver Wattle	**Local**
Acacia mearnsii	Black Wattle	**Local**
Acacia melanoxylon	Blackwood	**Regional**
Acaena novae-zelandiae	Bidgee-widgee	**Local**
Acaena echinata	Sheep's Burr	**Regional**
Allitia cardiocarpa ^	Swamp Daisy	**Regional**
*Amyema pendula**	Drooping Mistletoe	**Local**
Anthosachne scabra ^	Common Wheat-grass	**Local**
Arthropodium milleflorum	Pale Vanilla-lily: robust form	**Regional**
Arthropodium fimbriatum	Nodding Chocolate-lily	**Regional**
Arthropodium strictum	Chocolate-lily	**Local**
Arthropodium sp.3	Small Chocolate-lily	**Regional**
Asperula conferta	Common Woodruff	**Regional**
Asperula scoparia subsp. *scoparia*	Prickly Woodruff	**Regional**
Asplenium flabellium *	Necklace Fern	**Local**
Austrostipa mollis	Supple Spear-grass	**Regional**
Austrostipa nodosa	Knotty Spear-grass	**Regional**
Austrostipa scabra	Rough Spear-grass	**Regional**
Bossiaea prostrata	Creeping Bossiaea	**Local**
Brunonia australis	Blue Pincushion	**Local**
Bulbine bulbosa	Bulbine Lily	**Regional**
Burchardia umbellata	Milkmaids	**Local**
Caladenia carnea	Pink Fingers	**Regional**
Caladenia gracilis	Musk Hood-orchid	**Regional**
Cardamine paucijuga	Annual Bitter-cress	**Regional**
Carex inversa	Knob Sedge	**Regional**
Cassinia aculeata *	Common Cassinia	**Local**
Cassinia arcuata	Drooping Cassinia	**Local**

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Convolvulus erubescens spp. agg.	Pink Bindweed	**Regional**
Craspedia variabilis	Variable Billy-buttons	**Regional**
Cymbonotus preissianus	Austral Bear's-ear	**Local**
Cynoglossum suaveolens	Sweet Hound's-tongue	**Regional**
Daviesia leptophylla	Narrow-leaf Bitter-pea	**Local**
Deyeuxia quadriseta	Reed Bent-grass	**Regional**
Dianella amoena (EPBC Act)	Matted Flax-lily	**National**
Dianella admixta ^	Black-anther Flax-lily	**Local**
Dichelachne hirtella	Hairy Plume-grass	**Regional**
Dichondra repens	Kidney Weed	**Local**
Dillwynia cinerascens	Grey Parrot-pea	**Local**
Dillwynia glaberrima	Smooth Parrot-pea	**Regional**
Diuris chryseopsis ^	Golden Moths	**Regional**
Diuris spp.	Diuris	**Regional**
Drosera aberrans ^	Scented Sundew	**Local**
Drosera auriculata	Tall Sundew	**Local**
Drosera peltata subsp. *peltata* spp. agg.	Pale Sundew	**Local**
Epilobium billardierianum	Variable Willow-herb	**Local**
Epilobium ciliatum	Glandular Willow-herb	**Regional**
Erodium spp.	Heron's Bill	**Regional**
Eucalyptus macrorhyncha	Red Stringybark	**Local**
Eucalyptus radiata subsp. *radiata*	Narrow-leaf Peppermint	**Local**
Eucalyptus rubida	Candle Bark	**Local**
Eucalyptus viminalis	Manna Gum	**Local**
Euchiton involucratus	Common Cudweed	**Regional**
Exocarpos cupressiformis	Cherry Ballart	**Local**
Galium gaudichaudii	Rough Bedstraw	**Regional**
Galium spp.	Bedstraw	**Regional**
Geranium antrorsum	Rosetted Crane's-bill	**Regional**
Geranium spp.	Crane's Bill	**Regional**

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Glossodia major	Wax-lip Orchid	**Regional**
Glycine clandestina	Twining Glycine	**Local**
Glycine latrobeana (EPBC Act)	Clover Glycine	**National**
Gonocarpus tetragynus	Common Raspwort	**Local**
Haloragis heterophylla	Variable Raspwort	**Local**
Hardenbergia violacea	Purple Coral-pea	**Local**
Helichrysum scorpioides	Button Everlasting	**Local**
Hovea heterophylla ^	Common Hovea	**Local**
Hydrocotyle laxiflora	Stinking Pennywort	**Local**
Hypericum gramineum	Small St-John's Wort	**Local**
Hypoxis vaginata	Yellow Star	**Regional**
Isotoma fluviatilis subsp. *australis*	Swamp Isotome	**Regional**
Juncus spp.	Rush	**Local**
Juncus subsecundus	Finger Rush	**Local**
Kennedia prostrata	Running Postman	**Local**
Leptorhynchos squamatus	Scaly Buttons	**Local**
Leptorhynchos tenuifolius	Wiry Buttons	**Regional**
Leucopogon virgatus	Common Beard-heath	**Local**
Lomandra micrantha	Small-flower Mat-rush	**Regional**
Lomandra filiformis	Wattle Mat-rush	**Local**
Lomandra longifolia subsp. *exilis* *	Cluster-headed Mat-rush	**Local**
Lomandra spp.	Mat-rush	**Regional**
Luzula spp.	Wood Rush	**Regional**
Luzula meridionalis	Common Woodrush	**Regional**
Melicytus dentatus *	Tree Violet	**Regional**
Microlaena stipioides var. *stipoides*	Weeping Grass	**Local**
Microseris sp. 3 ^	Yam Daisy	**Regional**
Microtis unifolia	Common Onion-orchid	**Regional**
Myosotis australis	Austral Forget-me-not	**Regional**
Myriophyllum spp.	Water Milfoil	**Regional**

