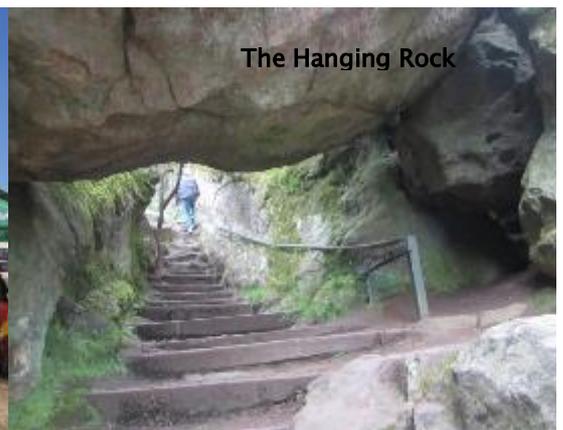


# Hanging Rock Reserve Environmental Management Plan

## Part 1: Background Report



Classic Car Display February 2015



The Hanging Rock

Prepared for Macedon Ranges Shire Council and the  
Department of Environment, Land, Water and Planning

Adopted by Council 16 December 2015

## **Hanging Rock Reserve Environmental Management Plan Part One: Background Report**

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# 1. INTRODUCTION

Practical Ecology Pty Ltd was commissioned by the Macedon Ranges Shire Council in November 2014 (through funding provided by the Rural Council Planning Flying Squad; the Department of Environment, Land, Water and Planning (DELWP), which was formerly the Department of Transport, Planning and Local Infrastructure; DTPLI); to prepare an Environmental Management Plan (EMP) for the 'Hanging Rock Precinct', which includes Hanging Rock Reserve and the adjoining East Paddock. Throughout this EMP, the entire Hanging Rock Precinct will be referred to as Hanging Rock or the Reserve.

Hanging Rock is synonymous with the 'rock itself', the novel and film 'Picnic at Hanging Rock', the Hanging Rock races; the annual classic car display and more recently a number of large concerts featuring (to date) The Eagles, Leonard Cohen, Bruce Springsteen and Rod Stewart (twice). Hanging Rock also contains a significant number of environmental assets including large areas of native vegetation, numerous large old trees, a 'grassland' patch, a section of Smokers Creek and numerous indigenous fauna species. Hanging Rock is classified as a Recreation Reserve, and its management is currently undertaken through the Recreation and Sport Department of the Macedon Ranges Shire Council.

The EMP is based on the ecological conditions and management practices undertaken across the Reserve in the current conservation and recreational areas, as directed by the Project Brief (refer to Section 1.1). Considering the ecological management issues that exist with the current conservation areas, it was determined the most effective direction of the EMP would be to focus upon the ecological improvement of these areas, with additional consideration of the management of the scattered ecological values in the recreation areas. It is envisaged that throughout the life of this EMP, the management directions and actions will stabilise and then increase the ecological values within the existing conservation areas of the Reserve. The EMP will also commence the process of stabilising and increasing the existing ecological values within some of the recreational areas. Once this has been achieved, and a steady state of ecological management exists in these areas, there will be scope to investigate increasing the ecological values within the recreational areas, if this is perceived as the next logical management direction within the Reserve.

A previous Management Plan (Loder and Bayly) was prepared for the reserve in 1993. Since 1993, conservation practices as well as knowledge of the site's environmental values has improved. Consequently a new Environmental Management Plan is required to reflect the current knowledge of the site's environmental values, current management requirements and current best practice approaches to environmental management. This EMP identifies the ecological values within the Reserve, designates management zones and then outlines appropriate ecological management objectives, principles and recommendations for the entire Reserve.

The environmental and fire management directions provided in the Loder and Bayly Plan will be superseded by this Environmental Management Plan and the Fire Management Plan (2015) once adopted by Council. Council aspires to prepare an overarching strategic plan for the site that sets out the long term vision for the reserve in terms of future

infrastructure and recreation and tourism activities. This strategic plan will be informed by the directions established in the Environmental and Fire Management Plans, along with other studies, plans and strategies related to the site.

This EMP also recognises that Hanging Rock is a multi-function reserve that contains significant ecological values, attracts tourists and picnickers and also hosts a number of recreational and major events. This EMP needs to ensure that the different management requirements of all of these values and events is acknowledged, and that a management balance is achieved that protects and conserves both the ecological and recreational values of the site.

To prepare the EMP, the project has been involved in reviewing previous literature associated with Hanging Rock and the surrounding area; interviewing the Reserve Rangers regarding their work and knowledge of the Reserve; undertaking fieldwork to determine the ecological values of Hanging Rock and to establish baseline ecological monitoring data; and undertaking stakeholder consultations. Internal stakeholders include representatives from the various relevant Council Departments. External stakeholders included the Friends of Hanging Rock, the Newham and District Landcare Group and the Hanging Rock Development Advisory Committee.

The fieldwork and consultation process determined that everyone who is involved with Hanging Rock is passionate about the Reserve, and that everyone wants the best outcomes for the site. It is the aim of this EMP to provide an environmental management framework that focuses upon the ecological values of the Reserve, whilst also acknowledging the myriad of recreational uses currently undertaken at Hanging Rock.

## 1.1 EMP Objectives

The objectives of the Hanging Rock Environmental Management Plan (as outlined in the Project Brief; October 2014) are:

- To identify the environmental values of the Hanging Rock Precinct
- To establish a prioritised program of management actions aimed at conserving and enhancing the site's environmental values while managing environmental risks and maintaining the reserve's recreation and tourist functions
- To establish a monitoring and evaluation program for the Precinct's environmental assets and management.

This EMP is primarily focused upon the ecological (indigenous flora, fauna and vegetation communities) values of Hanging Rock. It is not concerned with other environmental concerns such as water usage, climate and resources, except where these concerns are related to the management of ecological values within Hanging Rock.

## 1.2 Regional Context

Hanging Rock (Mt. Diogenes) is located near the townships of Woodend and Mount Macedon in Victoria, Australia. It is located approximately seven kilometres to the north-east of Woodend, and 11 kilometres (km) to the north-east of Macedon. Hanging Rock is also located approximately 80km to the north of Melbourne.

In the regional landscape, Hanging Rock occurs between the Macedon Ranges (part of the Great Dividing Ranges) to the south and the Cobaw Ranges to the north. In the regional context, Hanging Rock is an important landscape feature that rises from the surrounding volcanic plains between the Macedon and Cobaw Ranges. Aerial photography (Google Earth) depicts that Hanging Rock is one of the few larger patches of remnant vegetation that remains in these plains, which makes it an important habitat 'stepping stone' within the region. It is the largest landscape feature between these two areas that is still predominantly vegetated with numerous habitat values. It is an important component of the Cobaws biolink.

Since 2006 the Newham and District Landcare Group has been very active in applying for funding and undertaking on-ground works that contribute to the Cobaw biolink as defined in the Macedon Ranges Planning Scheme. The eastern part of this biolink project will create habitat connectivity between the Cobaw Range, Hanging Rock, the Jim Jim and Macedon Ranges.

Habitat links are being created through riparian zones of both Five Mile Creek and Deep Creek at Newham. These tie into remnant and strategic plantings on private land to effectively link Hanging Rock to both the Macedon Regional Park and the Cobaw State Forest.

The prime focus of the Cobaw Biolink is to improve biodiversity in the region by connecting native vegetation in the landscape as well as through pest plant and animal management, protection of remnant vegetation, strategic revegetation and other conservation and community education initiatives.

*Refer to Map 1 (page 17) for the location of Hanging Rock in the regional landscape.*

## 1.3 Reserve Description

Whilst Hanging Rock is considered to be a Recreational Reserve, the rock formation itself comprises the dominant landscape feature. The slopes and the rock itself are still covered in native vegetation, which provides an important component of the local landscape.

The study site for the Hanging Rock Environmental Management Plan consists of two land parcels which together make up the Hanging Rock Precinct; these are the Hanging Rock Reserve parcel and the adjacent parcel to the east of the reserve known as the East Paddock.

Hanging Rock Reserve is a 67 hectare area that consists of three Crown allotments; one located on the western side of Racecourse Road and two on the eastern side of Racecourse Road. Racecourse Road traverses these allotments from north to south and divides the rock and main picnic areas from the racecourse. There is no through access available along Racecourse Road, and the main access into the Reserve is from the southern end of Racecourse Road. Within the three allotments is the multitude of natural and built/recreational features.

