



Final Report:

Environmental Management Plan – Woodend Grassland Reserve, Woodend

Prepared by Atlas Ecology

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Environmental Management Plan Woodend Grassland Reserve, Woodend

Field assessment: Matt Aquilina and Bianca Aquilina (Atlas Ecology)

Report preparation: Matt Aquilina, Bianca Aquilina and Eliza Watters (Atlas Ecology)

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

Paul Gray (front cover – Milkmaids *Burchardia umbellata*, page 13 - Shining Buttercup *Ranunculus glabrifolius*, page 14 - Blue Pincushion *Brunonia australis*, Slender Sun-orchid *Thelymitra pauciflora*; Golden Moths *Diuris lanceolata*, page 15 - Common Rice-flower *Pimelea humilis*, Grey Parrot-pea *Dillwynia cinerascens* and Creeping Bossiaea *Bossiaea prostrata*)

Front cover photos taken within Reserve: interpretive sign at pedestrian access point; Kangaroo Grass *Themeda triandra*; Milkmaids *Burchardia umbellata*.

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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

The Woodend Grassland Reserve is valued by the community of Woodend as an intact grassland environment that supports regionally significant flora species and a vegetation community considered very rare for this region.

The Woodend Grassland Reserve is actively managed through an integrated approach to conserve and enhance its biodiversity values and to provide resilience to this endangered vegetation community.

The Woodend Grassland Reserve provides opportunities for local residents and visitors alike to engage with grassland environments through interpretive signage and formal and informal access tracks.

The Woodend Grassland Reserve provides passive recreational and tourism opportunities for photographers, bird watching, naturalists and students of science.

The Woodend Grassland 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

The Woodend Grassland Reserve ('the reserve') consists of nine hectares of remnant grassland located in the northern section of the Woodend Racecourse Reserve (see Figure 1 below). The reserve is located approximately 70 kilometres north-west of Melbourne and approximately one kilometre west of the Woodend central business district (Figure 1).

The reserve forms part of the larger Woodend Racecourse Reserve; 26 hectares of crown land managed by the Macedon Ranges Shire Council (see Figure 2). The Woodend Racecourse Reserve ceased use as a horse racing facility in 1982. Facilities including the racing track, grandstand, betting shelter, jockey weigh-in shed and various other buildings have been retained. Modern facilities including an indoor sports venue (Buffalo Sports Stadium), a sports oval, multi-purpose outdoor courts with equestrian facilities located within the Racecourse Reserve which are popular with the local community. All facilities are located within the south-eastern section of the Woodend Racecourse Reserve (Figure 2). Macedon Ranges Shire Council acquired responsibility for the Racecourse Reserve in 1992; prior to this it was managed by a local Committee of Management (CoM).

The reserve supports an intact native grassland of regional significance dominated by Kangaroo Grass *Themeda triandra* (Plate 1) with a rich diversity of grassland herbs, lilies and orchids; some of which are considered rare for the region. The high floristic values of the reserve are attributed to its location within the interior of the old Racecourse, which was spared from heavy grazing, fertiliser application or exposure to invasive weeds. A wildlife friendly fence surrounds the entire reserve, which is partly located within the floodplain of the adjoining Five Mile Creek. The reserve supports one dam, one main drainage line and a series of minor drainage lines that flow into the adjacent Five Mile Creek (see Figure 3).

2.2 Regional Context

The reserve is bound to the north by Five Mile Creek, which flows from the northern foothills of the Macedon Ranges, west to the confluence with the Campaspe River in Carlsruhe (Figure 1). The northern side of Five Mile Creek is crown land that is managed by the Woodend Golf Club and supports the geologically significant Golf Course Hill (Figure 1). Golf Course Hill consists of a small lava cone approximately 45 metres high with a shallow summit crater (Silver and Birch 1994). It is feasible that the lava flows from this extinct volcano influenced the geology of the Woodend Grassland Reserve, unique for the local area with its basalt soils; although this has been contested in the past (Platt 2006). The reserve is bound to the east by Jeffreys Street, to the south by Forest Street, and to the west by a privately-owned pastoral property cleared of native vegetation. The reserve is located on the western fringe of the township with residential areas located to the east and south.

The reserve is within a landscape that has been largely cleared for housing, recreation, agriculture and grazing. Surrounding vegetation is highly modified with exotic species proliferating along Five Mile Creek and around the Woodend Racecourse Reserve. Fragmented and modified native vegetation is located in and around the Woodend Township. Areas of significant core vegetation located close to the reserve include Macedon Regional Park, approximately five kilometres to the south-east, Hanging Rock Reserve, approximately seven kilometres to the north-east and the Wombat State Forest, approximately eight kilometres south of the Reserve (Figure 1). The reserve provides an important habitat linkage to Five Mile Creek, a tributary of the Campaspe River.

The closest areas of remnant plains grassland and woodland occur on volcanic-derived soils to the north-east in Woodend North and to the south within the Gisborne and Riddells Creek areas.

2.3 Zones and Overlays

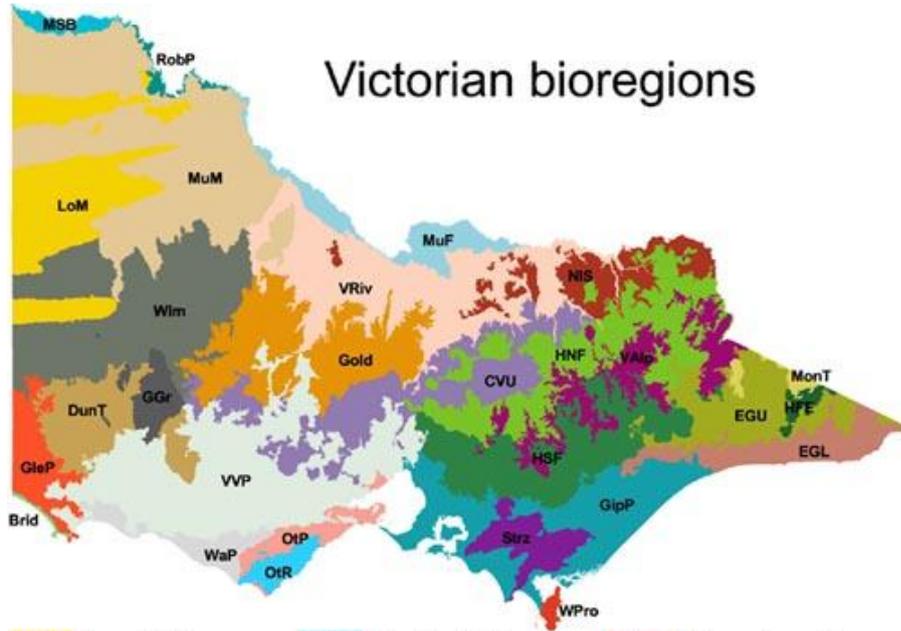
The Woodend Racecourse Reserve is currently zoned Public Conservation and Resource Use Zone (PCRZ). An Environmental Significance Overlay (ESO4) covers the entire Woodend Racecourse Reserve and a Vegetation Protection Overlay (VPO3) covers the Grassland Reserve. The ESO pertains to the Eppalock Proclaimed Catchment with the objective of protecting and maintaining water quality and yield within the Eppalock Water Supply Catchment Area. The VPO pertains to Native Grassland Areas and in particular the Woodend Grassland Reserve. The objective of the VPO is to protect this significant remnant grassland area and the rare and locally significant species within it.

2.4 Bioregion

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

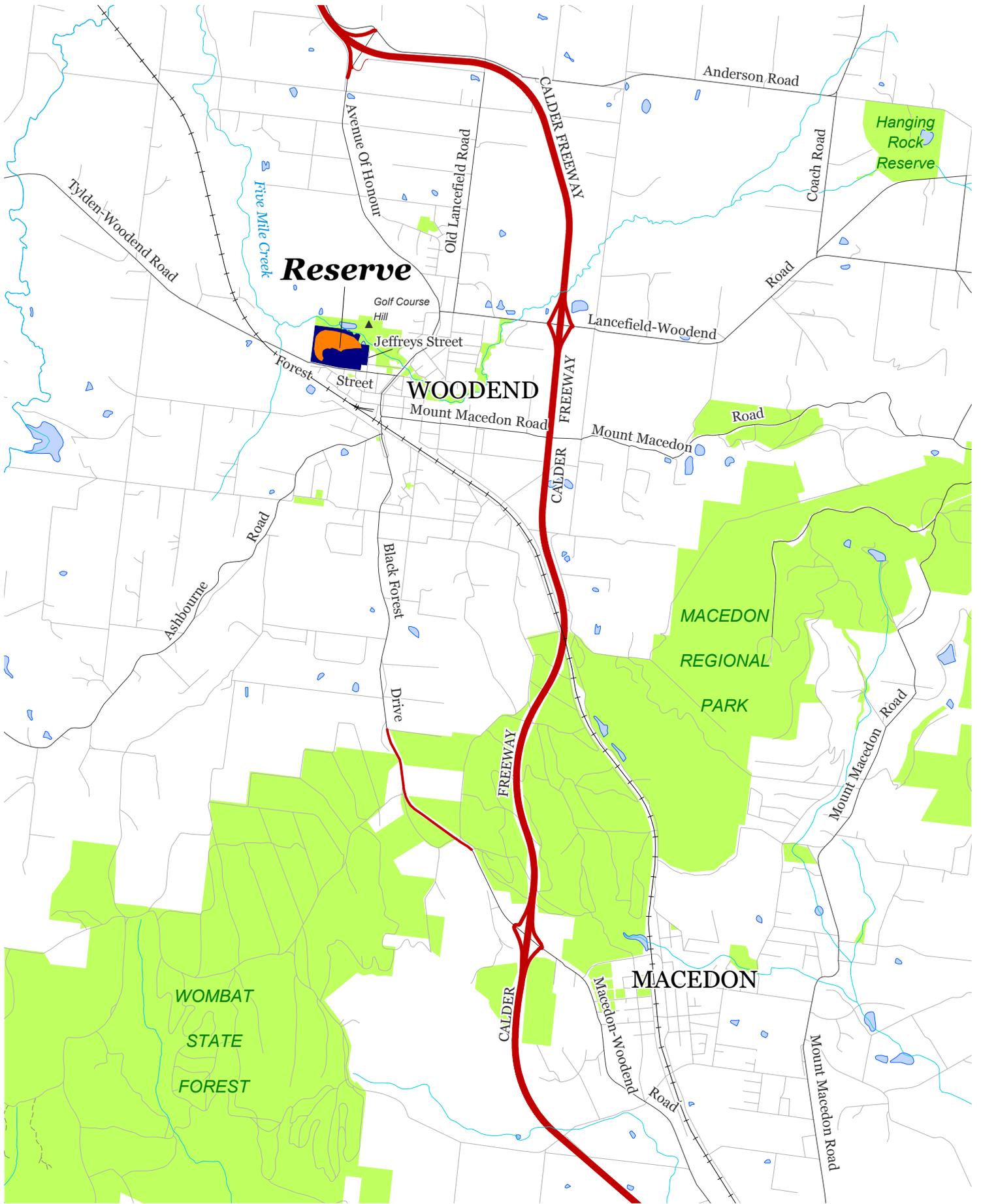
The reserve occurs within the *Central Victorian Uplands Bioregion* (CVU), which extends from Stawell in the west, to Ballarat and the You Yangs in the south, to the north-east through Alexandra and Mansfield, ending near Bright.

Victorian bioregions



LoM Lowan Mallee	GipP Gippsland Plain	WPro Wilsons Promontory
MuM Murray Mallee	OtP Otway Plain	HSF Highlands - Southern Fall
Wim Wimmera	WaP Warrnambool Plain	HNF Highlands - Northern Fall
GleP Glenelg Plain	Gold Goldfields	OtR Otway Ranges
Brid Bridgewater	CVU Central Victorian Uplands	Strz Strzelecki Ranges
VVP Victorian Volcanic Plain	GGr Greater Grampians	MonT Monaro Tablelands
VRiv Victorian Riverina	DunT Dundas Tablelands	HFE Highlands - Far East
MSB Murray Scroll Belt	NIS Northern Inland Slopes	VAip Victorian Alps
RobP Robinvale Plains	EGL East Gippsland Lowlands	
MuF Murray Fans	EGU East Gippsland Uplands	

Figure 1 - Location of Reserve



-  Grassland Reserve
-  Racecourse Reserve



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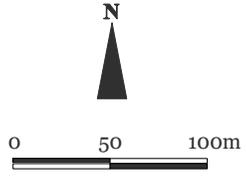


Note: Map features are approximate and are to be used as a guide only.