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Olearia lirata *	Snowy Daisy-bush	**Regional**
Oxalis perennans	Grassland Wood-sorrel	**Local**
Oxalis spp.	Wood Sorrel	**Local**
Pelargonium rodneyanum	Magenta Stork's-bill	**Regional**
Pentapogon quadrifidus var. *quadrifidus*	Five-awned Spear-grass	**Regional**
Pimelea humilis	Common Rice-flower	**Local**
Pimelea linifolia	Slender Rice-flower	**Local**
Pimelea glauca	Smooth Rice-flower	**Regional**
Plantago varia	Variable Plantain	**Local**
Poa labillardierei	Common Tussock-grass	**Local**
Poa morrisii	Velvet Tussock Grass	**Local**
Poa sieberiana	Grey Tussock-grass	**Local**
Poranthera microphylla	Small Poranthera	**Local**
Pterostylis nutans	Nodding Greenhood	**Regional**
Pultenaea pedunculata^	Matted Bush-pea	**Local**
Ranunculus sessiliflorus	Annual Buttercup	**Regional**
Ranunculus spp.	Buttercup	**Regional**
Rumex spp.	Dock	**Regional**
Rytidosperma bipartitum ^	Leafy Wallaby-grass	**Regional**
Rytidosperma geniculatum ^	Kneed Wallaby-grass	**Local**
Rytidosperma leave ^	Smooth Wallaby-grass	**Regional**
Rytidosperma pallidum ^	Silvertop Wallaby-grass	**Local**
Rytidosperma pilosum ^	Velvet Wallaby-grass	**Regional**
Rytidosperma racemosum var. *racemosum* ^	Slender Wallaby-grass	**Local**
Rytidosperma spp. ^	Wallaby Grass	**Local**
Senecio quadridentatus	Cotton Fireweed	**Local**
Senecio runcinifolius	Tall Fireweed	**Regional**
Senecio spp.	Groundsel	**Regional**
Stellaria pungens	Prickly Starwort	**Local**
Stylidium graminifolium	Grass Triggerplant	**Local**

INDIGENOUS SPECIES		
Botanical Name	**Common Name**	**Significance**
Thelymitra spp.	Sun Orchid	**Regional**
Themeda triandra	Kangaroo Grass	**Local**
Thysanotus patersonii	Twining Fringe-lily	**Local**
Tricoryne elatior	Yellow Rush-lily	**Local**
Triglochin procera	Water Ribbons	**Regional**
Veronica gracilis	Slender Speedwell	**Regional**
Vittadinia cuneata var. *cuneata**	Fuzzy New Holland Daisy	**Regional**
Viola betonicifolia	Showy Violet	**Regional**
Wahlenbergia luteola	Bronze Bluebell	**Regional**
Wahlenbergia spp.	Bluebell	**Regional**
Wahlenbergia stricta subsp. *stricta*	Tall Bluebell	**Local**
Wurmbea dioica	Common Early Nancy	**Local**

* Species recently recorded within Reserve (April 2012)

^ Species that have had a name change since initial surveys undertaken

INTRODUCED SPECIES		
Botanical Name	**Common Name**	**Declared Noxious Weed #**
Acacia spp. *	Wattle	-
Acacia howittii *	Sticky Wattle	-
Acetosella vulgaris	Sheep Sorrel	-
Agrostis capillaris	Brown-top Bent	-
Aira elegantissima	Delicate Hair-grass	-
Anthoxanthum odoratum	Sweet Vernal-grass	-
Aphanes arvensis	Parsley Piert	-
Arctotheca calendula	Cape Weed	-
Avena fatua	Wild Oat	-
Briza maxima	Large Quaking-grass	-
Briza minor	Lesser Quaking-grass	-
Bromus hordeaceus subsp. *hordeaceus*	Soft Brome	-
Carduus tenuifloris	Winged Slender-thistle	**Restricted**
Cerastium comatum	Levantine Mouse-ear	-

INTRODUCED SPECIES		
Botanical Name	**Common Name**	**Declared Noxious Weed #**
	Chickweed	
Cirsium vulgare	Spear Thistle	**Restricted**
Crataegus monogyna *	Hawthorn	**Restricted**
Cynodon dactylon var. *dactylon*	Couch	-
Cynosurus echinatus	Rough Dog's-tail	-
Galium spp.	Bedstraw	-
Galium murale	Small Goosegrass	-
Holcus lanatus	Yorkshire Fog	-
Hordeum leporinum	Barley-grass	-
Juncus articulatus subsp. *articulatus*	Jointed Rush	-
Lolium rigidum	Wimmera Rye-grass	-
Lysimachia arvensis ^	Pimpernel	-
Marrubium vulgare	Horehound	**Regionally controlled**
Moenchia erecta	Erect Chickweed	-
Parentucellia latifolia	Red Bartsia	-
Petrorhagia dubia	Velvety Pink	-
Petrorhagia nanteuilii	Childling Pink	-
Plantago coronopus	Buck's-horn Plantain	-
Ranunculus muricatus	Sharp Buttercup	-
Rosa rubiginosa *	Sweet Briar	**Regionally controlled**
Romulea rosea	Onion Grass	-
Rumex spp.	Dock	-
Sonchus oleraceus	Common Sow-thistle	-
Taraxacum officinale spp. agg.	Garden Dandelion	-
Trifolium campestre var. *campestre*	Hop Clover	-
Trifolium dubium	Suckling Clover	-
Trifolium suffocatum	Suffocated Clover	-
Trifolium spp.	Clover	-
Ulex europaeus	Gorse	**Regionally controlled, WON**
*Vinca major**	Blue Periwinkle	-
Unidentified ornamental creeper*	-	-