These features include: the volcanic rock formation (the Rock itself) and its surrounding slopes and base which are covered in indigenous vegetation and that are traversed by three main walking trails; the visitor centre and café; the racecourse and its' associated facilities and buildings; the racecourse grassland; the racecourse dam; three other smaller dams; Smokers Creek; the cricket oval and its clubhouse; the petanque picnic shelter and car park; the tennis courts and clubhouse; car parks and the numerous maintained picnic areas and other facilities such as amenity blocks and picnic shelters.

The East Paddock is a 22 hectare area (consisting of four land parcels) owned by Council located to the east of the Crown allotments. MRSC purchased the East Paddock over 20 years ago, to alleviate the picnicking and event pressure on the sensitive crown land reserve, to enable expansion of the site's conservation values and to serve as a buffer between the reserve and the adjoining rural living uses. The East Paddock was former grazing land, and it now consists of two cleared 'paddocks', and a smaller third area to the south which is lower lying and is situated along Smokers Creek. This southern section has been substantially revegetated with indigenous tree species, mostly along Smokers Creek's riparian zone. There are some plantations of indigenous trees around the perimeter of the two paddock areas. There is a small dam located in the north-west corner of the East Paddock. The East Paddock is utilised for the concerts, as parking for the classic car display, and as overflow parking for the races and the craft markets. Picnic shelters and public toilet facilities are proposed in two locations in the East Paddock as well.

Most of the perimeter of the Hanging Rock Reserve is surrounded by roads. South Rock Road along the southern perimeter, which is the main entrance into Hanging Rock Reserve; Straws Lane to the east, which provides the main access into the East Paddock and Colwells Road to the north, which provides access during the major events for horse floats, trailers and buses to the concerts held in the East Paddock.

The reserves' western perimeter is adjacent to a number of 5–10 hectare 'rural living' allotments. Six of these allotments back directly onto the reserve, and there are numerous other allotments to the west of these six allotments. There are also numerous smaller 'rural living' allotments to the south and north-west of the Reserve. There are larger rural properties located to the north-east and east of the Reserve.

Smokers Creek and a few smaller tributaries of Smokers Creek flow east to west through the southern portion of Hanging Rock Reserve. Three small dams within the Crown allotments are located along or adjacent to Smokers Creek. A larger dam, also within one of the Crown allotments is located in the middle of the racecourse.

The Creek enters the site in several places along South Rock Road (where it travels under the road), and in one place along Straws Lane. There are also two smaller drainage lines that enter the site from the north-east, that run into a small dam in the north-east corner of the East Paddock and into the racecourse dam.

The racecourse dam is primarily utilised to irrigate the racecourse for the two racing events in January, and the East Paddock for the summer concerts. Water within the racecourse dam is pumped into the dam (by licence agreement) from Smokers Creek during spring.

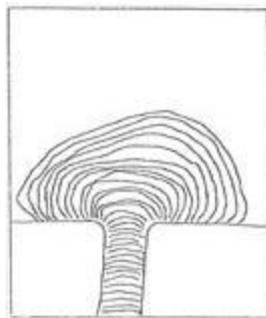
*Refer to Map 2 (page 19) for a map of the Reserve showing its land uses and layout.*

## 1.4 Geology

Hanging Rock is an iconic regional landscape feature and is the most prominent feature in the Reserve. It is a single rock formation that has formed from a volcanic plug (mamelon) which has been exposed to considerable weathering and erosion over millions of years, leading to the current conglomeration of rock formations within the one volcanic peak.

Hanging Rock occurs 718 metres above sea level, and 105 metres above the surrounding plain, which is why it is so prominent in the local landscape and can be viewed at certain angles from the nearby Calder Highway.

Hanging Rock was formed six million years ago when a stiff type of lava formed a rounded pile of layers on the earth's surface as it was squeezed up through a narrow vent from within the earth. This lava had a high soda content, and combined with rainwater, has resulted in an unusual rock type known as solvsbergite, or soda trachyte. This rock type is also found at the nearby Brocks Monument, Camel's Hump on Mt Macedon. Aside from these locations, the only other known locations of this rock type are in Norway and Sweden.



Formation of a mamelon.

(Visit Macedon Ranges website, 2014).

Whilst Hanging Rock generally refers to the entire rock formation that rises up from the surrounding plains; there is an actual suspended rock that is located along/under the steps that lead up from the lower slopes of the rock formation to the area that is known as 'Stonehenge'. This is the actual 'Hanging Rock' that has become synonymous with the entire rock formation.

*Within this EMP, the term Hangin Rock refers to the entire rock formation, not the suspended rock.*

## 1.5 Reserve Uses and Events

Hangin Rock has historically primarily been considered as a recreational reserve. Its main recreational features are the pathways leading to the top of the Rock, the Hangin Rock racecourse and the extensive picnic grounds which are located to the south of the rock.

The site's natural values and passive recreation opportunities are a major tourism and visitor attraction in the region. Over 30,000 people visit the reserve each year to climb the Rock, picnic and bushwalk.

The site is also used for a range of community conservation, engagement and education activities carried out by Council, Landcare, the Friends of Hangin Rock and the Woodend Bird Watching Group.

There are also several recreational facilities/clubs located at Hangin Rock, which include:

- The Kyneton and Hangin Rock Racing Club
  - Races have been held at the racecourse for over 120 years, since 1886. Currently two races are held annually; one on New Years' Day (1<sup>st</sup> January) and the second on Australia Day (26<sup>th</sup> January).
  - The club has a lease over the track and associated buildings and grounds.
- The Heskett Cricket Club
  - The pitch and clubhouse are located in the lower oval within the racecourse
  - The cricket club was established in 1891. It is not known how long they have been located at Hangin Rock Reserve.
- The Hangin Rock Petanque Club (since 2002)
  - The Petanque club utilises the main picnic shelter (built in partnership with Council) and gravel car park located within the western picnic grounds
- The Hangin Rock Tennis Club (since 1974)
  - The tennis club has four courts and a clubhouse located near the south-west corner of the reserve off South Rock Road
  - There is car parking and an amenity block near the courts and clubhouse
- The Woodend Angling Club (currently not functioning)
  - The club recently utilised the racecourse dam, which is regularly stocked (three times per year) with trout by the Department of Environment, Land, Water and Planning (DELWP)

- The club constructed a wooden platform at the dam and several picnic tables and seats along the eastern side of the dam

The other main users of the Precinct are the organisers of the major events that are held on a regular basis. These include:

- The Macedon Ranges & District Motor Club, which holds an annual classic car display in February
- Up to four concerts (managed by the Frontier Touring Company) which are held in the East Paddock between November to March annually.
- Craft Markets Australia which holds two annual craft markets between October to March
- 'Run the Rock' which is held annually in April. This event involves a choice of a 2km kids run, 5km run/walk, 10km run or 19km run.
- Macedon Ranges Shire Council also runs a number of smaller events at the Reserve, including Night Walks (over summer), Camp Out at the Rock (in March) and a Film Night (14<sup>th</sup> February).

## 1.6 Land Tenure and Management within the Reserve

### Land Tenure

Hanging Rock consists of both Crown allotments and freehold land. Lots 6A, 7A and 12C1 are Crown allotments, whilst Lots 7B, 7C, 7E and 7D are freehold land. The locations of the Lots are depicted in Figure 1 on the following page.

An outline of the land tenure, zoning and overlays associated with the Reserve is provided in Table 1 on page 16.

Information outlining the zoning and overlays across the Reserve and along the adjacent roadsides is available in the Macedon Ranges Shire Council Planning Scheme: <http://www.nre.vic.gov.au/planningschemes/macedonranges/insetmap2.html>

The zones and overlays which cover Hanging Rock have been incorporated within the Macedon Ranges Planning Scheme to ensure that any proposed development within the site and in the surrounding landscape have due regard to the environmental, landscape and vegetation features of the Reserve and of the surrounding landscape.

Any works undertaken within the Reserve must have due regard for the zoning and overlays which cover the reserve. In most cases, a planning permit is required for buildings, works and/or tree removal/limb lopping undertaken within the Reserve. The Crown land section has also been recently listed by Heritage Victoria and a permit is required for most works with some exceptions as set out in the heritage citation for the site. This citation also includes the Permit Policy which is considered when assessing development or works proposals. A copy of the heritage citation can be accessed from the Victorian Heritage Database at <http://vhd.heritagecouncil.vic.gov.au>. It is recommended that this policy be

reviewed to remove any unnecessary permit requirements which do not add value in terms of protecting the site's cultural heritage values and which may impact the efficient and effective environmental management of the site.



Figure 1. Land Tenure at Hanging Rock

### Management

Management of the Reserve has been undertaken by the Macedon Ranges Shire Council or its predecessors for over 130 years. For the western portion of the site (or Hanging Rock Reserve) Macedon Ranges Shire Council is the Committee of Management. Hanging Rock Reserve is Crown Land permanently reserved for the purpose of Public Recreation and Affording Access to Water by way of notice in the Government Gazette 1884.3210.