Figure 2 - Features of Woodend Racecourse Reserve



- Walking track
- █ Existing features
- █ Dam
- ▭ Racecourse Reserve
- ▭ Grassland Reserve



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

3 EXISTING VALUES AND USES WITHIN RESERVE

3.1 Flora

3.1.1 Ecological Vegetation Class and Vegetation Communities

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

Previous flora surveys for the reserve have identified two different EVCs. Section 3.1.2 below details the results of these surveys. A survey undertaken in 1985 indicated that the site supports Plains Grassland (EVC 132) (Lunt 1985), and more specifically Western (Basalt) Plains Grassland. The most recent assessment undertaken in 2006 disagreed with this earlier assessment, indicating that the reserve supported a modified remnant of Valley Grassy Forest (EVC 47) on sedimentary soils (Platt 2006). Valley Grassy Forest is common within riparian valleys in the Woodend area and the reserve is mapped as Valley Grassy Forest within Department of Sustainability and Environment (DSE) vegetation mapping (DSE 2012). It is feasible that the reserve is a natural clearing within a prior forest or woodland environment. Areas of Plains Grassy Woodland occur immediately to the north of Woodend.

Victorian geological mapping (NRE 1999) indicates that the reserve is on a combination of Ordovician sediments (mudstone, sandstone, black shale) and the more recent Neogene fluvial deposits closer to Five Mile Creek. It is worth noting, however, that geological mapping indicates that Golf Course Hill and large areas immediately to the north sit on more recent Quaternary volcanic cinder cones and lava flows. The reserve could, perhaps, support a combination of differing soil types. The Five Mile Creek Waterway Action Plan (NCCMA 2004) considers the Racecourse Reserve to be on basalt soils.

Whilst there is still contention regarding the original vegetation and soil type, the Macedon Ranges Shire Council regards the reserve as a rare and valuable grassland for the region and intend to manage it as a Western (Basalt) Plains Grassland vegetation community. The grassland is a high quality remnant showcasing excellent grassland structure and species diversity; qualities that are now rare within remaining grasslands. The Macedon Ranges Shire Council acknowledges and values this significant grassland remnant within their region and is seeking to implement best practice management techniques to sustain this important natural asset.

3.1.2 Previous Flora Surveys

Four flora surveys conducted in the reserve help to inform the flora values identified within this Management Plan. The surveys provide a valuable data set detailing the condition, diversity and distribution of species found within the grassland. The first survey was conducted in 1985 for the Macedon Ranges Conservation Society and served as a catalyst for identifying significant vegetation values. The survey notes:

The Woodend Racecourse Reserve is the most significant area of natural grassland vegetation in the Region. No other nearby area is known to possess such flora (Lunt 1985, p.7).

A total of 78 species were identified in this survey. Three of these species were considered at the time to be rare or restricted in distribution within the Melbourne area: Narrow-leaf New Holland Daisy *Vittadinia muelleri*, Field Daisy *Brachyscome decipiens* and Prickfoot *Eryngium vesiculosum* (Lunt 1985). A further 14 species recorded had not previously been recorded within any conservation reserve north-west of the Melbourne area (Lunt 1985).

Subsequent flora surveys were conducted in 1999 (Damien Cook, Holistic Ecology), 2006 (Dean Platt, Tree Wishes Land Care Advice) and 2006/07 (Paul Gray, Macedon Ranges Shire Council). Each survey noted a variety of graminoids, small shrubs, herbs and orchid species within the reserve. The results of these surveys brought the total number of recorded flora species to 148, including 108 indigenous species and 40 introduced species. All of these species, together with their significance rating or status, are listed in Appendix 1.1.

3.1.3 Current Vegetation Description

The reserve supports an intact native grassland dominated by Kangaroo Grass (Plate 1) with an unusually high diversity of grassland herbs, lilies and orchids. The grassland has previously been divided into three distinct vegetation associations (Cook 1999);

1. The alluvial flats closest to Five Mile Creek; consists of heavy clay soils dominated by species such as Kangaroo Grass, Mat Grass *Hemarthria uncinata* var. *uncinata*, Smooth Wallaby-grass *Rytidosperma laeve* (formerly *Austrodanthonia laevis*) with a diversity of herbs and lilies.
2. The slightly more elevated sections of gravelly clay soils supporting Kangaroo Grass, Silvertop Wallaby-grass *Rytidosperma pallidum* (formerly *Joycea pallida*) (Plate 2) with a range of herbs and prostrate shrubs.

Plate 1. Kangaroo Grass dominates the reserve



Plate 2. Silvertop Wallaby-grass near dam



3. The small depressions and low-lying areas scattered throughout the reserve supporting species tolerant of periodic inundation, such as Wetland Wallaby-grass *Rytidosperma semiannulare* (formerly *Notodanthonia semiannularis*), Pointed Swamp Wallaby-grass *Amphibromus archeri*, Swamp Isotome *Isotoma fluviatilis* subsp. *australis* and Shining Buttercup *Ranunculus glabrifolius* (Plate 3).

Plate 3. Shining Buttercup



Dominant herbs recorded within the reserve include Common Hovea *Hovea heterophylla* (formerly *Hovea linearis*), Grass Triggerplant *Stylidium graminifolium*, Blue Pincushion *Brunonia australis* (Plate 4) and Grassland Crane's-bill *Geranium retrorsum*, whilst common lilies and orchids include Black-anther Flax-lily *Dianella admixta* (formerly *Dianella revoluta*), Bulbine Lily *Bulbine bulbosa*, Chocolate Lily *Arthropodium strictum*, Slender Sun-orchid *Thelymitra pauciflora* (Plate 5) and Golden Moths *Diuris lanceolata* (Plate 5) (this species has since been split into three separate species, and is now known as *Diuris chryseopsis*).

Plate 4. Blue Pincushion



Plate 5. Left- Slender Sun-orchid; Right- Golden Moths



Small and prostrate shrubs populate discrete areas within the reserve and include the Common Rice-flower *Pimelea humilis* (Plate 6), Grey Parrot-pea *Dillwynia cinerascens* (Plate 6), Narrow-leaf Bitter-pea *Daviesia leptophylla* and Creeping Bossiaea *Bossiaea prostrata* (Plate 7).

Plate 6. Left-Common Rice-flower; Right- Grey Parrot-pea



Plate 7. Creeping Bossiaea



Mature and regenerating Narrow-leaf Peppermint *Eucalyptus radiata* subsp. *radiata* and Manna Gum *Eucalyptus viminalis* are scattered across the northern portion of the reserve. Silver Wattle *Acacia dealbata* (Plate 8) and Blackwood *Acacia melanoxylon* (Plate 9) are frequently encountered across the reserve and are regenerating prolifically in some sections (see Figure 3 for tree and shrub locations).

Plate 8. Regenerating Silver Wattle



Plate 9. Regenerating Blackwood

Areas supporting a high weed cover are generally along the periphery of the reserve and along the main drainage line easement (Plate 10). These areas are slashed annually as a working path. Weed cover in these areas is high (typically >50% cover) and includes introduced pastoral species such as Brown Top-bent *Agrostis capillaris*, Sweet Vernal-grass *Anthoxanthum odoratum*, Cocksfoot *Dactylis glomerata*, Flatweed *Hypochaeris radicata* and Ribwort *Plantago lanceolata* (see location of weedy verges in Figure 4).

Woody weeds occupy scattered areas in both the interior and along the periphery of the reserve, with many species emanating from areas outside of the grassland reserve. Dominant woody weed species include Gorse *Ulex europaeus* (Plate 11), Spanish Heath *Erica lusitanica* (Plate 12), English Broom *Cytisus scoparius* (Plate 12), Blackberry *Rubus fruticosus*, Radiata Pine *Pinus radiata* and Poplar *Populus* spp. (Plate 12) (see Figure 4 for location of major weeds).

See Appendix 4 for definitions of vegetation condition.

Plate 10. Weedy verge along northern boundary



Plate 11. Gorse stand



Plate 12. Top- Spanish Heath; Centre-English Broom; Bottom- Regenerating Poplars



3.1.4 Significant Flora Species

No flora species of national or state significance have previously been recorded at the reserve. A total of 64 flora species recorded are considered to be significant at a regional scale (within the Central Victorian Uplands bioregion, see Appendix 1.1). Three species are considered rare or restricted within the Melbourne area (Lunt 1985):

- Field Daisy *Brachyscome decipiens*
- Narrow-leaf New Holland Daisy *Vittadinia muelleri*
- Prickfoot *Eryngium vesiculosum*

Additional rare or restricted species for the region have likely been identified since the 1985 survey. The reserve has not been thoroughly surveyed since 1999, after which time the current ecological burning regime began. Periodic burns since 1999 have likely stimulated the germination of dormant seeds. Further surveys at the reserve may subsequently uncover additional flora species and possibly flora species of national or state significance.

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

3.1.5 Significant Vegetation Communities

The Western (Basalt) Plains Grassland vegetation community is of national significance and is listed as the critically endangered *Natural Temperate Grassland of the Victorian Volcanic Plain* on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The community is listed as a threatened vegetation community under the *Victorian Flora and Fauna Guarantee Act 1988* (FFG Act) and is classed as ‘endangered’ within the Central Victorian Uplands bioregion.

This community largely occurs within the Victorian Volcanic Plain bioregion which extends across the flat and undulating plains from Hamilton in the west to the Plenty River, north of Melbourne. Woodend is not located within the volcanic plains and therefore the presence of this grassland is atypical of the community’s range. Only small isolated pockets of the community persist within the central uplands, and these remnants are considered very rare for the region. Ian Lunt (1985) noted: *‘The Woodend Racecourse Reserve contains the only extensive area of intact native grassland in the Woodend district . . . investigation of other public reserves in the area (including Woodend golf course and new sewerage treatment works, Five Mile Creek area, Springfield School reserve, Hanging Rock reserve) have, unfortunately, failed to uncover any further areas of intact native grasslands’*.

Western (Basalt) Plains Grassland is an open treeless grassland that is typically dominated by Kangaroo Grass but can support Wallaby Grasses *Rytidosperma* spp., Spear Grasses

Austrostipa spp. and Tussock Grasses *Poa* spp. Grasslands typically support a high diversity of herbs, lilies and orchids, many of which are represented within the reserve. Western (Basalt) Plains Grassland supports a large number of threatened flora species currently listed in national and state legislation; however none have been recorded within the reserve to date.

Less than 1% of the original cover of lowland grasslands and woodlands within south-eastern Australia remain today (Lunt *et al.* 1998). This is due predominantly to the value pastoralists placed on the fertile, nutrient-rich basalt soils of the plains for agriculture. Cattle and sheep compacted the soils, changed their nutrient composition and grazed and dug up many of the tuberous herbs and lilies once relied upon by the Indigenous people as a staple food source. Soils were ripped, basalt boulders removed, fields of grassland ploughed, fertilised and sown with introduced pasture. In more recent times, urban development to the west of Melbourne has further contributed to the loss of this vegetation community. Other threats to the quality and extent of lowland grassland and woodland communities include continuing clearance and fragmentation of remnants, inappropriate grazing or fire regimes, inappropriate herbicide and fertiliser use and weed invasion (Threatened Species Scientific Committee 2008).

The most valuable grassland remnants are known to occur within areas protected from agricultural threats, such as road and railway reserves, cemeteries, rifle ranges, Commonwealth lands, and in this case an old racecourse; however more and more high-quality remnants are being discovered and protected on private land.

3.2 Fauna

3.2.1 Previous Fauna Assessment

A net gain assessment for a proposed recycled water pipeline was undertaken in 2006 by Dean Platt. Sighted fauna species and habitats were recorded as part of this assessment, however no detailed fauna surveying was undertaken. Assessment results indicate the presence of important habitat for a diversity of frogs, reptiles and waterbirds within both the ephemerally inundated and drier environments. The reserve is located within an area surrounded by large vegetation patches and as such there are important habitat linkages from the reserve to Hanging Rock, Macedon Ranges and along Five Mile Creek.

No rare or threatened fauna species were recorded as part of the net gain assessment. Three rare or threatened species previously recorded within three kilometres of the reserve and considered likely to use habitats within the reserve include: Hardhead (duck) *Aythya australis*, Eastern Great Egret *Ardea modesta* and Blue-billed Duck *Oxyura australis* (Platt 2006). Records of fauna species previously identified within five kilometres and lodged with DSE are provided in Appendix 2.1. Records of rare and threatened fauna species identified within five kilometres of the reserve are provided in Appendix 2.2.