* Species recently recorded within Reserve (April 2012)
^ Species that have had a name change since initial surveys undertaken

= Declared noxious weed within the North Central 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 Within the 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 2005b)
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, or with the potential to occur, within 10 kilometres of the Reserve

Botanical Name	Common Name	Total number of records#	EPBC Act 1999	FFG Act 1988	DSE	Comments
NATIONALLY SIGNIFICANT SPECIES						
Dianella amoena	Matted Flax-lily	2	EN	L	e	Present in Reserve
Glycine latrobeana	Clover Glycine	2	VU	L	v	Present in Reserve
Pimelea spinescens subsp. spinescens *	Spiny Rice-flower	-	CR	L	e	Habitat present
Caladenia ornata *	Ornate Pink Fingers	-	VU	L	v	Habitat present
STATE SIGNIFICANT SPECIES						
Diuris X *palachila*	Broad-lip Diuris	1	-	-	r	Habitat present
Grevillea repens	Creeping Grevillea	2	-	-	r	Presence unlikely
Euphrasia collina subsp. *speciosa*	Purple Eyebright	1	-	-	x	Presence unlikely
Caladenia clavescens	Castlemaine Spider-orchid	1	-	L	v	Presence unlikely

Appendix 2.1 – Fauna Recorded within the Reserve and the Local Area

Table A2.1. Fauna species previously recorded within the Reserve and recorded within a 10 kilometre radius of the Reserve.

Key

Type of Record:

S	Seen
H	Heard
I	Incidental (identified from feathers, bones, tracks or scats, or based on eye witness accounts)
R	Recorded (e.g. using a bat detector that records echolocation frequencies)
X	Unknown type of record

Migratory/Marine:

Mi	Migratory (EPBC Act)
Ma	Marine (EPBC Act)

Surveys undertaken within and surrounding the Reserve:

A	Atlas Ecology (2012)
B	Davidson *et al.* (1995)
C	Paul Gray (pers. comm.)
AVW	Atlas of Victoria Wildlife

Hollow Use:

Total	Totally dependent on tree hollows for shelter
Partial	Partially dependent on tree hollows for shelter
✖	Species that use small crevices and gaps under bark, standing and/or fallen timber
⌘	Aquatic species that use submerged hollows for shelter and egg attachment

* Introduced Species

NOTE: Several species recorded on the AVW as occurring within a 10 kilometre radius of the Reserve, but not recorded during the current survey (Atlas Ecology 2012) or previous surveys (Davidson *et al.* (1995) and Paul Gray (pers. comm.)) may potentially use habitats within the Reserve.