The East Paddock is wholly owned and managed by the Macedon Ranges Shire Council, since it was purchased in 1989/1990.

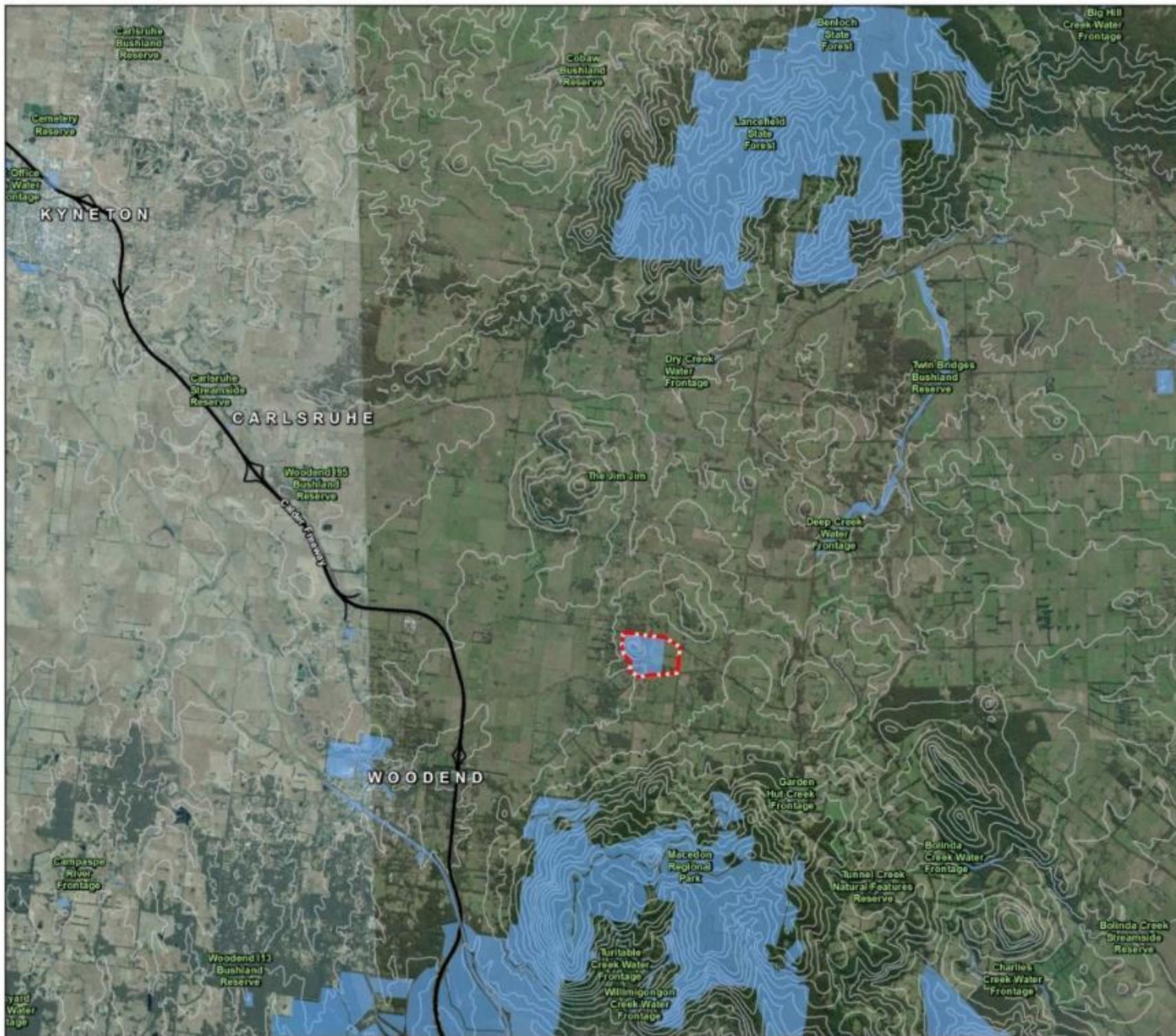
Currently Hanging Rock Reserve is managed by the Recreation and Sports Department of the Macedon Ranges Shire Council. There is a Coordinator Hanging Rock, and the day-to-day operation of the Reserve is undertaken by two Reserve Rangers. There are also part-time/casual rangers who work on the weekends/during busy times. Environmental management advice and assistance is provided by the Strategic Planning and Environment Department of the Macedon Ranges Shire Council.

The operational management of Hanging Rock is generally self-sufficient in terms of funding although it is provided with the corporate support of the Council (e.g. environmental advice and assistance, finance, management, occupational health and safety, risk management and so on). State and Federal Government funding has been made available in recent years for environmental management, infrastructure needs and asset renewal.

Council seeks advice on major infrastructure upgrades and developments within the reserve from the Hanging Rock Development Advisory Committee.

**Table 1. Land Tenure and Management within the Hanging Rock Precinct**

Area	Land tenure	Legal status	Zoning and Overlays
<b>Hanging Rock Reserve</b>			
Lot 6A (land to the west of Racecourse Road)	Crown Land	Crown Land (Reserves) Act 1978 (Section 4)	<ul style="list-style-type: none"> <li>• Public Conservation and Resource Zone (PCRZ)</li> <li>• Environmental Significance Overlay- Schedule 4 (ESO4)</li> <li>• Heritage Overlay 88 (HO88)</li> <li>• Significant Landscape Overlay- Schedule 1 (SLO1)</li> <li>• Wildfire Management Overlay (WMO)</li> </ul>
Lot 7A (northern portion of racecourse- land located to the east of Racecourse Road)	Crown Land	Crown Land (Reserves) Act 1978 (Section 4)	<ul style="list-style-type: none"> <li>• Public Resource and Conservation Zone (PCRZ)</li> <li>• Environmental Significance Overlay- Schedule 4 (ESO4)</li> <li>• Significant Landscape Overlay- Schedule 1 (SLO1)</li> <li>• Wildfire Management Overlay (WMO)</li> </ul>
Lot 2 (southern portion of racecourse- land located to the east of Racecourse Road)	Crown Land	Crown Land (Reserves) Act 1978 (Section 4)	<ul style="list-style-type: none"> <li>• Public Resource and Conservation Zone (PCRZ)</li> <li>• Environmental Significance Overlay- Schedule 4 (ESO4)</li> <li>• Significant Landscape Overlay- Schedule 1 (SLO1)</li> <li>• Wildfire Management Overlay (WMO)</li> </ul>
<b>East Paddock</b>			
Comprises four Lots (7B, 7C, 7D and 7E)	Freehold	Private land	<ul style="list-style-type: none"> <li>• Public Park and Recreation Zone (PPRZ)</li> <li>• Environmental Significance Overlay- Schedule 4 (ESO4)</li> <li>• Significant Landscape Overlay- Schedule 1 (SLO1)</li> <li>• Vegetation Protection Overlay- Schedule 9 (VPO9)</li> </ul>
<b>Adjacent Roadsides</b>			
South Rock Road	Crown Land (Government Road)	Crown Land (Reserves) Act 1978 (Section 4)	<ul style="list-style-type: none"> <li>• Road Zone- Category 1 (RDZ1)</li> <li>• Environmental Significance Overlay- Schedule 4 (ESO4)</li> <li>• Vegetation Protection Overlay-Schedule 2 (VPO2)</li> <li>• Vegetation Protection Overlay- Schedule 6 (VPO6)</li> <li>• Wildfire Management Overlay (WMO) (covers portion of road south of Crown allotments)</li> </ul>
Straws Lane	Crown Land (Government Road)	Crown Land (Reserves) Act 1978 (Section 4)	<ul style="list-style-type: none"> <li>• Rural Conservation Zone- Schedule 1 (RCZ1)</li> <li>• Environmental Significance Overlay- Schedule 4 (ESO4)</li> <li>• Vegetation Protection Overlay-Schedule 2 (VPO2)</li> </ul>
Colwells Road	Crown Land (Government Road)	Crown Land (Reserves) Act 1978 (Section 4)	<ul style="list-style-type: none"> <li>• Rural Conservation Zone- Schedule 1 (RCZ1)</li> <li>• Environmental Significance Overlay- Schedule 4 (ESO4)</li> <li>• Vegetation Protection Overlay-Schedule 2 (VPO2)</li> <li>• Wildfire Management Overlay (WMO) (covers portion of road north of Crown allotments)</li> </ul>



## Landscape Context Hanging Rock Reserve

### Legend

-  Contours (30m)
-  Study site
-  Public land

### Details

Mapping by: Karen McGregor & Colin Broughton  
 Date: 15/04/2015  
 Data Source: Aerial photography courtesy of NearMap