A key aspect of the net gain assessment is the abundance and diversity of frog species recorded. Four species were identified: Common Eastern Froglet *Crinia signifera*, Eastern Sign-bearing Froglet *Crinia parasignifera*, Plains Brown Tree Frog *Litoria paraewingii* and Bibron's Toadlet *Pseudophryne bibronii*.

The following fauna habitats were identified by Platt (2006).

3.2.2 Grassy Ground Cover

The reserve supports a high value grassy ground cover that provides useful ecosystem functions and dispersal opportunities for a wide range of fauna species. The grassy ground cover provides grazing opportunities for macropods; cover and nesting resources for small mammals, birds, frogs and reptiles; clear searching-ranges for birds of prey; and prey for seed and insectivorous birds.

3.2.3 Waterways and Wetlands

Waterways and wetlands provide breeding, foraging and refuge habitat for a suite of native fauna, including waterbirds, frogs and some ground-dwelling mammals.

The on-site dam and open drainage channel contain dense riparian vegetation that provides habitat for frogs, waterfowl and other water birds (Plate 13, Figure 3). Other minor drainage channels flow through the reserve (Figure 3). The open water of the dam provides deep water for waterfowl, frogs, fish including redfin, crustaceans and other aquatic invertebrates (Plate 14). Larger animals such as kangaroos may utilise these spots as watering points which are suitable habitat for a range of avifauna.

Plate 13. Main drainage line



Plate 14. Dam



3.2.4 Tree and Shrub Cover

Tree cover within the reserve provides low habitat values for fauna as the site is largely open grassland and the trees present are not large. Trees are likely to provide nesting, perching, foraging and shelter sites for birds and other fauna species. Regenerating trees, shrubs and woody weeds provide limited nesting and cover for birds.

It is important to note that whilst trees and shrubs do not form a significant part of the grassland community, they may still provide important habitat for local fauna species. Many fauna species in an open treed environment will utilise both arboreal and terrestrial habitat throughout the course of a day, for example using trees for shelter and foraging on the ground. Although Platt (2006) indicated that there was no evidence of macropod (kangaroo and swamp wallabies) existence within the reserve, site visits in March and April 2012 did uncover evidence of macropod existence through trampled pathways under fences and within dense areas of wattle regeneration (Plate 15). Trampled circles of grass were observed in dense wattle stands that indicate usage by macropods for rest, shelter, shade and protection within an otherwise open grassland environment.

Tree and shrub cover provide a diversity of habitat niches that may be used by a variety of native birds, reptiles and arboreal mammals for nesting, foraging, perching and shelter. Flowering trees and shrubs provide foraging sites for insectivorous and nectar-feeding birds such as honeyeaters, lorikeets, parrots and wattlebirds. Dense areas of cover can be used by smaller passerine birds, such as wrens, thornbills and fantails, for nesting and foraging

purposes. Mature trees provide potential perching and nesting sites for birds, foraging and shelter for arboreal mammals, and dispersal habitat for many other fauna species.

Plate 15. Dense stand of regenerating Silver Wattles used by macropods for shelter



3.3 Recreation

Recreational opportunities within the reserve are limited, with few informal tracks traversing the site. No formal paths are present, while informal paths have been formed over time between the northern and southern entrance points (Plate 16, Figure 3). A section of this informal pathway is suitable for vehicles, with weed control contractors, the local Country Fire Authority (CFA) and power company staff occasionally accessing the reserve. The informal paths are mostly utilised by local walkers, with the dam serving as an occasional fishing spot and swimming hole for domestic dogs in the warmer months.

Five access points provide entry into the grassland reserve (see Figure 3). All five access points provide for pedestrian entry (Plate 17), with two of the access points providing gates for vehicle entry (Plate 17, Figure 3).

Two access points feature interpretative signage (Figure 3) (see front cover photo). A further sign welcoming visitors to the grassland is situated on the southern boundary, near the walking trail (Figure 3). Beyond these interpretive signs there are no tracks that direct visitors within the reserve.

Plate 16. Informal path around dam

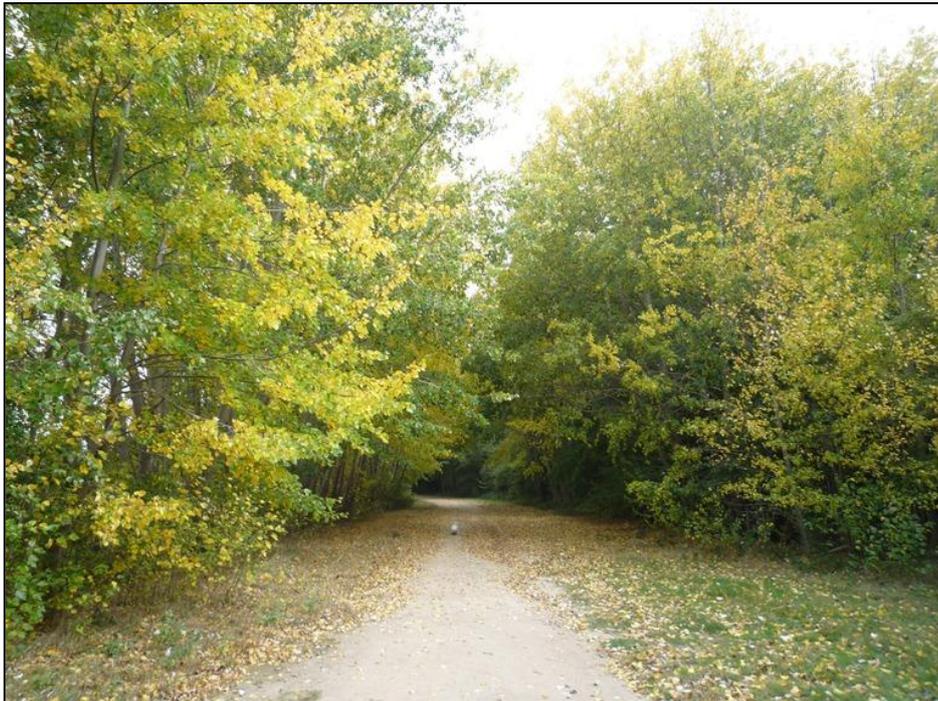


Plate 17. Northern pedestrian and vehicle access point



The reserve is encircled by a popular walking trail that is a continuation of the Five Mile Creek walking trail (Plate 18, Figure 2 and 3). This trail, which is maintained and allows for vehicle access, is the focus of local residents for passive recreational pursuits including walking and cycling.

Plate 18. Five Mile Creek walking trail encircles the reserve



4 MANAGEMENT ISSUES, THREATS AND ACTIONS

4.1 Management Objectives

The key management objectives for the reserve are to:

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

4.2 Biodiversity Management

Unless remedial action is undertaken promptly, many of the distinctive communities of lowland grasslands and grassy woodlands in Victoria, and many of the rare and threatened species they contain, will soon become extinct. A comprehensive conservation program must immediately be implemented if these threatened ecosystems and species are to survive (Lunt 1991, p.56)

4.2.1 Invasive Plants

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

Invasive plant cover (weed cover) across the site is generally low-moderate. Weed spread is still, however, the largest threat to the values of the grassland with the potential to out-compete and displace native species if not actively managed. Introduced pasture grass cover is generally low throughout the reserve due to the dominance of Kangaroo Grass; however discrete areas concentrated around the reserve's edges and along the main drainage line support a high cover of introduced pastoral species ('weedy verges' and drainage line in Figure 4). The maintenance and improvement of playing surfaces within the sports oval has likely resulted in increased nutrient levels and weed seed dispersal along the reserve's edges. Key pastoral species within the weedy verges include Cocksfoot, Flatweed, Ribwort, Sweet

Vernal-grass, Yorkshire Fog *Holcus lanatus*, Spear Thistle *Cirsium vulgare*, Centaury *Centaureum* spp. and Dock *Rumex* spp. In some areas these weeds can cover greater than 70% of vegetative cover.

A variety of woody weed species are present within the reserve, dominated by Gorse, English Broom and Spanish Heath (Plate 12, Figure 4). Several mature plants of these species have been sprayed in recent times, however total dieback has not occurred and many of the plants are now re-establishing. Gorse and Spanish Heath seedlings are particularly prolific throughout a large portion of the reserve. Poplars and Radiata Pine are encroaching into the northern edges of the reserve; emanating from mature stands within the Five Mile Creek area (Plate 12, Figure 4).

Weed cover is high along previously disturbed drainage lines, where Drain Flat Sedge *Cyperus eragrostis* and Blackberry are common (Plate 13). The dam in the centre of the reserve is fringed by Gorse, Broom and Blackberry (Figure 4).

Weed incursion is less prevalent in the central zones of the reserve, with the exception of Spanish Heath, which is widespread across most of the reserve and especially at the northern end of the wetland (Plate 12).

A total of 40 introduced species have been recorded and are listed in Appendix 1.1.

Actions:

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

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

Weed control works aim to reduce or eliminate weed populations and to assist native species to re-establish and thrive. Whilst the weed cover present is low-moderate, weed control works will none the less 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 provided in Table 1. The locations of woody weeds and weedy verges are indicated within Figure 4.

Woody weeds:

- The source of woody weed infestations needs to be identified and targeted. Mature parent populations of Gorse, Broom, Blackberry and Spanish Heath are identifiable within the reserve and should be targeted as a priority. All of these species are readily regenerating within the ground layer. In some instances the parent population may occur within the wider Woodend Racecourse Reserve, in which case control efforts need to be focused in these areas. Other species such as Poplar and Pine, which are stemming from parent populations close to Five Mile Creek, will require more intensive resources for removal and control and a longer-term commitment between the responsible authorities, including the NCCMA, due to the size and extent of mature trees along the creek.
- Juvenile saplings or seedlings of target woody weeds (Table 1) should be prioritised for control. This may include a combination of methods such as cut and paint and foliar spray. A concerted effort will be required over consecutive years to control woody species' spread within the reserve.

Weedy verges:

- Weedy verges along the edge of the reserve (Figure 4) support greater than 70% weed cover. Weeds in these areas are dominated by pastoral herbs and grasses. These areas must be monitored over late winter and spring to ensure plants do not flower and set seed within the reserve and thus continue their spread. Regular slashing of these areas will be required within the growth season. Weedy verges (within the reserve boundary) to be burnt that season as part of the cyclical burning regime (Section 4.2.2) will require vigilant monitoring and follow-up control with herbicide to eliminate emerging plants stimulated from the stored seed bank. Adequate resources must be allocated to these weedy verges post-ecological burning. Portions of the weedy verges form the required fire breaks for ecological burning. These areas in particular will require vigilance and continued slashing during the growth season.
- Grassy weeds outside of the reserve boundary are to also be slashed and sprayed as part of the reserve's weed control program.
- Areas close to the outer edge of the reserve that support a combination of native and introduced grasses will require spot-spraying between late winter and spring using appropriate herbicide to prevent off-target damage to native species. These areas will require more vigilant monitoring and control post-ecological burning.

Reserve interior:

- The interior of the reserve supports the highest cover of native species which help out-compete and suppress other introduced species. This interior needs to be monitored regularly (particularly in late winter - spring) with introduced species spot sprayed and controlled as appropriate (Table 1).

Yearly Plan for weed control works

- Weed control target areas can be divided into separate ‘zones’ as per the zones identified for ecological burns (see Section 4.2.2 below and Figure 5): Zones A, B and C.
 - The zone burnt for that year will require more intensive follow-up weed treatment within 4-6 weeks after the burn. Contractors should focus within the interior of the reserve, where the quality is higher, and gradually move outwards when spot spraying.
 - Each zone will need to be treated in late winter/early spring to target woody weeds and emerging herbaceous species (see Table 1). As an example, one day could be committed to weed control works within each of Zones A, B and C in late winter/early spring.
 - Each zone should again be treated in mid-spring to early summer to target woody weeds and emerging pasture grass species. Again, as an example, one day could be committed to each of Zones A, B and C during this period.
 - Weed control works for each zone should incorporate existing weeds within 10 metres outside of the reserve boundary. Populations of Blackberry, Elm *Ulmus* spp. and Hawthorn *Crataegus monogyna* amongst others occur close to the reserve boundary and must be treated to ensure longer-term benefits. Many of the target weeds will continue to emerge whilst their parent populations are allowed to fruit and seed immediately outside the reserve. Any weed control program within the reserve must take into account the surrounding parent populations.
 - The Timeline and Checklist for Management Actions table (Appendix 5) provides a chronological guide to the actions listed above.
-

General:

- Ensure weed control works are undertaken by qualified and experienced contractors with appropriate licenses and permits. They must be aware of the objectives of this management plan and should be sensitive to ecological values. They must possess sound flora identification skills to limit the chance of off-target spot spraying or disturbance to native vegetation.
- Any use of herbicide 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. Herbicide run-off should not be allowed to enter into any drainage lines, the dam or Five Mile Creek.
- Large stands of weeds (such as Blackberry along the drainage line) should be left after being sprayed and allowed to gradually break down. Shrubs within the reserve, both native and exotic, provide habitat for a range of small bird species. Retention of large stands of sprayed shrubs will reduce further soil disturbance and subsequent weed invasion. Incremental removal of all woody weed stands is advised.
- 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.