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
MAMMALS								
Short-beaked Echidna	*Tachyglossus aculeatus*	2012	6	S	X	S	Partial	-
Brush-tailed Phascogale	*Phascogale tapoatafa*	2012	11	S	X	S	Total	-
Common Brushtail Possum	*Trichosurus vulpecula*	2012	14	S	X	H	Total	-
Common Ringtail Possum	*Pseudocheirus peregrinus*	2012	8	S	X	S	Partial	-
Greater Glider	*Petauroides volans*	2012	0	S	-	-	-	-
Sugar Glider	*Petaurus breviceps*	2012	10	S	X	S	Total	
Feathertail Glider	*Acrobates pygmaeus*	1995	1	-	X	-	Total	-
Koala	*Phascolarctos cinereus*	2012	14	H	X	S	-	-
Common Wombat	*Vombatus ursinus*	2007	1	-	-	-	-	-
Swamp Wallaby	*Wallabia bicolor*	2012	6	S	X	S	-	-
Eastern Grey Kangaroo	*Macropus giganteus*	2012	19	S	X	S	-	-
White-striped Freetail Bat	*Tadarida australis*	2012	0	H	X	H	-	-
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	Not known	0	-	X	S	-	-
Goulds Wattled Bat	*Chalinolobus gouldii*	Not known	0	-	X	R	-	-
Chocolate Wattled Bat	*Chalinolobus morio*	Not known	0	-	X	R	-	-
Eastern False Pipistrelle	*Falistrellus tasmaniensis*	Not known	0	-	-	R	-	-
Southern Forest Bat	*Vespadelus regulus*	Not known	0	-	X	S	-	-
Little Forest Bat	*Vespadelus vulturnus*	Not known	0	-	X	R	-	-
Large Forest Bat	*Vespadelus darlingtoni*	Not known	0	-	X	R	-	-
Swamp Rat	*Rattus lutreolus*	2012?	0	I?	-	-	-	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Black Rat *	*Rattus rattus*	2012	3	I	-	S	-	-
House Mouse *	*Mus musculus*	2012	4	S	-	S	-	-
Water-rat	*Hydromys chrysogaster*	2012?	0	I?	-	-	-	-
European Rabbit *	*Oryctolagus cuniculus*	2012	5	S	-	S	-	-
European Hare *	*Lepus europeaus*	2012	1	S	-	-	-	-
Pig (feral) *	*Sus scrofa*	1983	2	-	-	-	-	-
Red Fox *	*Canis vulpes*	2012	5	S	-	S	-	-
Cat (feral) *	*Felis catus*	2012	3	I	-	S	-	-
Southern Freetail Bat	*Mormopterus* species	Not known	0	-	-	R	-	-
Unidentified Microbat	*Vespertilionidae* species	2012	0	S	-	S	-	-
Unidentified Rat	*Rattus species*	1986	1	-	-	-	-	-
BIRDS								
Stubble Quail	*Coturnix pectoralis*	2000	3	-	-	-	-	Ma
Painted Button-quail	*Turnix varius*	1979	2	-	-	-	-	-
Common Bronzewing	*Phaps chalcoptera*	2012	3	H	-	S	-	-
Crested Pigeon	*Ocyphaps lophotes*	2001	15	-	-	-	-	-
Buff-banded Rail	*Gallirallus philippensis*	2000	2	-	-	-	-	Ma
Dusky Moorhen	*Gallinula tenebrosa*	1980	9	-	-	-	-	-
Purple Swamphen	*Porphyrio porphyrio*	Not known	0	-	-	S	-	-
Eurasian Coot	*Fulica atra*	Not known	12	-	-	S	-	-
Great Crested Grebe	*Podiceps cristatus*	1980	5	-	-	-	-	-
Australasian Grebe	*Tachybaptus novaehollandiae*	2007	14	-	-	-	-	-
Hoary-headed Grebe	*Poliocephalus poliocephalus*	1992	9	-	-	-	-	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Great Cormorant	*Phalacrocorax carbo*	1979	7	-	-	-	-	-
Little Black Cormorant	*Phalacrocorax sulcirostris*	2001	14	-	-	-	-	-
Pied Cormorant	*Phalacrocorax varius*	2001	4	-	-	-	-	-
Little Pied Cormorant	*Microcarbo melanoleucos*	2012	18	S	-	S	-	-
Australian Pelican	*Pelecanus conspicillatus*	1980	6	-	-	-	-	Ma
Silver Gull	*Chroicocephalus novaehollandiae*	1979	4	-	-	-	-	Ma
Masked Lapwing	*Vanellus miles*	2012	53	H	X	S	-	Mi
Black-fronted Dotterel	*Elseyornis melanops*	1992	2	-	-	-	-	Mi
Australian White Ibis	*Threskiornis molucca*	2001	11	-	-	-	-	Ma
Straw-necked Ibis	*Threskiornis spinicollis*	2012	38	S	-	S	-	Ma
Royal Spoonbill	*Platalea regia*	1978	1	-	-	-	-	-
Yellow-billed Spoonbill	*Platalea flavipes*	2001	5	-	-	-	-	-
White-faced Heron	*Egretta novaehollandiae*	2012	43	S	X	-	-	-
White-necked Heron	*Ardea pacifica*	2012	19	S	X	-	-	-
Australian Wood Duck	*Chenonetta jubata*	2012	61	S	X	S	Total	Mi
Black Swan	*Cygnus atratus*	2008	20	-	-	-	-	Mi
Australian Shelduck	*Tadorna tadornoides*	2008	10	-	-	-	Total	Mi
Pacific Black Duck	*Anas superciliosa*	2012	37	S	X	S	Partial	Mi
Chestnut Teal	*Anas castanea*	1979	1	-	-	-	Total	Mi
Grey Teal	*Anas gracilis*	2007	12	-	-	-	Total	Mi
Australasian Shoveler	*Anas rhynchotis*	1981	2	-	-	-	-	Mi
Pink-eared Duck	*Malacorhynchus membranaceus*	1980	1	-	-	-	Partial	Mi
Hardhead	*Aythya australis*	1980	4	-	-	-	-	Mi