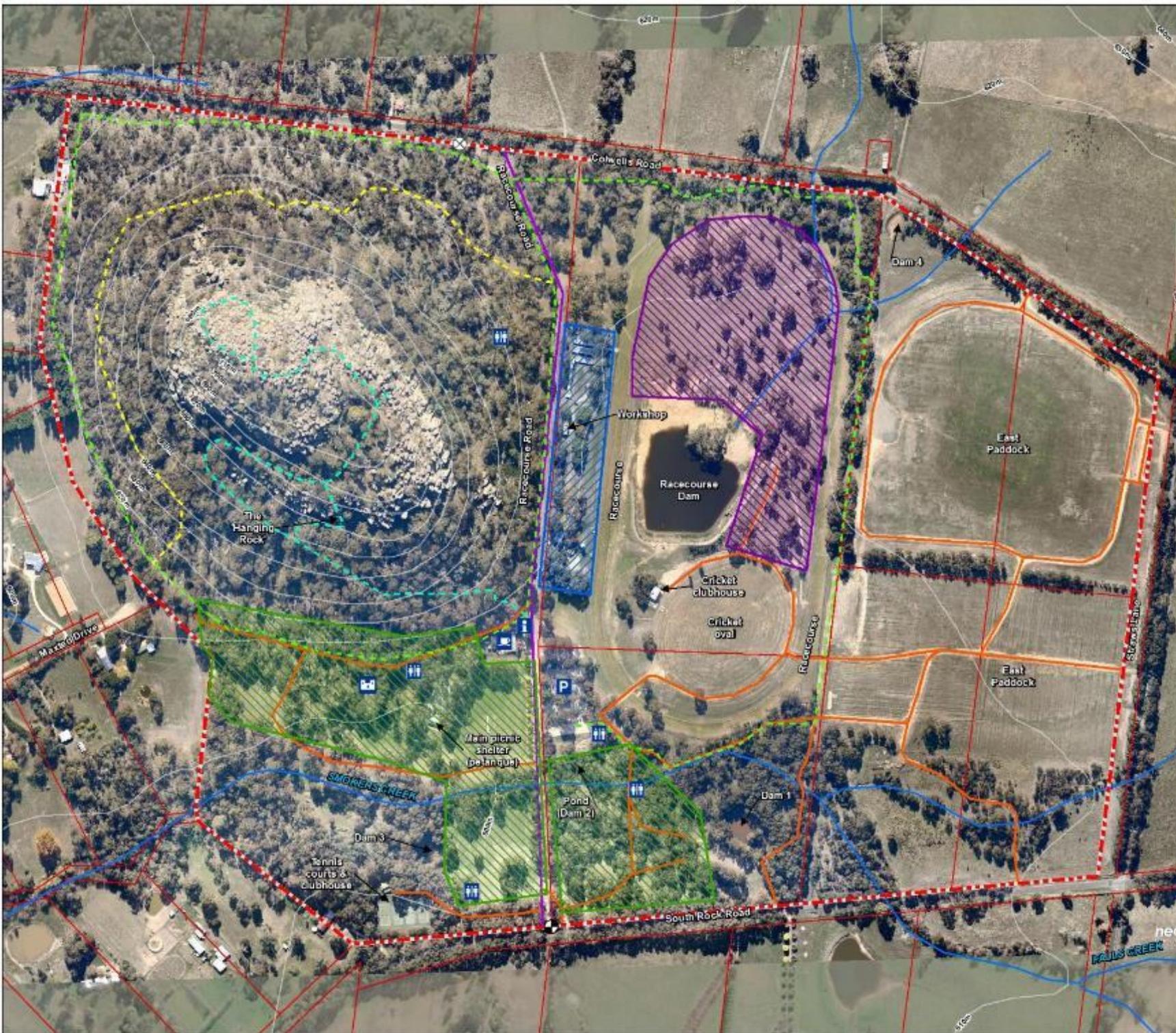
Scale 1:78,500 (Page size A3)

### Disclaimer

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# Site Description

## Hanging Rock Reserve



**Study site**

- Study site (Red dashed line)
- Contours (10m) (Grey line)
- Watercourse (Blue line)
- Parcels (Red outline)

**Roads**

- Management Tracks (Orange line)
- Racecourse Rd (Purple line)

**Walking tracks**

- Base walking track (Green dashed line)
- Upper base walking track (Yellow dashed line)
- Summit walking track (Cyan dashed line)

**Facilities**

- Main entrance (Black circle with dot)
- Northern entrance (race days & concert(s)) (Black circle with X)
- Information (Blue 'i' icon)
- Car parking (Blue 'P' icon)
- Toilet block (Blue toilet icon)
- Cafe (Blue coffee cup icon)
- Playground (Blue play icon)
- Picnic areas (Green hatched area)
- Racecourse Precinct (Blue hatched area)
- Racecourse grassland (Purple hatched area)

**Details**

Mapping by: Karen McGregor & Colin Broughton  
 Date: 29/09/2015  
 Data Source: Aerial photography courtesy of NearMap

0 25 50 75 100 125 150 175 200m

Scale 1:4,100 (Page size A3)

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## 2. STRUCTURE OF THE EMP

To ensure simplicity for all users, the EMP has been divided into two separate documents:

- Part 1: Background Report. This report presents the contextual information, fieldwork outcomes and discussion of issues.
- Part 2: Environmental Management Plan. This document sets out the management principles for the reserve as well as a set of actions to achieve the plan's aims and objectives.

Part 1 presents all of the ecological information gathered during the site assessments and stakeholder liaison, and discusses these ecological values in terms of management zones across the entire Reserve. Each management zone has been considered with regards to:

- The ecological values within each zone
- The prime 'function/purpose' of each zone
- The management objectives of each zone, and
- Appropriate management recommendations for each zone.

The use of management zones provides a basic framework for recognising and designating the variety of current uses of the reserve, and for highlighting the ecological values present in each of the management zones. The purpose of the EMP is to define management objectives to primarily conserve and also enhance (where possible) these values.

Part 2 presents:

- The management zones across the Reserve
- An outline of the management recommendations regarding all of the ecological values and/or management issues identified within the Reserve
- Management principles for each of the management zones, and
- An Implementation/Action Plan.

## 3. METHODS

As outlined in Section 1.1, the objectives of the Hanging Rock EMP are to:

- To identify the environmental values of the Hanging Rock Precinct
- To establish a prioritised program of management actions aimed at conserving and enhancing the site's environmental values while managing environmental risks and maintaining the reserve's recreation and tourist functions
- To establish a monitoring and evaluation program for the Precinct's environmental assets and management.

To achieve this, the project methodology required extensive literature reviews and liaison with both internal and external stakeholders, and then ecological fieldwork to determine the ecological values across the Reserve and the management issues facing each of the values.

### 3.1 Literature Review

The literature review was based on researching the literature outlined within the Project Brief and other relevant literature. Literature and other information reviewed included:

- Background Documents:
  - Loder and Bayly Consulting Group (September 1993). *Hanging Rock Recreation Reserve Management Plan*.
  - Enspeg Environment and Risk (December 2009). *Visual Tree Assessment and Written Report*
  - Macedon Ranges Shire Council (June 2014). *Draft Weed and Pest Animal Management Strategy 2014–2024*
  - Macedon Ranges Shire Council (February 2013). *Hanging Rock Emergency Management Plan*
  - SMEC (June 2011). *Report of Hanging Rock Dam Safety Inspection*
  - *Draft Hanging Rock Reserve Fire Management Plan* (Version 6: September 2008)
  - Australia Koala Foundation (September 2008). *Hanging Rock Koalas and Koala Habitat*
  - M Patrick (MRSC) and B Aquilina (Atlas Ecology). *Draft Offset Plan for Straws Lane, Heskett*
  - *Statement of Cultural Heritage Significance: Hanging Rock Reserve* (undated)
  - Newham and District Landcare Group (Spring 2013). *Newsletter No. 38: Hanging Rock in the spotlight and Under Threat*
  - P Foreman (October 2014). *Rapid Assessment of Four Fence Enclosures– hanging Rock Community Recreation Reserve*
  - DSE NW Region (2007/8). *General Guidelines for the Rehabilitation and Management of the Hanging Rock Racecourse Grasslands*
  - Government Gazette (October 1990). *Regulations for the Care, Protection and Management of the Hanging Rock Reserve, Woodend*.

- Flora and fauna database searches including:
  - Victorian Biodiversity Atlas (DEPI)
  - EPBC Act 1999 database (Protected Matters Search Tool).
- GIS datasets including DSE datasets.