Table 1. High threat weeds for control within reserve

Botanical Name	Common Name	Location	Timing	Control Method*	Comments
TREES & SHRUBS					
<i>Pinus radiata</i>	Radiata Pine	Saplings scattered in northern section	Any time	HP, CP, DF	Small seedlings can be hand-pulled with larger plants cut and painted or drilled and filled with herbicide at base of trunk. Parent populations outside of Reserve
<i>Populus</i> spp.	Poplar	Dense thickets in northern section	Any time	CP, DF	Poplars spread vegetatively and are suckering from nearby parent populations along the creek. Long-term control of this species in the grassland will require removal of Poplars within the creek area, and additional resources and involvement from other parties (i.e. Landcare, CMA)
<i>Ulex europaeus</i>	Gorse	Scattered throughout Reserve	Any time	CP, SS, BN	Parent populations to be targeted as a priority. Follow-up treatment required within 4-6 weeks after a burn
<i>Rubus fruticosus</i>	Blackberry	Scattered throughout Reserve. Dense along drainage line	Sep-Dec	CP, SS	Cut and paint or scrape and paint isolated plants to prevent off-target damage. Otherwise spray in spring when actively growing. Thicket along drainage line to be retained as habitat
<i>Cytisus scoparius</i>	English Broom	Western edge	Any time	HP, CP	Smaller plants easily hand pulled
<i>Genista monspessulana</i>	Montpellier Broom	Western edge	Any time	HP, CP	Smaller plants easily hand pulled
<i>Erica lusitanica</i>	Spanish Heath	Throughout Reserve	Spring-summer	CP, SS, BN	Parent populations to be targeted as a priority. Follow-up treatment required 4-6 weeks after a burn
<i>Crataegus monogyna</i>	Hawthorn	Minor amount of plants near western edge	Any time	CP	
HERBS					
<i>Hypochaeris radicata</i>	Flatweed/Cat's Ear	Scattered	Winter-spring	SS	Easily chipped out at rosette stage or spot sprayed at rosette stage
<i>Centaureum</i> spp.	Centaury	Scattered	Winter-spring	SS	
<i>Sonchus oleraceus</i>	Common Sow-thistle	Scattered	Winter-spring	SS	
<i>Plantago lanceolata</i>	Ribwort	Scattered	Winter-spring	SS	Chip out any time, spot spray in winter-spring
GRASSES					
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	Scattered. Dense cover along weedy verges	Winter-spring	SL, SS, BN	Plants within weedy verges to be slashed before seed set. Follow-up treatment required 4-6 weeks after a burn. Spot spray plants outside of weedy verges within areas of native vegetation
<i>Agrostis capillaris</i>	Brown Top-bent	Scattered. Dense cover along	Winter-spring	SL, SS, BN	Plants within weedy verges to be slashed before seed set. Follow-up

Botanical Name	Common Name	Location	Timing	Control Method*	Comments
		weedy verges			treatment required 4-6 weeks after a burn. Spot spray plants outside of weedy verges within areas of native vegetation
<i>Dactylis glomerata</i>	Cocksfoot	Scattered. Dense cover along weedy verges	Winter-spring	SL, SS, BN	Plants within weedy verges to be slashed before seed set. Follow-up treatment required 4-6 weeks after a burn. Spot spray plants outside of weedy verges within areas of native vegetation
<i>Holcus lanatus</i>	Yorkshire Fog Grass	Scattered. Dense cover along weedy verges	Winter-spring	SL, SS, BN	Plants within weedy verges to be slashed before seed set. Follow-up treatment required 4-6 weeks after a burn. Spot spray plants outside of weedy verges within areas of native vegetation
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	Moist areas, drainage line	Winter-spring	SL, SS, BN	Plants within weedy verges to be slashed before seed set. Follow-up treatment required 4-6 weeks after a burn. Spot spray plants outside of weedy verges within areas of native vegetation
<i>Briza maxima</i> and <i>Briza minor</i>	Large and Lesser Quaking-grass	Scattered. Dense cover along weedy verges	Winter-spring	SS, BN	Plants within weedy verges to be slashed before seed set. Spot spray plants outside of weedy verges within areas of native vegetation

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

4.2.2 Fire Management

Objective: Maintain the diversity of native plants and reduce pest plant invasion within the reserve through a mosaic burning approach.

Objective: Assist measures to reduce fire risk to nearby residences.

Native grasslands and woodlands in south-east Australia have adapted to certain fire regimes and require periodic burning to shape their composition and structure. Fire within these adapted vegetation communities help to maintain the health and growth of specific species and vegetation communities as a whole. Vegetation communities that require fire may suffer through inappropriate fire regimes or no fire regime at all. An absence of fire can result in a susceptibility of certain ecological processes that can lead to species loss, structural changes, reduced or simplified cover, loss of fauna habitat and weed invasions (Lunt 1991).

Regular burning in grasslands dominated by Kangaroo Grass (referred to henceforth as *Themeda*) helps to maintain the diversity of native plants by preventing the vigorous *Themeda* from outcompeting smaller native plants (Stuwe and Parsons 1977, Robertson 1985). The optimal bare earth cover to be created through burning is 30%; to encourage herb and lily germination through the creation of inter-tussock spaces. The seed of most grassland

species does not remain viable in soil for extended periods and hence the absence of fire (i.e. more than five years) would constitute a major threat to some grassland species (Murphy 2000). Burning can be used to reduce biomass and inhibit introduced species dispersal within the landscape. However, as Lunt (1991) notes, burning can promote many exotic species, particularly in degraded remnants.

The reserve has historically been subject to management burns on an infrequent and ad-hoc basis. Burns were previously aimed at reducing biomass to achieve bushfire protection and fuel reduction objectives (Murphy 2000). Coordinated by the Macedon Ranges Shire Council and Woodend CFA, these burns ceased in the early 1990's and replaced by more strategic measures that aim to reduce fire risk to nearby residences and to sustain ecological values. A mosaic, rotating schedule of burns has been adopted, with the northern, southern and central sections of the reserve burned in alternate years (Zones A, B and C, see Figure 5).

Due to unfavourable weather conditions, a burn has not occurred in the reserve for the past two years (pers. comm. Stan Wilson, Macedon Ranges Shire Council and Mick Christie, Captain Woodend Fire Brigade). In March/April 2012, at the time of writing this management plan, a burn was put through the southern end of the reserve (Zone A, see Plate 19, Figure 5). Plate 20 below shows the fire break on the periphery of the reserve, adjacent to the wildlife friendly fence.

Actions:

- Continue the mosaic burning pattern, with each zone (northern, southern and central, indicated as Zones A, B and C in Figure 5) burnt every three years or on an 'as needs' basis.
- 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 Woodend CFA under the direction of the Macedon Ranges Shire Council and 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 with a brushcutter or lawn 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 should be notified of the burn to take place and traffic along Forest Street may need to be alerted to possible heavy smoke in the area.

- Minimise vehicle disturbance to the grassland. Vehicles should not be driven on wet ground and tankers should not be taken onto the site except in an emergency.
- 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. Macedon Ranges Veterinary Clinic in Woodend). If this is not possible, Wildlife Victoria should be contacted immediately. DSE should be contacted in the event of wildlife injury or death occurring due to a prescribed burn.
- Ensure follow up weed control is undertaken in burnt areas within 4-6 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. Several weed species within the reserve, (i.e. Gorse and Spanish Heath) may germinate on a large scale as fire is known to trigger their stored seed.
- Burning is likely to control native woody species regeneration within the reserve.
- Records must be kept indicating the zone burnt, the date and any issues encountered during the burn.

Plate 19. Photo taken nearly three weeks post-burn in April 2012



Plate 20. Zone A burn zone on left and three-metre fire break adjacent to fence



4.2.3 Tree Regeneration

Objective: Reduce the potential impact of Silver Wattle, Blackwood and Narrow-leaf Peppermint regeneration.

Silver Wattle, Blackwood and a minor number of Narrow-leaf Peppermint are successfully regenerating across the reserve, especially in perimeter zones. In sections of the reserve this regeneration is prolific (see Plates 8, 9 and 15). These woody species are representative of Valley Grassy Forest (EVC 48), which is likely to have been the original vegetation on-site. The reserve, however, is to be managed as a grassland and woody regrowth may threaten the diversity of species present and the values of the grassland community.

A considered and strategic approach to remove some of this regrowth will assist in conserving floral species diversity whilst not compromising the mature remnants of the Valley Grassy Forest EVC.

Woody saplings and seedlings will readily succumb to ecological burns and this was evidenced on-site with the March 2012 burn (see Plate 21 below).

Plate 21. Regenerating Silver Wattle and Blackwood were affected during a recent burn



4.2.4 Pest Animal Management

Objective: *Reduce the number of invasive pest animals within the reserve and the adjoining Five Mile Creek through an integrated habitat removal program.*

Rabbits have previously been recorded in high numbers within the reserve (Murphy 2000). Rabbit diggings were identified within the reserve and a large number of rabbits were observed within surrounding vegetation.

Rabbits have the potential to cause serious environmental damage through the suppression of indigenous plant regeneration, competition with native wildlife for food resources, and by providing a ready food source for foxes. Foxes prey upon many smaller native animals and have been identified as a known or perceived threat to 34 indigenous fauna species in threat abatement plans provided under the EPBC Act. The European Rabbit, and Red Fox, are a declared Established Pest Animals under the *Catchment and Land Protection Act 1994* (CALP Act). Under this Act, landowners must take all reasonable steps to control established pest animals on their property. Competition and land degradation by rabbits and predation by foxes are also listed as Key Threatening Processes under both the FFG Act and EPBC Act.

Woody weed species such as Gorse, Hawthorn and Blackberry surround the reserve perimeter together with large mature Cypress *Cupressus* spp., English Oak *Quercus robur*, Radiata Pine

and Poplar (Plate 22). These species provide suitable habitat for rabbits and foxes, although no foxes have formally been recorded on-site. Drainage lines to the west of the reserve and the densely vegetated Five Mile Creek area to the north provide ample rabbit and fox habitat. Pest animal management on-site should focus on removing rabbit harbour both within and surrounding the reserve. The gradual replacement of this vegetation with indigenous species will create a less favourable environment for rabbits and foxes, whilst providing improved habitat and linkages for native species.

Actions:

- An integrated pest animal management approach may incorporate a number of measures, including warren and harbour destruction, warren fumigation, poisoning (e.g. 1080) and shooting. Optimum control is best achieved by integrating more than one control method. However, the location of the reserve at the edge of the township and the potential for adverse impacts upon other values and uses of the reserve preclude some of these measures. For example, soil disturbance by warren destruction may lead to increased weed cover; poisoning may affect non-target species (e.g. pet dogs); whilst shooting is not advised near residential areas. Therefore, management actions at the reserve should concentrate upon the destruction of pest animal harbour.
- Weed control works to be undertaken within a 10 metre-wide strip outside of the reserve boundary (i.e. largely between the reserve boundary and the outside walking trail). Works in this area to target woody weeds and pest animal harbour such as Blackberry, Hawthorn and Poplar as part of weed control program outlined in Section 4.2.1.
- Liaise with Woodend Landcare, the NCCMA, Woodend Golf Course and nearby landholders to determine opportunities and resources available to target established introduced flora species within the Five Mile Creek riparian zone. Significant areas both within the creek zone and north of the creek support dense and well-established stands of introduced trees 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.

Plate 22. Gorse, Broom and Poplar surrounding the reserve perimeter



4.2.5 Native Fauna Management

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

Macropod density at the reserve is low, and they are not considered to pose a large grazing threat to the ecological values of the grassland.

To provide safe harbour for the macropod population, selective dense stands of trees should be retained within separate sections of the reserve. These trees provide ideal native habitat and sanctuary within an otherwise open urban environment.

Actions:

- Retain selective dense stands of trees and shrubs as habitat and sanctuary for the local macropod population.
- Given the connectivity of the reserve with surrounding open land, particularly to the west and north, it is unlikely that macropod density will reach deleterious levels on site. Therefore, active control measures are not advised at this stage.