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Blue-billed Duck	*Oxyura australis*	2007	1	-	-	-	-	Mi
Musk Duck	*Biziura lobata*	1981	11	-	-	-	-	Mi/Ma
Swamp Harrier	*Circus approximans*	1979	1	-	-	-	-	Mi/Ma
Grey Goshawk	*Accipiter novaehollandiae*	2001	1	-	-	-	-	Mi
Brown Goshawk	*Accipiter fasciatus*	2001	6	-	-	-	-	Mi/Ma
Wedge-tailed Eagle	*Aquila audax*	20012	17	S	-	S	-	Mi
Little Eagle	*Hieraaetus morphnoides*	1995	4	-	X	-	-	Mi
Whistling Kite	*Haliastur sphenurus*	Not known	9	-	-	S	-	Mi/Ma
Black-shouldered Kite	*Elanus axillaris*	2001	2	-	-	-	-	Mi
Australian Hobby	*Falco longipennis*	2001	3	-	-	-	-	Mi
Peregrine Falcon	*Falco peregrinus*	2002	6	-	X	-	Partial	Mi
Black Falcon	*Falco subniger*	1999	3	-	-	-	-	Mi
Brown Falcon	*Falco berigora*	2012	20	S	-	-	-	Mi
Nankeen Kestrel	*Falco cenchroides*	2008	14	-	X	-	Partial	Mi/Ma
Southern Boobook	*Ninox novaeseelandiae*	2012	5	S	-	H	Total	Ma
Powerful Owl	*Ninox strenua*	1987	1	-	-	-	Total	-
Eastern Barn Owl	*Tyto javanica*	Not known	2	-	-	S	Partial	-
Musk Lorikeet	*Glossopsitta concinna*	2005	4	-	-	-	Total	-
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	2008	18	-	-	-	Total	-
Sulphur-crested Cockatoo	*Cacatua galerita*	2012	94	S	X	S	Total	-
Little Corella	*Cacatua sanguinea*	1995	0	-	X	-	-	-
Long-billed Corella	*Cacatua tenuirostris*	2012	68	H	X	S	Total	-
Galah	*Eolophus roseicapilla*	2012	91	S	X	S	Total	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Crimson Rosella	*Platycercus elegans*	2012	113	S	X	S	Total	-
Eastern Rosella	*Platycercus eximius*	Not known	30	-	-	S	Total	-
Red-rumped Parrot	*Psephotus haematonotus*	2008	7	-	-	-	Total	-
Tawny Frogmouth	*Podargus strigoides*	Not known	14	-	X	S	-	-
Azure Kingfisher	*Ceyx azureus*	Not known	0	-	-	S	-	-
Laughing Kookaburra	*Dacelo novaeguineae*	2012	97	S	X	S	Total	-
Sacred Kingfisher	*Todiramphus sanctus*	2012	9	S	-	-	Partial	Ma
Rainbow Bee-eater	*Merops ornatus*	2001	3	-	-	-	-	Ma
White-throated Needletail	*Hirundapus caudacutus*	2008	2	-	-	-	-	Mi/Ma
Pallid Cuckoo	*Cuculus pallidus*	Not known	12	-	-	H	-	Ma
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	1980	6	-	-	-	-	Ma
Unidentified Cuckoo species	*Cacomantis* species	Not known	0	-	-	S	-	-
Horsfield's Bronze-Cuckoo	*Chalcites basalis*	2012	8	S	-	-	-	Ma
Shining Bronze-Cuckoo	*Chalcites lucidus*	2001	3	-	-	-	-	Ma
Welcome Swallow	*Hirundo neoxena*	2012	68	S	-	-	Partial	Ma
Tree Martin	*Petrochelidon nigricans*	2008	10	-	-	-	Total	-
Fairy Martin	*Petrochelidon ariel*	1999	3	-	-	-	Partial	-
Grey Fantail	*Rhipidura albiscarpa*	2012	59	S	X	S	-	-
Willie Wagtail	*Rhipidura leucophrys*	2008	47	-	-	-	-	-
Satin Flycatcher	*Myiagra cyanoleuca*	1979	4	-	-	-	-	Mi/Ma
Restless Flycatcher	*Myiagra inquieta*	1999	2	-	-	-	-	-
Jacky Winter	*Microeca fascinans*	1976	2	-	-	-	-	-
Scarlet Robin	*Petroica boodang*	2002	29	-	X	S	-	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Flame Robin	*Petroica phoenicea*	2001	14	-	X	-	Partial	Ma
Rose Robin	*Petroica rosea*	1979	2	-	-	-	-	-
Eastern Yellow Robin	*Eopsaltria australis*	2012	1	S	-	-	-	-
Golden Whistler	*Pachycephala pectoralis*	2003	22	-	X	S	-	-
Rufous Whistler	*Pachycephala rufiventris*	2012	10	H	-	H	-	-
Grey Shrike-thrush	*Colluricincla harmonica*	2012	61	S	X	S	Partial	-
Magpie-lark	*Grallina cyanoleuca*	Not known	62	-	-	S	-	Ma
Crested Shrike-tit	*Falcunculus frontatus*	1999	1	-	-	-	-	-
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	2012	22	S	X	-	-	Ma
White-winged Triller	*Lalage sueurii*	1995	1	-	X	-	-	-
White-fronted Chat	*Epthianura albifrons*	2008	8	-	-	-	-	-
Western Gerygone	*Gerygone fusca*	1978	1	-	-	-	-	-
Weebill	*Smicrornis brevirostris*	1979	2	-	-	-	-	-
Striated Thornbill	*Acanthiza lineata*	2012	32	S	-	S	-	-
Yellow Thornbill	*Acanthiza nana*	Not known	5	-	-	S	-	-
Brown Thornbill	*Acanthiza pusilla*	2012	63	S	-	S	-	-
Buff-rumped Thornbill	*Acanthiza reguloides*	2012	9	S	-	S	Partial	-
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	2012	85	S	X	S	-	-
White-browed Scrubwren	*Sericornis frontalis*	2012	58	H	-	S	-	-
Speckled Warbler	*Chthonicola sagittatus*	1979	4	-	-	-	-	-
Brown Songlark	*Cincloramphus cruralis*	2008	3	-	-	-	-	-
Rufous Songlark	*Cincloramphus mathewsi*	1976	1	-	-	-	-	-
Little Grassbird	*Megalurus gramineus*	1979	2	-	-	-	-	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Clamorous Reed Warbler	*Acrocephalus stentoreus*	1979	2	-	-	-	-	Ma
Golden-headed Cisticola	*Cisticola exilis*	1979	3	-	-	-	-	-
Superb Fairy-wren	*Malurus cyaneus*	2012	83	S	X	S	-	-
Dusky Woodswallow	*Artamus cyanopterus*	1979	4	-	-	-	Partial	-
Varied Sittella	*Daphoenositta chrysoptera*	2002	15	-	-	-	-	-
Brown Treecreeper (SE subspecies)	*Climacteris picumnus victoriae*	1979	3	-	-	-	Total	-
White-throated Treecreeper	*Cormobates leucophaea*	2012	34	S	-	S	Total	-
Red-browed Treecreeper	*Climacteris erythrops*	1979	1	-	-	-	Total	-
Mistletoebird	*Dicaeum hirundinaceum*	1992	3	-	-	-	-	-
Spotted Pardalote	*Pardalotus punctatus*	2012	17	H	-	S	Partial	-
Silvereye	*Zosterops lateralis*	2012	31	S	-	-	-	Ma
White-naped Honeyeater	*Melithreptus lunatus*	2012	63	S	-	S	-	-
Black-chinned Honeyeater	*Melithripterus gularis*	1977	1	-	-	-	-	-
Brown-headed Honeyeater	*Melithreptus brevirostris*	2012	11	H	-	-	-	-
Eastern Spinebill	*Acanthorhynchus tenuirostris*	Not known	6	-	-	S	-	-
Painted Honeyeater	*Grantiella picta*	2001	2	-	-	-	-	-
Fuscous Honeyeater	*Lichenostomus fuscus*	1977	2	-	-	-	-	-
Yellow-faced Honeyeater	*Lichenostomus chrysops*	2012	64	H	X	S	-	-
White-eared Honeyeater	*Lichenostomus leucotis*	2012	43	S	-	S	-	-
Yellow-tufted Honeyeater	*Lichenostomus melanops*	1978	3	-	-	-	-	-
White-plumed Honeyeater	*Lichenostomus penicillatus*	2008	18	-	X	-	-	-
New Holland Honeyeater	*Phylidonyris novaehollandiae*	Not known	47	-	-	S	-	-
Bell Miner	*Manorina melanophrys*	Not known	0	-	-	H	-	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Noisy Miner	*Manorina melanocephala*	2007	9	-	-	-	-	-
Little Wattlebird	*Anthochaera chrysoptera*	2008	2	-	-	-	-	-
Red Wattlebird	*Anthochaera carunculata*	2012	81	S	X	S	-	-
Australasian Pipit	*Anthus novaeseelandiae*	2008	14	-	-	-	-	Ma
Horsfield's Bushlark	*Mirafra javanica*	2000	2	-	-	-	-	-
Red-browed Finch	*Neochmia temporalis*	2012	13	S	-	-	-	-
Olive-backed Oriole	*Oriolus sagittatus*	1978	2	-	-	-	-	-
White-winged Chough	*Corcorax melanorhamphos*	2012	13	S	X	S	-	-
Pied Currawong	*Strepera graculina*	2002	6	-	X	-	-	-
Grey Currawong	*Strepera versicolor*	2012	23	S	-	S	-	-
Australian Magpie	*Cracticus tibicen*	2012	118	S	X	S	-	-
Bassian Thrush	*Zoothera lunulata*	2001	4	-	-	-	-	Ma
Australian Raven	*Corvus coronoides*	2005	69	-	X	-	-	-
Northern Mallard *	*Anas platyrhynchos*	1978	2	-	-	-	-	-
Little Raven	*Corvus mellori*	2012	35	S	X	S	-	Ma
Rock Dove *	*Columba livia*	1999	7	-	-	-	-	-
Striated Pardalote	*Pardalotus striatus*	2012	59	H	X	S	Partial	-
Common Blackbird *	*Turdus merula*	2012	60	S	-	S	-	-
Eurasian Skylark *	*Alauda arvensis*	2008	10	-	-	-	-	-
Eurasian Tree Sparrow *	*Passer montanus*	1976	1	-	-	-	-	-
House Sparrow *	*Passer domesticus*	2008	58	-	-	-	-	-
European Goldfinch *	*Carduelis carduelis*	2008	59	-	-	-	-	-
European Greenfinch *	*Chloris chloris*	1998	5	-	-	-	-	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Common Myna *	*Sturnus tristis*	Not known	37	-	-	S	Partial	-
Common Starling *	*Sturnus vulgaris*	2012	65	S	-	-	Partial	-
REPTILES								
Tree Dragon	*Amphibolurus muricatus*	1992	1	-	-	-	Partial	-
Cunningham's Skink	*Egernia cunninghami*	2007	1	-	-	-	-	-
Delicate Skink	*Lampropholis delicata*	2012		S	X	S	-	-
Garden Skink	*Lampropholis guichenoti*	2012	1	S	X	S	Partial ✖	-
Bougainville's Skink	*Lerista bougainvillii*	Not known	0	-	X	S	-	-
Grass Skink	*Pseudemoia entrecasteauxii*	Not known	0	-	-	S	-	-
Blotched Bluetongue Lizard	*Tiligua nigrolutea*	Not known	0	-	X	S	-	-
Common Bluetongue Lizard	*Tiliqua scincoides*	Not known	0	-	X	S	-	-
Tiger Snake	*Notechis scutatus*	2012	0	I	X	-	-	-
Red-bellied Black Snake	*Pseudechis porphyriacus*	Not known	0	-	X	S	-	-
Eastern Brown Snake	*Pseudonaja textilis*	2003	2	-	X	-	-	-
Unidentified Grass Skink	*Pseudomoia species*	Not known	0	-	-	I	-	-
Unknown Skink	*Lampropholis species*	2012	0	S	-	-	-	-
Lowland Copperhead Snake	*Austrelaps superbus*	2012	0	I	X	S	-	-
Unidentified Snake	*Pseudechis species?*	Not known	0	-	-	I	-	-
Eastern Long-neck Turtle	*Chelodina longicollis*	Not known	0	-	-	S	-	-
FROGS								
Eastern Banjo Frog	*Limnodynastes dumerilii*	2012	10	S	X	S	-	-
Spotted Marsh Frog	*Limnodynastes tasmaniensis*	2012	9	S	X	S	Partial ✖	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Common Spadefoot Toad	*Neobatrachus sudelli*	Not known	0	-	-	S	-	-
Eastern Sign-bearing Froglet	*Crinia parinsignifera*	2012	1	H	-	H	-	-
Common Froglet	*Crinia signifera*	2012	5	S	X	S	-	-
Southern Brown Tree Frog	*Litoria ewingii*	2012	10	S	X	S	Partial ✖	-
Growling Grass Frog	*Litoria raniformis*	1788	1	-	-	-	Partial ✖	-
Whistling Brown Tree Frog	*Litoria verreauxii*	Not known	0	-	-	S	-	-
FISH								
Brown Trout *	*Salmo trutta*	1981	1	-	-	-	-	-
Mountain Galaxias	*Galaxias olidus*	1999	2	-	-	-	-	-
Redfin *	*Perca fluviatilis*	1981	1	-	-	-	-	-
INVERTEBRATES								
Portuguese Millipede *	*Ommatoiulus moreletti*	2012	0	S	-	-	-	-
Black Field Cricket	*Teleogryllus commodus*	2012	0	S	-	-	-	-
Bull Ant	*Myrmecia* species	2012	0	S	-	S	-	-
Unidentified Ant	*Formicidae species*	Not known	0	-	-	S	-	-
European Honeybee *	*Apis mellifera*	2012	0	S	-	-	-	-
Caper White Butterfly	*Belenois java*	2012	0	S	-	-	-	-
Common Brown Butterfly	*Heteronympha merope*	2012	0	S	-	S	-	-
Common Grass-blue Butterfly	*Zizina labradus*	2012	0	S	-	-	-	-
White Cabbage Moth *	*Plutella xylostella*	Not known	0	-	-	S	-	-
Goat Moth *	*Cossus cossus*	Not known	0	-	-	S	-	-
Marbled Xenica Butterfly	*Geitoneura klugii*	2012	0	S	-	-	-	-
Meadow Argus Butterfly	*Junonia villida calybe*	Not known	0	-	-	S	-	-