## 3.2 Consultations with Stakeholders

Consultation with both internal and external stakeholders was undertaken in conjunction with the literature review. Consultation was required to help understand the history of the site and to discuss ecological issues for the Reserve from a variety of perspectives. Anecdotal information was relied upon in some cases to help understand what management practices occurred in the past and whether they were considered successful. This information was utilised to inform the fieldwork and the preparation of the EMP.

Some information was also utilised directly in identifying and mapping some management concerns, such as the location of pest plants. Table 2 below provides a list of the various stakeholders who were consulted during the preparation of this EMP.

**Table 2. Stakeholder Consultation Undertaken during EMP Preparation**

<b>Organisation</b>	<b>Contact</b>	<b>Type of Contact</b>
Newham and District Landcare group	Penny Roberts	2 x site meetings (17/11/2014 & 4/12/2014) Email
Friends of Hanging Rock	Penny Roberts and Doug Dalgleish	1 x site meeting (17/11/2014)
Hanging Rock Development Advisory Committee	-	Attendance and presentation at Quarterly Meeting (6/11/2014), Presentation by Council officers to Committee (11/2/15 & 16/6/15)
Australia Koala Foundation	-	Phone call
MRSC – Reserve Rangers	Hanging Rock Rangers	Site meetings (23/10/2014, 28/10/2014, 17/11/2014, 4/12/2014, 22/12/2014 & 24/02/2015)
MRSC– Coordinator Hanging Rock	Anne Walsh	Site meetings (15/09/2014, 17/11/2014, 22/12/2014, 24/02/2015, 17/03/2015) Email
MRSC– Natural Resources Officer	Michelle Patrick	Site meetings (15/09/2014 & 4/12/2014) Email
MRSC– Environmental programs and Education Officer	William Terry	Site meetings (15/09/2014 & 17/11/2014), plus Email contact
MRSC– Project Contact	Michelle Wyatt (Coordinator Policy Implementation)	Site meetings (15/09/2014, 17/11/2014, 22/12/2014, 24/02/2015, 17/03/2015 & 9/03/2015) Email and phone call

Organisation	Contact	Type of Contact
MRSC– Manager Recreation and Sport	Rod Clough	Site meeting (15/09/2014, 24/02/2015, 17/03/2015 & 9/03/2015) Email

### 3.3 Flora

A flora survey was undertaken as a component of the EMP fieldwork. The purpose of the flora survey was to record the flora (indigenous, exotic and naturalised) growing across the Reserve.

The flora surveys were undertaken over a period of three months from October to December 2014, which is generally the best flora survey period, especially for herbaceous species and grasses.

Flora surveys (or flora observations) were undertaken on the following dates: 23/10/2014, 28/10/2014, 17/11/2014, 4/12/2014 and 22/12/2014. The main surveys were undertaken on 23/10/2014, 28/10/2014 and 4/12/2014.

To reflect on the different conservation areas across the reserve, two flora species lists were prepared for the Reserve: one for the entire site and another just for the racecourse grassland.

Planted species were not included within the flora species lists; as per database convention, planted species are not accepted within the flora databases. However planted species that had become naturalised (and were self-seeding) were included.

Plant taxonomy for common and scientific names used in this report are generally in accordance with *A Census of the Vascular Plants of Victoria* ([Walsh and Stajsic 2008](#)) and/or from the Victorian Biodiversity Atlas (DEPI 2013).

#### 3.3.1 Plant Identification

Species that could not be identified in the field were recorded to the nearest possible family or genera. These were then collected as per protocols of Practical Ecology’s FFG permit (No. 10003267) for the collection of plant material. Major features of the specimen were collected where possible including leaves, parts of branches, fruits and/or flowers.

#### 3.3.2 Limitations of Flora Survey

The following considerations should be made regarding the limitations of the flora survey:

- Whilst the survey was undertaken during spring, which is generally the best flora survey period, it does mean that any winter flowering and bulbous species (particularly exotic species such as Angled Onion \**Allium triquetrum*) that may be growing in the Reserve will have been missed

- it is expected that some species, particularly orchid, lily and other herbaceous species that can only be observed for a limited period of time may not have been recorded during the assessments
- a one-off seasonal flora survey will never be able to 'capture' the full suite of indigenous grassy and herbaceous species within a bushland reserve
- due to the topography of the site (especially on 'the rock') some areas were not physically able to be inspected, which means species will have been missed

With regard to these limitations, it is still considered that the majority of flora species within the Reserve will have been recorded due to the number of fieldwork days.

### 3.4 Vegetation Categorisation, Classification and Quality

Vegetation in the Reserve was categorised into different types to facilitate collection of data. Vegetation in all sections of the Reserve was either classified as native or exotic.

Vegetation was assessed for its categorisation according to the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI 2013), then its Ecological Vegetation Class and finally, its quality, through Indigenous Ground-storey Vegetation Quality mapping.

#### 3.4.1 Vegetation Categories

Vegetation in the Reserve was surveyed for categorisation as per the definitions within *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Department of Environment & Primary Industries 2013), which are outlined below:

##### **Native Vegetation**

*Native Vegetation* as per the Victorian Planning Provisions (Clause 72): plants which are indigenous to Victoria, including trees shrubs, herbs and grasses.

##### Remnant Vegetation

*Remnant patch* of native vegetation is either:

- an area of vegetation where at least 25% of the total perennial understorey plant cover is native
- any area with three or more native canopy trees where the canopy foliage cover is at least 20% of the area

##### Scattered Tree

A *scattered tree* is a native canopy tree that does not form part of a remnant patch. A canopy tree is a mature tree that is greater than 3m in height and is normally found in the upper layer of a vegetation type.

## Exotic Vegetation

Exotic vegetation is vegetation dominated by weed species, where there is an area of vegetation, with or without trees, where more than 75% of the total understorey plant cover is weeds or non-native plants, such that less than 25% of the understorey cover is native

Whilst exotic vegetation is dominated by non-indigenous plant species, which in the context of indigenous species are mostly considered to be weed species, not all weed species are as threatening to indigenous vegetation as other weed species.

### 3.4.2 Ecological Vegetation Classes

Ecological Vegetation Classes (EVCs) are a method of systematic organisation of plant communities into common types that occur in similar environmental conditions throughout Victoria. Each vegetation type is identified on the basis of its floristic composition (the plant species present), vegetation structure (woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate).

DEPI EVC mapping ([DEPI 2014a](#)) was accessed to assess the EVC likely to occur on the study area. EVCs were then identified in the field according to observable attributes including dominant and characteristic species consistent with the benchmark descriptions ([DEPI 2014b](#)). The Ecological Vegetation Classes for the reserve are shown on page 38.

### 3.4.3 Vegetation Quality Mapping

Vegetation Quality Mapping provides a useful guide for determining management priorities within bushland areas, and for determining the priority areas for management by on-the-ground bushland managers, Friends Groups and contractors.

Vegetation Quality Maps can also be utilised to monitor indigenous vegetation quality across a reserve. Vegetation Quality mapping provides indicative data on the indigenous ground storey vegetation cover in bushland areas. Indigenous ground storey is focused upon, as the difference in 'bushland quality' is dependent upon the extent and level of intactness of the ground storey layer.

To undertake an assessment, the entire ground storey vegetation cover in an area is considered. The amount of 'indigenous' versus 'exotic' plant cover is then considered to determine the vegetation quality category. Vegetation Quality Mapping is based on a four-colour coded rating system as presented in Table 3.

As there are also areas across the Reserve which contain indigenous vegetation (mature trees and/or shrubs) with no indigenous understorey vegetation, and other areas with revegetation; two additional categories has been utilised to depict these areas so their ecological values are also considered.

**Table 3. Indigenous Vegetation Quality Mapping Categories**

Colour	Indigenous Vegetation Quality
Red	<25% indigenous ground storey vegetation cover Areas where remnant vegetation has been severely degraded as a result of weed invasion to the extent it is almost completely replaced by exotic plant species
Orange	25–50% indigenous ground storey vegetation cover Areas where remnant vegetation is severely degraded although some remnant vegetation is evident
Blue	50–75% indigenous ground storey vegetation cover Areas of remnant vegetation with light to moderate infestations of weeds
Green	75%–100% indigenous ground storey vegetation cover Areas of remnant vegetation virtually free of exotic plants and where the native plant communities structure, species composition and diversity are comparatively intact
Purple	<25% indigenous ground storey vegetation cover present, but contains mature remnant trees and/or shrubs These areas still contain important ecological and habitat values, they just no longer contain understorey indigenous vegetation cover
Bright Blue	Areas with indigenous revegetation (and some scattered remnant trees/shrubs) Consists of a mixture of trees 10–25 years old, and some ground storey plantings These areas will provide habitat as they mature

Issues with Vegetation Quality mapping include the subjectivity between different assessors and the time of year in which the mapping is undertaken. As different flora species flower and seed at different times of the year and there are autumn/winter and spring/summer seasonal species, there is never an ideal time of year in which the one survey will capture all indigenous species within a reserve.