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, swampy riparian woodland and plains grassy woodland. 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. 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.

Located on the outskirts of the Woodend Township, the reserve sits within a highly fragmented and degraded landscape. Connectivity to other bushland areas is limited to the east and south of the reserve due to the presence of residential housing, while cleared open pasture is found to the west. The reserve's primary connection with other vegetated areas occurs along the Five Mile Creek to the north. The creek supports a combination of remnant vegetation together with revegetation undertaken by the local Woodend Landcare group, which provides connectivity to the east towards the Woodend Township. The creek in turn provides linkages to larger vegetated, albeit highly fragmented, areas to the east of the township.

Improving habitat connectivity to the surrounding local area will link areas of remnant vegetation within an otherwise cleared or modified landscape. It will allow for the movement of wildlife between remnant patches of native vegetation and will provide useful fauna habitat, effectively reversing habitat fragmentation in the local area. Mammals, birds, reptiles, amphibians and invertebrates that would otherwise be isolated in one patch can utilise such connections to travel between patches with relative ease and safety.

Actions:

- Improve fauna habitat and connectivity through the gradual replacement of introduced and invasive plant species with indigenous species, both within the reserve and along Five Mile Creek.
- Determine opportunities and resources available to target established introduced species within the Five Mile Creek riparian zone. Works to improve connectivity along the Five Mile Creek involve an integrated and coordinated approach involving Council, Woodend Landcare, NCCMA, the Woodend Golf Club and private landholders. Gradual removal and replacement of large stands of exotic trees will require a long-term commitment from all stakeholders together with intensive long-term resourcing.

4.2.7 Further Surveys

The level of documented fauna survey within the reserve is minimal, with only one fauna survey undertaken since 1985 (Platt 2006). It is worth noting that this fauna survey did not include a full species list. Four flora surveys have been completed at the reserve which is considered sufficient, however additional incidental records will further contribute to the aims of this management plan.

Actions:

- Fauna: undertake a comprehensive fauna survey of the reserve and its immediate surrounds, preferably in spring to early summer. Methodology should include a general daytime survey, spotlighting and call playback, and may also include more intensive techniques (e.g. tiling, pit trapping, hair tubing and use of remote infrared cameras).
- Flora: incidental records of any new species at the reserve should be documented and provided to Council, the Flora Information System (FIS) or any other relevant database systems available at the time. New species may have emerged since periodic burning began in 2000. Local Council officers, ecologists, on-ground contractors and the community have a responsibility to positively identify any potentially new species 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.

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 Woodend 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 small size and lack of 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:

- 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 affected;
- An increasing vulnerability for aquatic species as rain events become less frequent but more severe; periodic inundation of the reserve to become less frequent but more severe;
- An increasing frequency and severity of fire events.

Consideration and reference to the objectives and outcomes of the Macedon Ranges Shire Council's *Climate Change Risk Assessment and Early Adaptation* project (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 addresses potential impacts such as the appearance of invasive pest plants and animals, the decline of some indigenous plant and animal species and new fire regimes is required under a changing climate scenario. This management framework should recognise that natural assets are not static systems but undergo change, which is likely to accelerate under a warming climate.
- *Adopt a landscape scale approach to management of the reserve.* The small size of the reserve and its unique vegetation community for this region presents considerable

challenges to increasing its resilience to potential disturbance events. A landscape scale approach that considers connectivity to adjoining bushland areas such as the Five Mile Creek and surrounds will provide better options for species distribution and abundance.

- *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 Cultural Management

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

The reserve is located within the traditional land of the Dja Dja Wurung. 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, explore potential partnership approaches.* Partnership opportunities between the DDWCAC and Macedon Ranges Shire Council range from informal ‘in principal’ documents such as a memorandum of understanding or statement of intent through to formal, legally binding agreements such as a Cultural Heritage Agreement.

4.5 Recreation Management

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

Visitor impacts to the reserve are minor due to limited access opportunities. The impact from informal tracks is negligible, and there is no evidence of rubbish dumping within the reserve. Two campfire spots were located within the reserve and were likely lit by visitors fishing in the nearby dam (Plate 23). These fires appear to have been fuelled by pine trees that were lopped nearby. During a site visit a domestic dog was also observed swimming in the dam although the impact of this activity may be negligible if it is an isolated occurrence.

Plate 23. Campfire besides an informal track



Opportunities for low impact engagement with the reserve's ecological values should, ideally, be encouraged. Measures aimed at encouraging passive recreational access need to be, however, undertaken in a cautionary and sensitive manner. The relatively small size of the reserve, lack of connectivity with adjoining bushland environments and close proximity to the Woodend Racecourse Reserve and township make it particularly susceptible to visitor impacts. Grassland communities are fragile and vulnerable to invasive plant invasion which visitors can, unknowingly, accelerate through the introduction of weed seed and other impacts. These issues, and the relative abundance of recreational opportunities in the adjoining Woodend Racecourse Reserve and Five Mile Creek, limit the need for formal tracks and any further informal tracks to traverse the reserve.

4.5.1 Reserve Access

Objective: *Encourage low impact visitation through a formal track access that limits intrusion into the reserve.*

Informal tracks currently encircle the dam and extend from a vehicle access path which is used for fire fighting purposes, weed control and to access powerline infrastructure (see Figure 3). Minor informal tracks appear around some sections of the reserve perimeter. A minor informal track was noted along the proposed fitness track alignment (see Figure 3) which will traverse the reserve along Western Water's recycled water pipeline easement. No other informal tracks that traverse the reserve were recorded during the site visit. A well-utilised walking trail encircles the grassland, extending from the Five Mile Creek walking path

(Figure 3). It is likely that the proposed fitness track through the grassland will be well-utilised by walkers and joggers.

Actions:

Formal Tracks:

- *Include the proposed fitness track as part of the reserve's main walking trail.* Whilst the fitness track is intended for more active pursuits, inclusion of this track as a means of traversing the reserve for passive visitors will limit any further impacts (see Plate 24). Signage should be installed at both entrance points of the fitness track alerting people to the sensitive nature of the grassland and to stay on the formed path. Horses and trail bike riders should not be allowed to access this path. Simple signage indicating this (i.e. horse and trail bike sign with a cross through it) should be considered for installation.
- *Prevent/limit further formal or informal access within the reserve.* The delivery of objectives for passive recreational access to the reserve can be achieved without the need for further track creation. The current informal track network, in addition to the proposed fitness track, provides visitors with good access points within the reserve and ample opportunities for engagement with the grassland environment. Active naturalists keen to observe the grassland at a closer level will be able to access the grassland via the pedestrian access points; however formulation of new tracks should not be encouraged.

With regards to the proposed formal fitness track, it is recommended:

- The invasive plant management program focus on this formal track and prevent weed incursion spreading into sensitive zones;
- Any construction activities associated with this track comply with the relevant requirements and conditions in regards to soil and machinery movement, sediment retention and grassland protection.

Access Points:

- *Improve existing interpretive signage and install additional signage.* See section 4.5.2 Interpretative Signage.
- *Ensure the access points are weed free and maintained.* Access points are overgrown with pastoral weeds and other grasses (see Plate 17). These access points should be slashed and maintained whilst undertaking other weed control and maintenance duties.

Plate 24. Proposed fitness track alignment adjacent to drainage line, used as a fire break



4.5.2 Interpretive Signage

Objective: Through information provided via interpretive displays at key access points, provide visitors with an opportunity to understand and engage with the values of grassland communities.

As detailed in Section 3.3, interpretive signage is provided at two key access points and at another point on the southern boundary of the reserve (Figure 3). This signage is visually impressive and provides a striking marker to the reserve's boundary point. Information on the reserve's history and key signature grassland species are provided at these points. Exposure to the elements is, however, taking a minor toll on sections of this signage.

As a destination for passive recreation visitors and tourists, the value of this signage is significant and greatly enhances the visitor's appreciation and understanding of the fragility and importance of grassland environments.

Actions:

- *Consider placing additional interpretive signage along the proposed formal fitness track.* Information on grasslands, flora and fauna identification, invasive plants and animals should be provided along the proposed fitness track. Information on who is currently managing the grassland and what is being done (i.e. weed control, burning) could be provided.

- *Use non-fade material.* Existing interpretive material has already suffered from exposure to the elements. Investigate and use material not subject to fade.
- *Ensure interpretive signage areas are weed free and maintained.* Currently the interpretive signage areas are overgrown with pastoral weeds and other grasses, with signage on the southern boundary difficult to see through overgrown weeds (see Plate 25). The signage areas should be slashed and maintained whilst undertaking other weed control and maintenance duties.
- *Highlight prohibited and inappropriate activities.* Inappropriate activities within the reserve such as horse riding, trail bikes, rubbish dumping, camping and seed and flower collecting should be noted at key entrance points and along the proposed fitness track.

Plate 25. Signage on southern boundary



4.5.3 Low Impact, Passive Tourism

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

The scarcity of intact grassland communities greatly heightens their appeal as a destination for low impact, nature-based tourists including bird watchers, photographers, naturalists and students of science and education. Such interactions are aimed at informing and educating visitors on the values of grassland 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.

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 deliver significant economic benefits to Woodend and the wider region. The significance of the Evans Street Grassland, a small four hectare basalt plains grassland in Sunbury, has been widely promoted and attracts nature-based enthusiasts that provide tourism dollars into the local community.

i. Birdwatchers, Photographers, Naturalists

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

Promotion of the reserve as a rare intact grassland for the region will attract low impact visitors interested in photography, bird watching and ecology.

Actions:

- *Promote the values of the reserve 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 Woodend Landcare.*

ii. Education and Science

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

Promotion of the reserve as an intact grassland environment will attract local secondary and regional tertiary institutions in the field of ecology, biology, botany and zoology. Tertiary students currently utilise the Evans Street Grassland for learning activities during the course of their studies, and the Woodend Grassland could be promoted for such educational activities.

Actions:

- *Promote the values of the reserve 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 Woodend Landcare.*

4.6 Adjoining Uses

Objective: *Ensure the adjoining Woodend Racecourse Reserve, Five Mile Creek, pastoral farms and residential areas do not impact on the reserve's conservation values.*

4.6.1 Woodend Active Recreation Reserve

Impacts from the area at the Woodend Racecourse Reserve occupied by the active recreation uses primarily involve invasive plants entering the reserve from the adjoining sports ovals and old race track. This issue is highlighted by the proliferation of weeds in perimeter zones. A minor amount of litter is present within the reserve and is largely located within drainage lines; having been washed in during storm events. Other litter appears to have blown in from the adjoining sports ovals (see Plate 26).

The recreational needs of the community may alter over time and should the need arise to alter the boundaries any change would be subject to statutory approvals.

Plate 26. Wind-blown litter within the reserve



4.6.2 Five Mile Creek and Woodend Golf Club

Measures to remove and control invasive plants along the Five Mile Creek riparian zone and walking track would significantly reduce pest animal harbour, and minimise further weed spread into the reserve. Assistance from Woodend Golf Club, who own land to the north of Five Mile Creek, would provide a coordinated landscape approach. Sections 4.2.1 and 4.2.4 provide further information and actions related to the Five Mile Creek riparian zone.

4.6.3 Adjoining residents: Forest Street, Jeffreys Street and surrounds

Forest Street, Jeffreys Street and surrounding streets contain residential lots that are landscaped with planted ornamentals and exotics that can easily escape. Domestic pets, such as cats and dogs, can have a severe impact on native fauna within the reserve.

4.6.4 Pastoral farms

Pastoral farms west of the reserve provide an ever-present weed threat. These farms consist of introduced pasture grasses that likely disperse their seed into the reserve and along its fringes.