Common Name	Scientific Name	Date of Most Recent Record	AVW (Total No. Records)	Current Survey of Reserve [A]	Previous Survey of Reserve [B, C]	Previously Recorded Nearby [C]	Hollow Use	Mi/Ma
Heliotrope Moth	*Utetheisa pulchelloides*	Not known	0	-	-	S	-	-
Unidentified Moth 1	*Hepialidae species*	Not known	0	-	-	I	-	-
Unidentified Moth 2	*Chlorocoma species*	Not known	0	-	-	S	-	-
Common Hover Fly	*Melangyna viridiceps*	2012	0	S	-	S	-	-
Crane Fly?	*Leptotarsus* species	2012	0	S	-	-	-	-
Long-legged Fly	*Austrosciapus connexus*	Not known	0	-	-	S	-	-
European wasp *	*Vespula germanica*	Not known	0	-	-	S	-	-
Saw Fly	*Perga species*	Not known	0	-	-	S	-	-
Scorpion Fly	*Harpobittacus species*	Not known	0	-	-	S	-	-
Unidentified Damselfly	*Zygoptera species*	Not known	0	-	-	S	-	-
Ladybird species x2	*Coccinellidae* family	Not known	0	-	-	S	-	-
Golden Orb-weaving Spider	*Eriophora biapicata*	2012	0	S	-	S	-	-
Melbourne Trapdoor Spider	*Stanwellia grisea*	2012	0	S	-	-	-	-
Native Cockroach	*Platyzosteria* species	2012	0	S	-	-	-	-
Common Yabby	*Cherax destructor*	2012	0	I	-	S	-	-