The outcomes of the Vegetation Quality mapping is shown in Map 5, on page 40.

## 3.5 Categorising Priority Weeds for Control

Weeds at Hanging Rock were categorised according to two methods; a site specific weed prioritisation system and according to the Catchment and Land Protection (CaLP) Act.

### 3.5.1 Site Specific Weed Prioritisation

Across Hanging Rock, each pest plant species that was identified was categorised according to its level of threat and invasiveness within the area in which it was recorded. The position of each pest plant species within the Reserve, the numbers of each particular pest plant species present, the ecology of each pest plant species and other variable site factors (such as topography, access, etc) were considered in assigning each pest plant species a weed prioritisation code.

Refer to Table 4 below for the weed prioritisation categories used at Hanging Rock.

**Table 4. Weed Prioritisation Categories**

Weed Prioritisation Categories	Description of each Category
Keystone (K)	<p>Totally dominate structurally and floristically/old populations that have reached the peak of their invasion potential in a given area</p> <ul style="list-style-type: none"> <li>• Many species (flora and fauna) may have become dependent on the weed</li> <li>• Work slowly and systematically from highest understorey indigenous vegetation quality areas outwards</li> <li>• Remove mature specimens first</li> <li>• Keep in mind buffers/habitat</li> </ul>
<p>Small patches (S)</p> <p><b>S1</b></p> <p><b>S2</b></p>	<p>Of variable risk, but easiest to eliminate as they are in small numbers</p> <p>Small patches or the only observed occurrence of a species in the site</p> <p><b>S1:</b> Highest risk and priority for control. Eliminate from the site</p> <p><b>S2:</b> Moderate risk and priority for control. Eliminate from the highest quality areas first</p>
Ubiquitous species (U)	<p>Scattered weeds of disturbed areas</p> <p>Hard to eliminate; look at management regimes</p> <p>Eliminate in high quality areas, But of lower priority elsewhere in the site</p>

*Weed categorisation categories provided by Gidja Walker*

These weed prioritisation categories are separate to noxious weed categories under the Catchment and Land Protection (CaLP) Act, as they are site specific.

### 3.5.2 Catchment and Land Protection (CaLP) Act1994

Under the CaLP Act declared noxious weeds are categorised into four groups depending on their known and potential impact and specific circumstances for each region:

- ◆ State Prohibited Weeds (S) are either currently absent in Victoria or are restricted enough to be eradicated. The Victorian Government is responsible for their control.
- ◆ Regionally Prohibited Weeds (P) in the North Central Catchment Management Authority (CMA) area are not necessarily widespread but have the potential to become widespread. It is expected that weeds that meet this criteria can be eradicated from the region. It is the responsibility of the land owner to control these weeds on their land.
- ◆ Regionally Controlled Weeds (C) are usually widespread but it is important to prevent further spread. It is the responsibility of the landowner to control these weeds on their property.
- ◆ Restricted Weeds (R) include plants that pose unacceptable risk of spreading in the State or other Australian states and are considered to be a serious threat to primary production, Crown land, the environment and/or community health if they were traded in Victoria. Trade in these weeds and their propagules, either as plants, seeds or contaminants in other material is prohibited. If observed, landowners should contact DELWP and report their location so they can be eradicated and monitored.

## 3.6 Fauna

Due to the variables associated with fauna survey and the current fauna monitoring programs being undertaken within the Reserve, the focus of the EMP was on undertaking a fauna habitat assessment across the Reserve, establishing three two hectare bird census areas and recording incidental fauna observations whilst undertaking the fauna habitat assessment.

The focus was also upon obtaining the available data from the current and previous spotlighting and monitoring activities and updating the Reserve's fauna species list.

Any recommendations regarding further fauna surveys were then made based on the available data and consultations with the stakeholders.

### 3.6.1 Bird Monitoring

Three bird monitoring plots have been established within the Reserve.

Bird monitoring plots were established to monitor changes in bird populations over the years. Ideally bird surveys would be undertaken in different seasons to observe and record different bird populations such as migrating birds either returning to Melbourne after summer or birds migrating from south to north in autumn/winter.

The bird monitoring data collection methods are based on the monitoring methods used to provide data for the Birdlife Australia Bird Atlas– the **2 hectare, 20 minute search** method:

This method is based on a defined 2 hectare area that can be used for future surveys and preferably would be surveyed once a season for at least one year. The coordinates of the search area are required, so that the precise location (area) can be re-visited and re-surveyed

The survey areas were defined through consultation with the MRSC Environment Education and Programs Officer.

The bird monitoring plots are distributed across the Reserve and include the woodland area on the northern side of 'the rock', the forested area on the southern side of 'the rock' and around the racecourse dam.

### 3.6.2 Incidental Observations

The diurnal fauna assessment focused upon collecting any incidental fauna observations. They were based on visual and auditory observations of fauna either directly or indirectly through evidence such as scats, tracks, burrows etc.

The data from these incidental observations was compiled as a component of collating and updating all of the fauna information available for the Reserve from a variety of sources including literature, the Reserve Rangers and from consultation with the stakeholders.

### 3.6.3 Fauna Habitat Assessment

In conjunction with the general incidental diurnal fauna survey, habitat conditions across the reserve were mapped. These were based on threatened species data within the general landscape surrounding the reserve (based on a 5km radius around the reserve) to determine any likely threatened species habitat within the Reserve.

### 3.6.4 Limitations

Whilst the fauna surveying as a component of the EMP fieldwork was limited, it has been supplemented by fauna species lists from previous reports, consultation with the stakeholders, results from the current and previous fauna spotlight nights and monitoring results from cameras which have been installed within the Reserve for varying periods.

Extensive fauna knowledge was also obtained from one of the rangers who has been working within the Reserve for approximately 30 years.

## 3.7 Mapping

Geographical positioning data collection in the field for the purposes of map display was carried out using a combination of a handheld GPS device, aerial photography and existing site survey plans. Determination of vegetation boundaries was undertaken using a combination of GPS data and ground-truthing with aerial photography.

Due to inaccuracy with GPS data the mapping should be considered approximate only.

## 4. ECOLOGICAL VALUES OF HANGING ROCK

The ecological values observed throughout Hanging Rock are presented below.

### 4.1 Existing Vegetation Condition

The site assessment determined that there was several 'levels' of indigenous vegetation cover across the Reserve:

#### Generally Intact Areas

Areas with all three vegetation layers (canopy, shrub and ground-storey) present, which covered approximately a quarter of the Reserve:

- The actual rock formation, its' slopes and some of its' base areas, and
- The racecourse grassland

These areas varied in indigenous ground storey vegetation cover (the overall vegetation cover divided into indigenous versus exotic cover), whilst they contained mostly indigenous shrubs and a completely indigenous canopy cover. The indigenous ground storey vegetation cover map (refer to page 40) depicts the varying ground storey cover across all areas of the Reserve with remnant vegetation.

#### Poor Understorey and Intact Canopy

There were numerous poor indigenous ground storey areas with an intact canopy layer, as indicated by the presence of large eucalypts and some shrubs. These areas contained either mown or unmown grassy areas dominated by exotic grasses and herbaceous species. These areas were predominantly located in:

- the picnic areas to the south of the actual rock formation,
- the unmown treed area in the south-west corner of the Reserve near the tennis courts
- Areas along the northern edge of the racecourse,
- Around the parking areas maintained for the racing club committee members, horse floats and buses for the concerts at the northern end of Racecourse Road, and
- Along sections of Smokers Creek

#### Open Mown Grassy Areas

Areas dominated by exotic grasses and herbaceous species that are used as picnic areas, for car parking during the large events such as the race meets, classic car display and concerts.

This area includes the East paddock which is used for the concerts and car parking.

## Riparian Areas

Areas located along Smokers Creek which contain remnant canopy and shrub layers, and that have been revegetated by the Friends of Hanging Rock and Newham and District Landcare.