Actions:

- *Provide information to adjoining residents, pastoral neighbours, the Golf Club and the Woodend Racecourse Reserve on the values of the reserve and potential impacts from adjoining uses including invasive plants and animals, litter and prohibited activities. This information could be provided via the production of a 'Good Neighbour' brochure (see Frankston City Council 'Good Bushland Neighbour' guide).*
- *Encourage adjoining residents and pastoral neighbours to plant indigenous species and to control invasive plants.*
- *Ensure adjoining residents know their responsibilities regarding pet animals to prevent them from entering the reserve at all times.*
- *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 occurring within the reserve.*

4.7 Monitoring

Management actions implemented at the site and outlined within this management plan require monitoring to determine whether they are achieving their stated objectives. Monitoring should generally assess current site values, changes, issues, improvements and the appropriateness of management actions being undertaken. Monitoring should be undertaken by an experienced council officer, bushland management contractor 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:

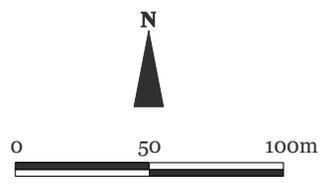
- *An assessment of management actions undertaken and outlined within this plan.* Objectives and actions outlined in this plan need to be formally assessed and documented. This should include whether they have/have not been undertaken on-site or are in progress, and how objectives are/are not being met. Appendix 5 summarises the plan's management actions and can be used as a check list.
- *Establishment of five 10 x 10 metre permanent quadrats within the reserve.* Two of the quadrats should be located to the west of the main drainage line whilst three quadrats should be located to the east of the main drainage line. Areas selected should represent differing reserve characteristics, i.e. interior and outer edge of reserve, area with trees and shrubs and area with weeds. 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 five 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;
 - Bare earth % cover;
 - Height of tallest plant in quadrat;
 - List of native species successfully recruiting or regenerating;
 - Organic litter % cover.
- *Establishment of one photopoint within each quadrat.* One corner of each quadrat is to form a photopoint to visually document changes that occur in the reserve. The photopoint should aim to capture the landscape and ideally incorporate trees, shrubs and weeds. The photopoint GPS coordinate and direction of photo should be documented and provided to Council.
- *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. Weedy verges and the main drainage line to be monitored for native re-growth. Direct seeding and planting to be considered if native regeneration not occurring.

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

Figure 3 - Features of Woodend Grassland Reserve



- Pedestrian access
- Vehicle access
- Signage
- Native trees & shrubs
- Dam
- Proposed fitness track
- Vehicle track
- Walking track
- Informal walking track
- Grassland Reserve
- Racecourse Reserve
- Drainage line

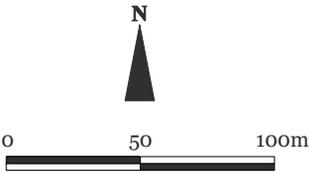


Note: Map features are approximate and are to be used as a guide only.

Figure 4 - Major weeds within Woodend Grassland Reserve



- | | | |
|---|--|--|
|  Blackberry |  Poplar, Pine and Spanish Heath |  Grassland Reserve |
|  Broom |  Spanish Heath |  Racecourse Reserve |
|  Gorse |  Weedy verge grasses | |
|  Poplar | | |



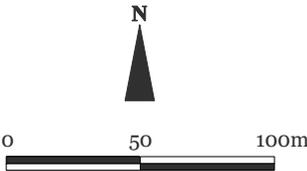
Note: Map features are approximate and are to be used as a guide only.

Figure 5 - Weed and Fire Management Zones



- Zone A
- Zone B
- Zone C

- Grassland Reserve
- Racecourse Reserve



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

Glossary

Arboreal: living in or among trees

Avifauna: birds of a specific region or period

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

Canopy: the cover of foliage of a plant

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

Habitat: the environment in which a plant or animal lives

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

Indigenous: native to a particular area, not introduced

Invertebrates: lacking a backbone or spinal column

Macropods: a marsupial family that includes kangaroos and wallabies

Neogene: a geologic period that ended about 2.588 million years ago

Ordovician: a geologic period that ended about 443 million years ago

Passive recreation: non-competitive and unorganised recreational activities.

Prostrate: a plant that grows close to the ground

Quaternary: most recent of the Cenozoic geologic period

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

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

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

Terrestrial: of this earth, inhabiting on land

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 (1985, 1999, 2006 and 2006/2007)

INDIGENOUS SPECIES		
Botanical Name	Common Name	Significance
<i>Acacia dealbata</i>	Silver Wattle	Local
<i>Acacia melanoxylon</i>	Blackwood	Local
<i>Acaena echinata</i>	Sheep's Burr	Local
<i>Acaena novae-zelandiae</i>	Bidgee Widgee	Local
<i>Allitia cardiocarpa</i> ^	Swamp Daisy	Regional
<i>Amphibromus archeri</i>	Pointed Swamp Wallaby-grass	Regional
<i>Anthosachne scabra</i> ^	Common Wheat-grass	Local
<i>Aphelia gracilis</i>	Slender Aphelia	Regional
<i>Aphelia pumilio</i>	Dwarf Aphelia	Regional
<i>Arthropodium strictum</i>	Chocolate Lily	Local
<i>Asperula conferta</i>	Common Woodruff	Regional
<i>Asperula scopari</i> subsp. <i>scoparia</i>	Prickly Woodruff	Regional
<i>Astroloma humifusum</i>	Cranberry Heath	Local
<i>Austrostipa</i> spp.	Spear Grass	Local
<i>Bossiaea prostrata</i>	Creeping Bossiaea	Local
<i>Brachyscome decipiens</i>	Field Daisy	Regional
<i>Brunonia australis</i>	Blue Pincushion	Local
<i>Bulbine bulbosa</i>	Bulbine Lily	Regional
<i>Burchardia umbellata</i>	Milkmaids	Local
<i>Caesia calliantha</i>	Blue Grass-lily	Regional
<i>Callitriche stagnalis</i>	Common Water-starwort	Regional
<i>Carex breviculmis</i>	Common Grass-sedge	Regional
<i>Carex inversa</i>	Knob Sedge	Regional
<i>Centrolepis aristata</i>	Pointed Centrolepis	Regional
<i>Centrolepis strigosa</i> subsp. <i>strigosa</i>	Hairy Centrolepis	Regional
<i>Coronidium scorpioides</i> ^	Button Everlasting	Local

INDIGENOUS SPECIES		
Botanical Name	Common Name	Significance
<i>Coronidium scorpioides aff rutidolepis</i> ^	Pale Swamp Everlasting	Regional
<i>Crassula helmsii</i>	Swamp Crassula	Regional
<i>Cymbonotus preissianus</i>	Austral Bear's-ear	Local
<i>Daviesia leptophylla</i>	Narrow-leaf Bitter-pea	Local
<i>Deyeuxia quadriseta</i>	Reed Bent-grass	Regional
<i>Dianella admixta</i> ^	Black-anther Flax-lily	Local
<i>Dichondra repens</i>	Kidney-weed	Local
<i>Dillwynia cinerascens</i>	Grey Parrot-pea	Local
<i>Diuris chryseopsis</i> ^	Golden Moths	Regional
<i>Drosera glanduligera</i>	Scarlet Sundew	Regional
<i>Eleocharis acuta</i>	Common Spike-sedge	Regional
<i>Eleocharis sphacelata</i>	Tall Spike-sedge	Regional
<i>Epilobium billardierianum</i>	Variable Willow-herb	Local
<i>Epilobium hirtigerum</i>	Hairy Willow-herb	Regional
<i>Eragrostis brownii</i>	Common Love-grass	Regional
<i>Eryngium vesiculosum</i>	Prickfoot	Regional
<i>Eucalyptus radiata</i>	Narrow-leaf Peppermint	Local
<i>Eucalyptus viminalis</i>	Manna Gum	Local
<i>Geranium retrorsum</i>	Grassland Crane's-bill	Regional
<i>Gonocarpus tetragynus</i>	Common Raspwort	Local
<i>Haloragis heterophylla</i>	Varied Raspwort	Local
<i>Hardenbergia violacea</i>	Purple Coral-pea	Local
<i>Hemarthria uncinata</i> var. <i>uncinata</i>	Mat Grass	Regional
<i>Hovea heterophylla</i> ^	Common Hovea	Local
<i>Hypericum gramineum</i>	Small St John's Wort	Local
<i>Hypoxis glabella</i>	Yellow Star	Regional
<i>Hypoxis hygrometrica</i>	Golden Weather-grass	Regional
<i>Hypoxis vaginata</i> var. <i>vaginata</i>	Sheath Star	Regional
<i>Isolepis cernua</i> var. <i>platycarpa</i> ^	Club-sedge	Regional
<i>Isolepis fluitans</i>	Floating Club-sedge	Regional

INDIGENOUS SPECIES		
Botanical Name	Common Name	Significance
<i>Isolepis hookeriana</i>	Grassy Club-sedge	Regional
<i>Isotoma fluviatilis</i> subsp. <i>australis</i>	Swamp Isotome	Regional
<i>Juncus amabilis</i>	Hollow Rush	Regional
<i>Juncus bufonius</i>	Toad Rush	Regional
<i>Juncus holoschoenus</i>	Joint-leaf Rush	Regional
<i>Juncus sarophorus</i>	Broom Rush	Regional
<i>Lachnagrostis filiformis</i> ^	Common Blown-grass	Local
<i>Lagenophora stipitata</i>	Common Bottle-daisy	Local
<i>Lomandra filiformis</i>	Wattle Mat-rush	Local
<i>Leptorhynchos squamatus</i>	Scaly Buttons	Local
<i>Linum marginale</i>	Native Flax	Regional
<i>Luzula meridionalis</i>	Field Woodrush	Regional
<i>Lythrum hyssopifolia</i>	Small Loosestrife	Regional
<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	Local
<i>Microseris</i> sp. 3 ^	Yam Daisy	Regional
<i>Microtis unifolia</i>	Common Onion-orchid	Regional
<i>Montia fontana</i>	Water-blinks	Regional
<i>Montia australasica</i>	White Purslane	Regional
<i>Myriophyllum crispatum</i>	Upright Milfoil	Regional
<i>Opercularia ovata</i>	Variable Stinkweed	Local
<i>Oxalis perennans</i>	Grassland Wood-sorrel	Local
<i>Pimelea humilis</i>	Common Rice-flower	Local
<i>Plantago gaudichaudii</i>	Narrow Plantain	Regional
<i>Plantago varia</i>	Variable Plantain	Local
<i>Pentapogon quadrifidus</i>	Five-awned Spear-grass	Regional
<i>Poa rodwayi</i>	Velvet Tussock-grass	Regional
<i>Poa sieberiana</i>	Grey Tussock-grass	Local
<i>Portulaca oleracea</i>	Common Purslane	Regional
<i>Potamogeton ochreatus</i>	Blunt Pondweed	Regional
<i>Ranunculus glabrifolius</i>	Shining Buttercup	Regional

INDIGENOUS SPECIES		
Botanical Name	Common Name	Significance
<i>Ranunculus lappaceus</i>	Australian Buttercup	Regional
<i>Rytidosperma erianthum</i> ^	Hill Wallaby Grass	Regional
<i>Rytidosperma laeve</i> ^	Smooth Wallaby-grass	Regional
<i>Rytidosperma pallidum</i> ^	Silver-top Wallaby-grass	Local
<i>Rytidosperma pilosum</i> ^	Velvet Wallaby-grass	Regional
<i>Rytidosperma semiannulare</i> ^	Wetland Wallaby-grass	Regional
<i>Schoenus apogon</i>	Common Bog-sedge	Local
<i>Schoenus tesquorum</i>	Soft Bog-sedge	Regional
<i>Senecio squarrosus</i>	Leafy Fireweed	Regional
<i>Senecio glomeratus</i>	Annual Fireweed	Local
<i>Senecio quadridentatus</i>	Cotton Fireweed	Local
<i>Solenogyne dominii</i>	Smooth Solenogyne	Regional
<i>Solenogyne gunnii</i>	Hairy Solenogyne	Regional
<i>Stylidium graminifolium</i>	Grass Trigger Plant	Local
<i>Thelymitra rubra</i>	Salmon Sun-orchid	Regional
<i>Thelymitra pauciflora</i>	Slender Sun-orchid	Regional
<i>Themeda triandra</i>	Kangaroo Grass	Local
<i>Tricoryne elatior</i>	Yellow Rush-lily	Local
<i>Veronica gracilis</i>	Slender Speedwell	Regional
<i>Vittadinia muelleri</i>	Narrow-leaf New Holland Daisy	Regional
<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	Tall Bluebell	Local
<i>Wurmbea dioica</i>	Common Early Nancy	Local

INTRODUCED SPECIES		
Botanical Name	Common Name	Declared Noxious Weed *
<i>Agrostis capillaris</i>	Brown-top Bent-grass	-
<i>Aira</i> spp.	Hair Grass	-
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	-