Source: Davidson *et al.* (1995); DSE Atlas of Victorian Wildlife (AVW 2012); Atlas Ecology (2012); Paul Gray (pers. comm.).

Appendix 2.2 – Significant Fauna Species Previously Recorded, or with Potential Habitat, within the Local Area

Sources used to determine species status:

EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
National Action Plans	Marsupials and monotremes (Maxwell *et al.* 1996), bats (Duncan *et al.* 1999), rodents (Lee 1995), birds (Garnett and Crowley 2000), reptiles (Cogger *et al.* 1993), frogs (Tyler 1997), freshwater fishes (Wagner and Jackson 1993) and butterflies (Sands and New 2002).
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
◆	Species previously recorded within the study site.
#	Species or species' habitat predicted to occur within the study site by the EPBC Act Protected Matters Search Tool (DSEWPC 2012)
⊙	Species or species' habitat predicted to occur within the study site by the Victorian Butterfly Database (Museum Victoria)

Table A2.2. Significant fauna species previously recorded, or with potential habitat present, within a ten kilometre radius of the Reserve

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Conservation Status			
				EPBC	National Action Plan	FFG	DSE
NATIONAL SIGNIFICANCE							
Grey-headed Flying-fox #	*Pteropus poliocephalus*	-	-	VU	VU	L	VU
Smoky Mouse #	*Pseudomys fumeus*	-	-	EN	RA	L	CE
Spotted-tailed Quoll (SE mainland) #	*Dasyurus maculatus maculatus*	-	-	EN	VU	L	EN
Australian Painted Snipe #	*Rostratula australis*	-	-	VU	VU	L	CE
Regent Honeyeater #	*Anthochaera phrygia*	-	-	EN	EN	L	CE
Swift Parrot #	*Lathamus discolor*	-	-	EN	EN	L	EN
Growling Grass Frog #	*Litoria raniformis*	1788	1	VU	VU	L	EN
Eastern Dwarf Galaxias #	*Galaxiella pusilla*	-	-	VU	VU	L	VU
Macquarie Perch #	*Macquaria australasica*	-	-	EN	DD	L	EN
Murray Cod #	*Maccullochella peelii peelii*	-	-	VU	-	L	EN
Golden Sun Moth #	*Synemon plana*	-	-	CE	-	L	CE
STATE SIGNIFICANCE							
Brush-tailed Phascogale ◆	*Phascogale tapoatafa tapoatafa*	2009	11	-	NT	L	VU
Koala ◆	*Phascolarctos cinereus*	1995	14	-	LR(NT)	-	-
Australasian Shoveler	*Anas rhynchotis*	1981	2	-	-	-	VU
Black Falcon	*Falco subniger*	1999	3	-	-	-	VU
Blue-billed Duck	*Oxyura australis*	2007	1	-	-	L	EN