## Revegetation

Areas of revegetation which are dominated by young indigenous eucalypts saplings (predominantly Swamp Gums)

- These areas are located in the south–east section of the East paddock, and
- In the south–east corner below the racecourse around Dam 1 (refer to Map 1 for the location of Dam 1)

## Indigenous Plantations

Plantations of predominantly Swamp Gums around the perimeter and internal fences of the East Paddock

*Section 4.3 provides more detail about the vegetation quality of these different areas.*

## 4.2 Ecological Vegetation Classes

### 4.2.1 DELWP Biodiversity Interactive Mapping

The vegetation within Hanging Rock has been broadly mapped by DELWP as containing a high coverage of indigenous vegetation which can be categorised into three EVCs:

- EVC 83: Swampy Riparian Woodland
- EVC 859: Montane Grassy Woodland/Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic, and
- EVC 23: Herb–rich Foothill Forest

DELWPs EVC mapping is broad scale and requires ground–truthing. The EVC mapping is indicative, to assist in determining the potential EVC's in an area based on landscape, topography and remaining vegetation cover.

The East Paddock and cricket oval are not mapped by DELWP as containing any native vegetation except for a few small patches of EVC 83: Swampy Riparian Woodland along Smokers Creek.

## 4.2.2 Site Assessment

The site assessment determined that whilst these three EVCs do exist within the Reserve, the extent of each EVC mapped by DELWP was not accurate. The site assessment also determined that an EVC mapped as occurring to the north of the Reserve (EVC 55: Plains Grassy Woodland) did actually have its southern-most extent at the northern base of the rock formation.

The site assessment also determined that there was a large Transition Zone between the two EVCs occurring along the northern and western slopes of the rock formation (between EVC 55: Plains Grassy Woodland and EVC 23: Herb-rich Foothill Forest).

The Reserve falls within the Central Victorian Uplands Bioregion (DEPI 2014 [online]).

The extent of the EVCs across Hanging Rock is depicted in Map 3 on page 36.

### The Rock Formation

The EVC mapping by DELWP of the actual rock formation was determined to be generally accurate. The different EVCs present in EVC 859: Montane Grassy Woodland/Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic occur in different areas of the rock formation depending on the depth of soil versus the depth of rock, aspect and topography.

### Racecourse Grassland

The 1993 *Hanging Rock Recreation Reserve Management Plan* (Loder and Bayly) outlined the existence of grassland of national significance within the northern half of the centre of the racecourse. This grassland still exists, however anecdotally it is now in poorer condition than in 1993, potentially due to the cessation of strip burning and an increase in kangaroo numbers. A recent report (Foreman 2013) discusses that the grassland does not fit the descriptions for either EVC 23: Herb-rich Foothill Forest or EVC 55: Plains Grassy Woodland. What is evident is that the grassland has resulted from vegetation modification and tree thinning/removal due to the sight lines required across the racecourse.

Vegetation modification has resulted in the removal of all shrubs and the on-going removal and/or thinning of regenerating eucalypt seedlings. This process, which has been occurring since 1909, has led to the development of a diverse indigenous species ground storey layer which resembles an area of grassland or grassy woodland.

It is the assemblage of eucalypts species present that makes it difficult to classify the EVC for the racecourse grassland. There is a dense patch of Snow Gums *Eucalyptus pauciflora* and Candlebarks *Eucalyptus rubida* growing near the northern end of the grassland which contains trees that are reminiscent of forest vegetation– they are growing straight and tall with little room to spread their branches. Approximately 10 metres from this patch is a large Swamp Gum *Eucalyptus ovata* that is reminiscent of a large woodland eucalypt with large spreading branches– a tree that has grown with room to spread. To add to the difficulty in classifying the grassland are the patches of Narrow-leaf Peppermints *Eucalyptus radiata* that are also growing in the grassland.

It was determined based on the large eucalypts present, that the area was once probably a mosaic between the three nearby EVCs: Plains Grassy Woodland, Herb-rich Foothill Forest and Swamp Riparian Woodland. There is a drainage line that bisects the north-eastern section of the grassland which accounts for the Swamp Gums, which are generally associated with lower-lying areas or the plains. The Narrow-leaf Peppermints and Snow Gums can be associated with vegetation more typically located on higher ground, indicating that the area may have been levelled as part of the development of the racecourse.

Whilst it is convenient to 'label' the grassland as one EVC, the reality is that many areas of bushland are actually transition zones or mosaics of several EVCs. The grassland contains a mixture of the characteristic trees species present in these three EVCs, whilst presenting a landscape appearance that is characteristic of EVC 55: Plains Grassy Woodland. As the racecourse grassland landscape appearance is the result of vegetation modification, it is difficult to classify it into the one EVC type.

### 4.2.3 EVC Descriptions

Table 5 on the following page provides descriptions of the EVCs recorded at Hanging Rock based on DELWPs EVC benchmark descriptions, and the EVCs that are a result of a mosaic or transition which do not fall within the available EVC benchmark descriptions.

*Map 3 following Table 5, depicts the EVC locations across the Reserve.*

The EVC extent in Map 3 was defined by the existing remnant vegetation, and is provided to guide future revegetation as an indication of what species used to naturally occur in different areas of the Reserve. This map is not intended to suggest current recreational areas such as the actual racecourse, cricket oval or East Paddock be revegetated to the extent of their former EVCs.

No EVC mapping is provided for the northern half of the East Paddock, as there were no mature remnant trees remaining in the area. The trees growing in the adjacent road reserves were a mixture of Swamp Gums, Narrow-leaf Peppermints and Candlebarks, which did not provide a clear indication of the extent of the former EVCs within the landscape.

The mixture of Swamp Gums, Narrow-leaf Peppermints and Candlebarks in the road reserve indicates that species lists for either EVC 23: Herb-rich Foothill Forest or EVC 83: Swampy Riparian Woodland would be suitable for revegetation in the northern end of the East Paddock, especially the use of species that occur in both EVCs.

Table 5. EVCs occurring at Hanging Rock

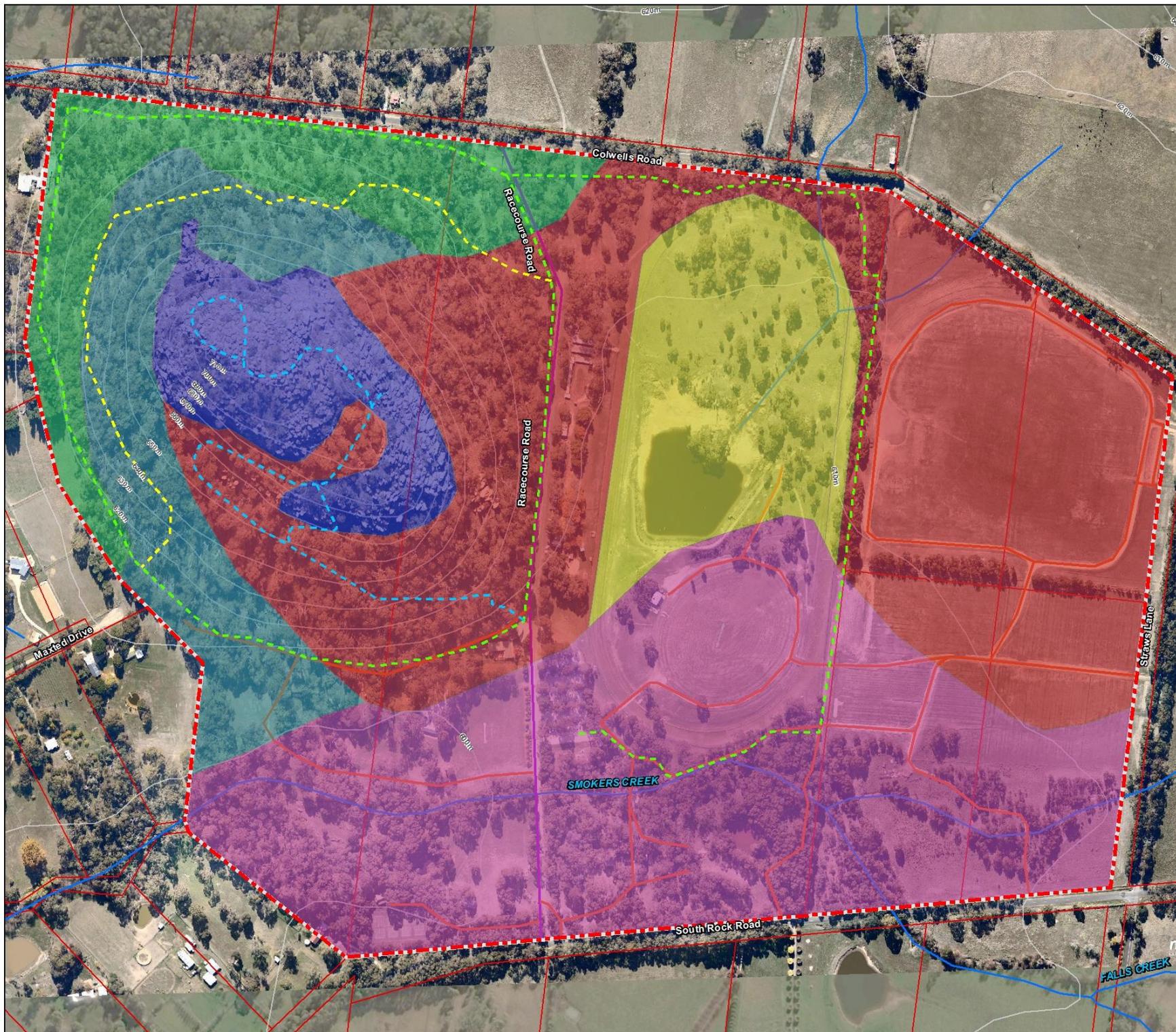
EVC No.	EVC	Bioregion Conservation Status	General Benchmark Description	Location within the Reserve Dominant Visual Characteristics
<b>EVCs Classified according to Benchmark Descriptions</b>				
23	Herb-rich Foothill Forest	Depleted	<p>Occurs on relatively fertile, moderately well-drained soils on an extremely wide range of geological types and in areas of moderate to high rainfall.</p> <p>Occupies easterly and southerly aspects mainly on lower slopes and in gullies.</p> <p>A medium to tall open forest or woodland to 25m tall with a small tree layer over a sparse to dense shrub layer.</p> <p>A high cover and diversity of herbs and grasses in the ground layer characterise this EVC (DSE 2004).</p>	<p>Located around the slopes and base of Hanging Rock, mostly to the south and east of the Rock.</p> <p>Historically this EVC extended to the east of the rock, and covered the hills located to the east of the Reserve.</p> <p>Fragments of this EVC can still be observed at the northern end of the racecourse and along Colwells Road.</p> <p>Around the rock it is dominated by Narrow-leaf Peppermints, with some Candlebarks, with a Bracken <i>Pteridium escaletum</i> understorey.</p> <p>There are some scattered shrubs (Blackwoods <i>Acacia melanoxylon</i>, Hazel Pomaderris <i>Pomaderris aspera</i>, Must Daisy-bush <i>Olearia argophylla</i>, Large-leaf Bush-pea, <i>Pultenea daphnoides</i>, Black Wattles <i>Acacia mearnsii</i> and Kangaroo Apple <i>Solanum spp</i>) mostly along/near the walking track and surrounding the base of the rock formations.</p> <p>It is a moist, green and shady area.</p> <p>To the north of the racecourse the EVC is represented by a mixture of Narrow-leaf Peppermints, Candlebarks and Swamp Gums with a denser shrub layer of Blackwoods and Black Wattles. The ground storey was dominated by exotic grasses and herbaceous species.</p>