INTRODUCED SPECIES		
Botanical Name	Common Name	Declared Noxious Weed *
<i>Acetosella vulgaris</i>	Sheep Sorrel	-
<i>Arbutus unedo</i>	Strawberry Tree	-
<i>Briza maxima</i>	Large Quaking-grass	-
<i>Briza minor</i>	Lesser Quaking-grass	
<i>Centaurium erythraea</i>	Common Centaury	-
<i>Chamaemelum nobile</i>	Common Chamomile	-
<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch	-
<i>Cyperus tenellus</i>	Tiny Flat-sedge	-
<i>Cyperus rotundifolius</i>	Nut Grass/Drain Sedge	-
<i>Cytisus scoparius</i>	English Broom	Restricted
<i>Dactylus glomeratus</i>	Cocksfoot	-
<i>Daucus carota</i>	Carrot	-
<i>Erica lusitanica</i>	Spanish Broom/Heath	-
<i>Festuca arundinacea</i>	Tall Fescue	-
<i>Holcus lanatus</i>	Yorkshire Fog	-
<i>Hypochaeris radicata</i>	Flatweed/Cat's Ear	-
<i>Juncus articulata</i>	Jointed Rush	-
<i>Juncus capitatus</i>	Capitate Rush	-
<i>Leontodon taraxacoides</i>	Hairy Hawkbit	-
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	-
<i>Lysimachia arvensis</i> ^	Pimpernel	-
<i>Paspalum dilatatum</i>	Paspalum	-
<i>Paspalum distichum</i>	Water Couch	-
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	-
<i>Pinus radiata</i>	Radiata Pine	-
<i>Plantago lanceolata</i>	Ribwort	-
<i>Populus</i> spp.	Poplar sp	-
<i>Romulea rosea</i> var. <i>australis</i>	Common Onion-grass	-
<i>Rubus fruticosus</i> spp. agg.	Blackberry	-

INTRODUCED SPECIES		
Botanical Name	Common Name	Declared Noxious Weed *
<i>Rumex conglomeratus</i>	Clustered Dock	-
<i>Rumex crispus</i>	Curled Dock	-
<i>Sisyrinchium iridifolium</i>	Striped Rush-leaf	-
<i>Sonchus oleraceus</i>	Common Sow-thistle	-
<i>Tragopogon porrifolius</i>	Salsify	-
<i>Trifolium</i> spp.	Clover	-
<i>Ulex europaeus</i>	Furze/Gorse	Regionally controlled
<i>Vicia hirsuta</i>	Tiny Vetch (Hairy Vetch)	-

^ 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 2005)

x – Extinct

e – Endangered

v – Vulnerable

r – Rare

k – Poorly known

= Information derived from Flora Information System (FIS 2012)

* = EPBC Act Protected Matters Report (DSEWPC 2012)

Significant flora species previously recorded, or with the potential to occur, within 5 kilometres of the reserve

Botanical Name	Common Name	Total number of records#	EPBC Act 1999	FFG Act 1988	DSE	Comments
NATIONALLY SIGNIFICANT SPECIES						
<i>Pimelea spinescens</i> subsp. <i>spinescens</i> *	Spiny Rice-flower	-	CR	L	e	Habitat present
<i>Glycine latrobeana</i> *	Clover Glycine	-	VU	L	v	Habitat present
STATE SIGNIFICANT SPECIES						
<i>Acacia nano-dealbata</i>	Dwarf Silver Wattle	3	-	-	r	Limited habitat
<i>Billardiera scandens</i> s.s.	Velvet Apple-berry	1	-	-	r	Limited habitat
<i>Bossiaea cordigera</i>	Wiry Bossiaea	3	-	-	r	Limited habitat
<i>Eucalyptus yarraensis</i>	Yarra Gum	6	-	-	r	Habitat present
<i>Grevillea micrantha</i>	Small-flower Grevillea	1	-	-	r	Limited habitat
<i>Leucopogon microphyllus</i> var. <i>pilibundus</i>	Hairy Beard-heath	2	-	-	r	Limited habitat
<i>Pseudanthus orbicularis</i>	Tangled Pseudanthus	3	-	L	r	Limited habitat
<i>Senecio campylocarpus</i>	Floodplain Fireweed	1	-	L	r	Habitat present
<i>Eucalyptus aggregata</i>	Black Gum	27	-	-	v	Habitat present
<i>Zieria aspalathoides</i> subsp. <i>aspalathoides</i>	Whorled Zieria	1	-	-	v	Limited habitat

Appendix 2.1 – Fauna Previously Recorded within the Local Area

Key

Migratory/Marine:

Mi Migratory (EPBC Act)

Ma Marine (EPBC Act)

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

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
MAMMALS					
Short-beaked Echidna	<i>Tachyglossus aculeatus</i>	1993	7	Partial	-
Brush-tailed Phascogale	<i>Phascogale tapoatafa tapoatafa</i>	1979	3	Total	-
Agile Antechinus	<i>Antechinus agilis</i>	1995	16	Partial	-
Dusky Antechinus	<i>Antechinus swainsonii</i>	1994	5		-
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	1995	6	Total	-
Mountain Brushtail Possum	<i>Trichosurus cunninghami</i>	2008	1	Total	-

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>	1997	20	Partial	-
Greater Glider	<i>Petauroides volans</i>	1967	1	Total	-
Sugar Glider	<i>Petaurus breviceps</i>	1995	1	Total	-
Koala	<i>Phascolarctos cinereus</i>	1997	36	-	-
Common Wombat	<i>Vombatus ursinus</i>	1993	6	-	-
Black Wallaby	<i>Wallabia bicolor</i>	1995	7	-	-
Eastern Grey Kangaroo	<i>Macropus giganteus</i>	1993	7	-	-
White-striped Freetail Bat	<i>Tadarida australis</i>	1993	3	Total	-
Gould's Long-eared Bat	<i>Nyctophilus gouldi</i>	1993	1	Total	-
Chocolate Wattled Bat	<i>Chalinolobus morio</i>	1960	1	Total	-
Little Forest Bat	<i>Vespadelphus vulturinus</i>	1993	2	Total	-
Large Forest Bat	<i>Vespadelphus darlingtoni</i>	1993	1	Total	-
Bush Rat	<i>Rattus fuscipes</i>	1995	43	-	-
Swamp Rat	<i>Rattus lutreolus</i>	1993	2	-	-
Black Rat *	<i>Rattus rattus</i>	1995	2	-	-
House Mouse *	<i>Mus musculus</i>	1959	3	-	-
European Rabbit *	<i>Oryctolagus cuniculus</i>	1993	4	-	-
European Hare *	<i>Lepus europeus</i>	1993	2	-	-
Dog (feral) *	<i>Canis lupus familiaris</i>	1995	1	-	-
Red Fox *	<i>Canis vulpes</i>	1995	7	-	-
Cat (feral) *	<i>Felis catus</i>	1982	2	-	-
BIRDS					
Stubble Quail	<i>Coturnix pectoralis</i>	2001	1	-	Ma

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
Common Bronzewing	<i>Phaps chalcoptera</i>	2001	4	-	-
Brush Bronzewing	<i>Phaps elegans</i>	1993	1	-	-
Crested Pigeon	<i>Ocyphaps lophotes</i>	2001	23	-	-
Dusky Moorhen	<i>Gallinula tenebrosa</i>	1999	2	-	-
Purple Swampphen	<i>Porphyrio porphyrio</i>	1992	1	-	Ma
Eurasian Coot	<i>Fulica atra</i>	1999	5	-	-
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	2000	3	-	-
Great Cormorant	<i>Phalacrocorax carbo</i>	1999	1	-	-
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	1992	2	-	-
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	2001	24	-	-
Australian Pelican	<i>Pelecanus conspicillatus</i>	1999	1	-	Ma
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	1976	1	-	Ma
Masked Lapwing	<i>Vanellus miles</i>	2000	15	-	Mi
Black-fronted Dotterel	<i>Elseyornis melanops</i>	1976	1	-	Mi
Latham's Snipe	<i>Gallinago hardwickii</i>	2000	1	-	-
Australian White Ibis	<i>Threskiornis molucca</i>	2001	12	-	Ma
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	2001	14	-	Ma
Yellow-billed Spoonbill	<i>Platalea flavipes</i>	2001	9	-	-
Eastern Great Egret	<i>Ardea modesta</i>	1992	2	-	Mi/Ma
White-faced Heron	<i>Egretta novaehollandiae</i>	2001	29	-	-
White-necked Heron	<i>Ardea pacifica</i>	2001	6	-	-
Australian Wood Duck	<i>Chenonetta jubata</i>	2001	38	Total	Mi
Black Swan	<i>Cygnus atratus</i>	1992	7	-	Mi
Australian Shelduck	<i>Tadorna tadornoides</i>	2000	3	Total	Mi

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
Pacific Black Duck	<i>Anas superciliosa</i>	2001	26	Partial	Mi
Grey Teal	<i>Anas gracilis</i>	1992	3	Total	Mi
Hardhead	<i>Aythya australis</i>	1999	1	-	Mi
Blue-billed Duck	<i>Oxyura australis</i>	1992	1	-	Mi
Musk Duck	<i>Biziura lobata</i>	1976	2	-	Mi/Ma
Brown Goshawk	<i>Accipiter fasciatus</i>	2001	1	-	Mi/Ma
Wedge-tailed Eagle	<i>Aquila audax</i>	2001	12	-	Mi
Little Eagle	<i>Hieraaetus morphnoides</i>	1976	1	-	Mi
Black-shouldered Kite	<i>Elanus axillaris</i>	2000	1	-	Mi
Peregrine Falcon	<i>Falco peregrinus</i>	2001	2	Partial	Mi
Black Falcon	<i>Falco subniger</i>	2000	1	-	Mi
Brown Falcon	<i>Falco berigora</i>	2000	3	-	Mi
Nankeen Kestrel	<i>Falco cenchroides</i>	2000	2	Partial	Mi/Ma
Southern Boobook	<i>Ninox novaeseelandiae</i>	2001	16	Total	Ma
Barking Owl	<i>Ninox connivens</i>	1999	3	Total	-
Powerful Owl	<i>Ninox strenua</i>	2001	5	Total	-
Musk Lorikeet	<i>Glossopsitta concinna</i>	1993	1	Total	-
Purple-crowned Lorikeet	<i>Glossopsitta porphyrocephala</i>	1993	1	Total	-
Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>	2001	17	Total	-
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	1999	3	Total	-
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	2001	45	Total	-
Long-billed Corella	<i>Cacatua tenuirostris</i>	2001	28	Total	-
Galah	<i>Eolophus roseicapillus</i>	2001	38	Total	-
Crimson Rosella	<i>Platycercus elegans</i>	2001	51	Total	-

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
Eastern Rosella	<i>Platycercus eximius</i>	2001	34	Total	-
Blue-winged Parrot	<i>Neophema chrysostoma</i>	1993	1	Partial	Ma
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	2001	46	Total	-
Sacred Kingfisher	<i>Todiramphus sanctus</i>	1993	4	Partial	Ma
Pallid Cuckoo	<i>Cacomantis pallidus</i>	1999	3	-	Ma
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	2000	5	-	Ma
Horsfield's Bronze-Cuckoo	<i>Chalcites basalis</i>	1969	1	-	Ma
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	2001	8	-	Ma
Welcome Swallow	<i>Hirundo neoxena</i>	2001	31	Partial	Ma
Tree Martin	<i>Petrochelidon nigricans</i>	1976	2	Total	Ma
Fairy Martin	<i>Petrochelidon ariel</i>	1993	2	Partial	-
Grey Fantail	<i>Rhipidura albiscarpa</i>	2001	24	-	-
Willie Wagtail	<i>Rhipidura leucophrys</i>	2001	33	-	-
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	1993	3	-	Mi/Ma
Restless Flycatcher	<i>Myiagra inquieta</i>	1999	1	-	-
Scarlet Robin	<i>Petroica boodang</i>	1999	3	-	-
Flame Robin	<i>Petroica phoenicea</i>	2001	11	Partial	Ma
Eastern Yellow Robin	<i>Eopsaltria australis</i>	1999	8	-	-
Golden Whistler	<i>Pachycephala pectoralis</i>	1993	4	-	-
Rufous Whistler	<i>Pachycephala rufiventris</i>	1999	7	-	-
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	2001	28	Partial	-
Magpie-lark	<i>Grallina cyanoleuca</i>	2001	33	-	Ma
Crested Shrike-tit	<i>Falcunculus frontatus</i>	1993	2	-	-
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	2000	7	-	Ma