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Conservation Status			
				EPBC	National Action Plan	FFG	DSE
Brown Treecreeper (SE subspecies)	*Climacteris picumnus victoriae*	1979	3	-	NT	-	NT
Grey Goshawk	*Accipiter novaehollandiae*	2001	1	-	-	L	VU
Hardhead	*Aythya australis*	1980	4	-	-	-	VU
Musk Duck	*Biziura lobata*	1981	11	-	-	-	VU
Painted Honeyeater	*Grantiella picta*	2001	2	-	NT	L	VU
Powerful Owl	*Ninox strenua*	1987	1	-	-	L	VU
Royal Spoonbill	*Platalea regia*	1978	1	-	-	-	VU
Speckled Warbler	*Chthonicola sagittatus*	1979	4	-	NT	L	VU
Two-spotted Grass-skipper Butterfly ⊙	*Pasma tasmanica*	-	-	-	-	-	VU
Yellow Ochre Butterfly ⊙	*Trapezites luteus luteus*	-	-	-	-	L	EN
Fiery Jewel Butterfly ⊙	*Hypochrysops ignitus ignitus*	-	-	-	-	L	VU
REGIONAL SIGNIFICANCE							
Black-chinned Honeyeater	*Melithripterus gularis*	1977	1	-	-	-	NT
Pied Cormorant	*Phalacrocorax varius*	2001	4	-	-	-	NT

Sources: DSE Atlas of Victorian Wildlife (AVW 2012); EPBC Act Protected Matters Search Tool (DSEWPC 2012); Atlas Ecology (2012); Victorian Butterfly Database (Museum Victoria).

Appendix 3
Definitions of Ecological Significance

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

Nationally Significant

Species of Central Victorian Uplandsnational 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 or 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 2005b), 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.
- 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 Victorian Volcanic Plain 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.
- 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.
- Corridors or habitat components that are 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 Habitat Quality

High Quality

Habitat of high quality is likely to be dominated by native flora species and supports relevant native structural components with few introduced flora species present. Habitat features present include ground debris such as litter, rocks, logs and intact ground cover, as well as hollow bearing trees if relevant. The habitat supports, or is likely to support, significant fauna species and habitat links to other remnant ecosystems are intact.

Moderate Quality

Habitat of moderate quality supports some native floristic and structural components, however introduced species may be prevalent in some areas. Some habitat elements such as ground debris and hollow bearing trees may be present. The area supports potential habitat for significant species and some form of habitat links with remnant ecosystems may be present.

Low Quality

Habitat of low quality is likely to be dominated by introduced flora species and support few native floristic and structural components. Habitat elements such as ground debris and tree bearing hollows are likely to be absent. The area is unlikely to support, or there is no suitable habitat, for any significant fauna species and habitat links to other remnant ecosystems are likely to be absent.

Appendix 5
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 6 – TIMELINE & CHECKLIST FOR MANAGEMENT ACTIONS

Action #	Management Action	Refer to section within report	Who is involved in undertaking this action?	Description of works undertaken and Priority Area/Location targeted	Issues encountered	Works still to undertake
Spring (Sep-Nov)						
1	Primary removal of woody & herbaceous weeds (Target Priority Areas)	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
2	Control of Gorse seedlings and re-growth within Priority Areas and around other mature stands	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
3	Control of other woody weeds and re-growth (Hawthorn, Sweet Briar, Spear Thistle & others)	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
4	Spot spray Sweet Vernal-grass, Brown Top-bent and other high-threat ground-layer weeds within areas of native vegetation	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
5	Slashing of introduced grasses in native vegetation and open grassland before seed set	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
6	Direct seeding and planting within previously burnt and prepared open grassland areas	Section 4.2.2. Figure 2	Council and specialised contractors			

7	Follow-up weed control of areas burnt in autumn	Section 4.2.2. Figure 2	Council, contractors, CFA			
8	Targeted surveys of Matted Flax-lily & Clover Glycine	Section 4.2.7. Section 4.7. Tables 3 & 4. Figure 2.	Council and ecologist			
9	Monitoring (undertaken biennially)	Section 4.7. Tables 3 & 4.	Council and contractors			
Summer (Dec-Feb)						
1	Continue primary removal of woody & herbaceous weeds (Target Priority Areas)	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
2	Continue control of Gorse seedlings and re-growth within Priority Areas and around other mature stands	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
3	Continue with control of other woody weeds and re-growth (Hawthorn, Sweet Briar, Spear Thistle & others)	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
4	Continue to spot spray Sweet Vernal-grass, Brown Top-bent and other high-threat ground-layer weeds within areas of native vegetation	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
5	Continue slashing introduced grasses in native vegetation and open grassland before seed set	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			

Autumn (Mar-May)						
1	Mosaic burn within open grassland areas	Section 4.2.2. Figure 2	Council, contractors, CFA			
2	Follow-up weed control within 4-6 weeks post-burn	Section 4.2.2	Council and contractors			
3	Establishment of regeneration & revegetation plots (min. 4 established per year or as required)	Section 4.2.3. Table 2. Figure 4	Council, contractors			
4	Primary removal of woody & herbaceous weeds (Target Priority Areas)	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
5	Control of Gorse seedlings and re-growth within Priority Areas and around other mature stands	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
Winter (Jun-Aug)						
1	General council and contractor monitoring of weed issues and regeneration/revegetation plots					

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** FIS 2012: Note- FIS 2012 has not received new data since 2007. A combination of FIS (2012) and DSE (2012) was therefore utilised.

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