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
Weebill	<i>Smicrornis brevirostris</i>	1976	1	-	-
Striated Thornbill	<i>Acanthiza lineata</i>	2001	14	-	-
Yellow Thornbill	<i>Acanthiza nana</i>	2001	1	-	-
Brown Thornbill	<i>Acanthiza pusilla</i>	2001	17	-	-
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>	1993	3	Partial	-
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	2001	32	-	-
White-browed Scrubwren	<i>Sericornis frontalis</i>	2000	10	-	-
Superb Fairy-wren	<i>Malurus cyaneus</i>	2001	34	-	-
Dusky Woodswallow	<i>Artamus cyanopterus</i>	1993	3	Partial	-
Varied Sittella	<i>Daphoenositta chrysoptera</i>	1999	4	-	-
White-throated Treecreeper	<i>Cormobates leucophaea</i>	1999	13	Total	-
Red-browed Treecreeper	<i>Climacteris erythroptis</i>	1999	1	Total	-
Spotted Pardalote	<i>Pardalotus punctatus</i>	1993	2	Partial	-
Silvereye	<i>Zosterops lateralis</i>	1999	4	-	Ma
White-naped Honeyeater	<i>Melithreptus lunatus</i>	2000	11	-	-
Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>	1999	3	-	-
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	2001	9	-	-
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>	2000	10	-	-
White-eared Honeyeater	<i>Lichenostomus leucotis</i>	1999	10	-	-
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	1999	1	-	-
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	1999	1		
Noisy Miner	<i>Manorina melanocephala</i>	2001	26		
Red Wattlebird	<i>Anthochaera carunculata</i>	2001	19		
Australasian Pipit	<i>Anthus novaeseelandiae</i>	1993	1	-	Ma

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
Red-browed Finch	<i>Neochmia temporalis</i>	2000	2	-	-
White-winged Chough	<i>Corcorax melanorhamphos</i>	1999	3	-	-
Pied Currawong	<i>Strepera graculina</i>	2001	14	-	-
Grey Currawong	<i>Strepera versicolor</i>	2001	34	-	-
Grey Butcherbird	<i>Cracticus torquatus</i>	2001	1	-	-
Australian Magpie	<i>Cracticus tibicen</i>	2001	55	-	-
Australian Raven	<i>Corvus coronoides</i>	2001	7	-	-
Northern Mallard *	<i>Anas platyrhynchos</i>	2000	2	-	-
Little Raven	<i>Corvus mellori</i>	2001	45	-	Ma
Rock Dove *	<i>Columba livia</i>	1976	1	-	-
Striated Pardalote	<i>Pardalotus striatus</i>	2000	17	Partial	-
Spotted Dove *	<i>Streptopelia chinensis</i>	1999	2	-	-
Common Blackbird *	<i>Turdus merula</i>	2001	30	-	-
Eurasian Skylark *	<i>Alauda arvensis</i>	1993	1	-	-
House Sparrow *	<i>Passer domesticus</i>	2001	27	-	-
European Goldfinch *	<i>Carduelis carduelis</i>	2000	7	-	-
Common Myna *	<i>Sturnus tristis</i>	2001	36	Partial	-
Common Starling *	<i>Sturnus vulgaris</i>	2001	35	Partial	-
REPTILES					
Garden Skink	<i>Lampropholis guichenoti</i>	1993	8	Partial ✘	-
Coventry's Skink	<i>Niveoscincus coventryi</i>	1993	1	Partial ✘	-
Southern Water Skink	<i>Eulamprus tympanum tympanum</i>	1993	2	Partial ✘	-
Unidentified Copperhead	<i>Austrelaps species</i>	1993	1	-	-

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Hollow Use	Mi/Ma
Unidentified Grass Skink	<i>Pseudemoia</i> species	1993	2	Partial ✘	-
FROGS					
Southern Bullfrog	<i>Limnodynastes dumerilii</i>	1993	4	-	-
Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>	1993	1	Partial #	-
Common Froglet	<i>Crinia signifera</i>	1993	7	-	-
Southern Brown Tree Frog	<i>Litoria ewingii</i>	1993	7	Partial #	-
Verreaux's Tree Frog	<i>Litoria verreauxii</i>	1993	2	-	-
FISH					
Brown Trout *	<i>Salmo trutta</i>	1989	1	-	-
Mountain Galaxias	<i>Galaxias olidus</i>	2001	4	-	-
Tench *	fam. Cyprinidae gen. Tinca	2001	1	-	-
Trout Cod	<i>Maccullochella macquariensis</i>	1970	1	Partial ☹	-
Murray Cod	<i>Maccullochella peelii peelii</i>	1970	1	Total ☹	-
Redfin *	<i>Perca fluviatilis</i>	1989	1	-	-
INVERTEBRATES					
Cabbage White Butterfly *	<i>Pieris rapae rapae</i>	-	-	-	-
Golden Sun Moth	<i>Synemon plana</i>	1908	1	-	-
Common Freshwater Shrimp	<i>Paratya australiensis</i>	2001	1	-	-
Upland Burrowing Crayfish	<i>Engaeus lyelli</i>	1992	1	-	-
Common Yabbie	<i>Cherax destructor</i>	1999	1	-	-

Source: DSE Atlas of Victorian Wildlife (AVW 2012).

Appendix 2.2 – Significant Fauna Species Previously Recorded, or With Potential Habitat, Within 5km of Reserve

Sources used to determine species status:

EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
National Action Plans	Marsupials and monotremes (Maxwell <i>et al.</i> 1996), bats (Duncan <i>et al.</i> 1999), rodents (Lee 1995), birds (Garnett and Crowley 2000), reptiles (Cogger <i>et al.</i> 1993), frogs (Tyler 1997), freshwater fishes (Wagner and Jackson 1993) and butterflies (Sands and New 2002).
FFG	<i>Flora and Fauna Guarantee Act 1988</i> (Victoria)
DSE	<i>Advisory List of Threatened Vertebrate Fauna in Victoria</i> (DSE 2007) and <i>Advisory List of Threatened Invertebrate Fauna in Victoria</i> (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 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)

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Conservation Status			
				EPBC	National Action Plan	FFG	DSE
NATIONAL SIGNIFICANCE							
Brush-tailed Rock-wallaby #	<i>Petrogale penicillata</i>	-	-	VU	VU	CR	L
Grey-headed Flying-fox #	<i>Pteropus poliocephalus</i>	-	-	VU	VU	VU	L
Smoky Mouse #	<i>Pseudomys fumeus</i>	-	-	EN	RA	CR	L
Spot-tailed Quoll (SE mainland) #	<i>Dasyurus maculatus maculatus</i>	-	-	EN	VU	EN	L
Australasian Bittern #	<i>Botaurus poiciloptilus</i>	-	-	EN	VU	EN	L
Australian Painted Snipe #	<i>Rostratula australis</i>	-	-	VU	VU	CR	L
Mallee fowl #	<i>Leipoa ocellata</i>	-	-	VU	VU	EN	L
Regent Honeyeater #	<i>Anthochaera phrygia</i>	-	-	EN	EN	CR	L
Swift Parrot #	<i>Lathamus discolor</i>	-	-	EN	EN	EN	L
Growling Grass Frog #	<i>Litoria raniformis</i>	-	-	VU	VU	EN	L
Eastern Dwarf Galaxias #	<i>Galaxiella pusilla</i>	-	-	VU	VU	VU	L
Macquarie Perch #	<i>Macquaria australasica</i>	-	-	EN	DD	EN	L
Murray Cod #	<i>Maccullochella peelii peelii</i>	1970	1	VU	-	EN	L
Trout Cod	<i>Maccullochella macquariensis</i>	1970	1	EN	EN	CR	L
Golden Sun Moth #	<i>Synemon plana</i>	1908	1	CR	-	CR	L
STATE SIGNIFICANCE							
Koala	<i>Phascolarctos cinereus</i>	1997	36	-	LR (NT)	-	-
Barking Owl	<i>Ninox connivens</i>	1999	3	-	NT	EN	L

Common Name	Scientific Name	Most Recent Record (AVW)	Total No. Records (AVW)	Conservation Status			
				EPBC	National Action Plan	FFG	DSE
Black Falcon	<i>Falco subniger</i>	2000	1	-	-	VU	-
Blue-billed Duck	<i>Oxyura australis</i>	1992	1	-	-	EN	L
Brush-tailed Phascogale	<i>Phascogale tapoatafa tapoatafa</i>	1979	3	-	NT	VU	L
Eastern Great Egret	<i>Ardea modesta</i>	1992	2	-	-	VU	L
Hardhead	<i>Aythya australis</i>	1999	1	-	-	VU	-
Musk Duck	<i>Biziura lobata</i>	1976	2	-	-	VU	-
Powerful Owl	<i>Ninox strenua</i>	2001	5	-	-	VU	L
Two-spotted Grass-skipper Butterfly ☉	<i>Pasma tasmanica</i>	-	-	-	-	VU	-
Yellow Ochre Butterfly ☉	<i>Trapezites luteus luteus</i>	-	-	-	-	EN	L
Fiery Jewel Butterfly ☉	<i>Hypochrysops ignitus ignitus</i>	-	-	-	-	VU	L
REGIONAL SIGNIFICANCE							
Latham's Snipe	<i>Gallinago hardwickii</i>	2000	1	-	-	NT	-

Sources: DSE Atlas of Victorian Wildlife (AVW 2012); EPBC Act Protected Matters Search Tool (DSEWPC 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 national significance are flora or fauna listed as Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable or Rare under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* or under the relevant National Action Plan. Relevant National Actions Plans include: Maxwell *et al.* (1996), Duncan *et al.* (1999), Lee (1995), Garnett and Crowley (2000), Cogger *et al.* (1993), Tyler (1997), Wagner and Jackson (1993) and Sands and New (2002).

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

Sites are considered nationally significant if they support:

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

State Significant

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

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

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

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

- Known habitat for state significant species or communities.
- Areas that support, or regularly support individuals of a state significant species or community.
- Vegetation which would have a vegetation significance rating of ‘Very High’ or ‘High’ if assessed using the DSE Vegetation Quality Assessment Manual (DSE 2004b).
- Areas with unusually high native species richness, vegetation, habitat types or communities that are exceptional when compared to sites on a statewide basis.
- Corridors or habitat components that are important at a state scale. i.e. forming a link with state significant vegetation such as State Parks and/or Flora and Fauna Reserves.
- Breeding sites, nesting or nursery or other sites where individuals aggregate for a defined part of their life cycle which comprises $\geq 1\%$ of the state breeding population of a species.
- Areas regularly used by migratory species which are threatened in Victoria, or used by $\geq 1\%$ 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 2007A) 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 (DSE 2004b).
- Areas with unusually high native species richness, vegetation, habitat types or communities that are exceptional when compared to sites regionally.
- Corridors or habitat components that are important at a regional scale.
- Breeding sites, nesting or nursery or other sites where individuals aggregate for a defined part of their life cycle which comprises $\geq 5\%$ of the bioregional breeding population of a species.
- Areas regularly used by migratory species which are declining in the bioregion, or used by $\geq 5\%$ of the bioregional population of taxon.
- Known or potential feeding sites of a nomadic, migratory or mobile species within the known range of a species which is known to be reliant on defined dispersed feeding sites and where the species is regionally significant.

Locally Significant

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

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

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

Appendix 4

Definitions of Vegetation Condition

Good Condition

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

Moderate Condition

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

Poor Condition

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

APPENDIX 5 – 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 Zone/Location targeted	Issues encountered	Works still to undertake
Spring (Sep-Nov)						
1	Identify and target woody weed parent populations	Section 4.2.1. Table 1. Figure 3	Council and contractors			
2	Target woody weed seedlings and saplings within Zone A	Section 4.2.1. Table 1. Figure 3	Council and contractors			
3	Target emerging herbaceous and grassy weeds within Zone A	Section 4.2.1. Table 1. Figure 3	Council and contractors			
4	Target woody weed seedlings and saplings within Zone B	Section 4.2.1. Table 1. Figure 3	Council and contractors			
5	Target emerging herbaceous and grassy weeds within Zone B	Section 4.2.1. Table 1. Figure 3	Council and contractors			
6	Target woody weed seedlings and saplings within Zone C	Section 4.2.1. Table 1. Figure 3	Council and contractors			
7	Target emerging herbaceous and grassy weeds within Zone C	Section 4.2.1. Table 1. Figure 3	Council and contractors			

8	Follow-up weed control of areas burnt in autumn	Section 4.2.1. Table 1. Figure 3	Council and contractors			
9	Monitoring (undertaken biennially)	Section 4.7. Tables 3 & 4.	Council and contractors			
Summer (Dec-Feb)						
1	Continue to target woody weeds, emerging herbaceous and grassy weeds within Zone A, B and C	Section 4.2.1. Table 1. Figures 3 & 4	Council and contractors			
Autumn (Mar-May)						
1	Mosaic burn within Zone A, B or C	Section 4.2.2. Figure 5	Council, contractors, CFA			
2	Follow-up weed control within 4-6 weeks post-burn	Section 4.2.2, Figure 5	Council and contractors			
3	Careful and strategic removal of native regrowth	Section 4.2.3.	Council, contractors			
Winter (Jun-Aug)						
1	General council and contractor monitoring of weed issues					

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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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