EVC No.	EVC	Bioregion Conservation Status	General Benchmark Description	Location within the Reserve Dominant Visual Characteristics
55	Plains Grassy Woodland	Endangered	<p>An open eucalypt woodland to 15m tall occurring on a number of geologies and soil types.</p> <p>Occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations.</p> <p>The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer (DSE 2004).</p>	<p>Located around the western and northern bases of the rock, along the perimeters of the Reserve,</p> <p>It was dominated by Narrow-leaf Peppermints with Candlebarks.</p> <p>There were only a some scattered shrubs present including Cherry Ballart <i>Exocarpus cupressiformis</i>, Dogwood and Black Wattles</p> <p>There was a large diversity of understorey species including numerous indigenous grasses such as Kangaroo Grass <i>Themeda triandra</i> and Wallaby Grasses <i>Rytidosperma spp</i>, with Chocolate Lilies <i>Arthropodium spp</i>, Bulbine Lilies <i>Bulbine bulbosa</i> and orchids.</p> <p>A drier and more open area with a more open tree cover, no Bracken and a grassy/herbaceous ground-storey.</p>
83	Swampy Riparian Woodland	Endangered	<p>Woodland to 15m tall generally occupying low energy streams of the foothills and plains.</p> <p>The lower strata are variously locally dominated by a range of large and medium shrub species on the stream levees with large tussock grasses and sedges in the ground layer (DSE 2004).</p>	<p>Located along the south of the Reserve mostly along and around Smokers Creek.</p> <p>It is characterised by mostly large eucalypts that are fairly dense along the creek and are more open around the picnic areas as a result of vegetation removal.</p> <p>It is dominated by Swamp Gums with a few Manna Gums <i>Eucalyptus viminalis</i> and Narrow-leaf Peppermints.</p> <p>There are some shrubs, especially along the creek. Mostly Blackwoods with some Black wattles.</p> <p>The understorey is essentially non-existent and is either unmown exotic grasses/ herbaceous species along the creek and in the south-west corner of the Reserve or mown and maintained picnic areas.</p>

EVC No.	EVC	Bioregion Conservation Status	General Benchmark Description	Location within the Reserve Dominant Visual Characteristics
859	Montane Grassy Woodland/Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic	<p><b>EVC 859 Status not available</b></p> <p>EVC 73: Least Concern</p> <p>EVC 37: Vulnerable</p>	<p><b>Benchmark description not available for EVC 859</b></p> <p><u>Description for EVC 73: Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic</u></p> <p>Occurs in areas of low site quality on exposed rocky outcrops where rock is a dominant landform feature, soils are shallow or virtually absent and effectively rainfall is low.</p> <p>Shrubland to 2m tall with occasional emergent trees interspersed with discrete shrubless areas dominated by herbs and bryophytes/lichens characterise this EV mosaic.</p> <p>Commonly, the shrubland and herbland components of this mosaic cannot be separated at the site scale (DSE 2004).</p> <p><u>Description for EVC 37: Montane Grassy Woodland</u></p> <p>Occurs in montane elevations on moderately fertile soils on all aspects.</p> <p>An open eucalypt woodland to 10m tall, sometimes with a secondary tree layer.</p> <p>The understorey often consists of a sparse shrub layer which can be variable in height.</p> <p>The EVC is characterised by its grassy ground cover together with a variety of other graminoids and herbs (DSE 2004).</p>	<p>The rock consists of a variety of areas, open exposed rocky areas with little to no vegetation or more sheltered areas with larger eucalypts and shrubs.</p> <p>Near the summit of the rock, there is a patch of larger Snow Gums, which are also scattered in other areas of the rock.</p> <p>In lower parts of the rock on the southern side (known as the Central Forest Area), which is more sheltered, there are large old Narrow-leaf Peppermints and Candlebarks.</p> <p>The shrub layer contains numerous Musk Daisy-bushes and Large-leaf Bush-pea,</p> <p>In the rockier areas, there are a variety of indigenous Wallaby Grasses, Flax-lilies Dianella sp, and Mat-rushes Lomandra spp.</p> <p>The grasses/herbaceous species are growing in areas where there is no or limited foot traffic, or on the sides of the rock formation which cannot be accessed.</p>

EVC No.	EVC	Bioregion Conservation Status	General Benchmark Description	Location within the Reserve Dominant Visual Characteristics
<b>Non-Benchmark EVCs</b>				
N/a	Herb-rich Foothill Forest/Plains Grassy Woodland Transition Zone	N/a	N/a	<p>Band of vegetation along the western and northern slopes of the rock formation.</p> <p>Transition between the 'drier' Plains Grassy Woodland and the moister Herb-rich Foothill Forest.</p> <p>This area is rockier than either the areas of Plains Grassy Woodland or Herb-rich Foothill Forest, and contains Shiny Cassinia <i>Cassinia longifolia</i>.</p> <p>Characterised by a strip of shrubs (predominantly Shiny Cassinia with Bracken and some Wallaby Grasses in places. Dense shrubs are essentially non-existent in the other two EVC patches</p>
N/a	Racecourse Grassland	N/a	N/a	<p>Modified vegetation with historic and on-going canopy and shrub removal that has resulted in a ground-storey layer dominated by indigenous species characteristic of Plains Grassland or Plain Grassy Woodland.</p> <p>Dominant tree species are a mixture of eucalypts associated with higher areas (Snow Gums and Narrow-leaf Peppermints) and lower-lying areas (Swamp Gums), with a range of growth patterns indicating both forest and woodland trees.</p> <p>The grassland is botanically interesting due to the mixture of eucalypts, and the presence of the Snow Gums.</p>

# Ecological Vegetation Classes Hanging Rock Reserve



**Study site**

- Contours (10m)
- Watercourse
- Parcels

**Roads**

- Management Tracks
- Racecourse Rd

**Walking tracks**

- Base walking track
- Upper base walking track
- Summit walking track

**Ecological Vegetation Class**

- EVC 55: Plains Grassy Woodland
- Transition Zone between EVC 55 & EVC 23
- EVC 859: Montane Grassy Woodland/ Rocky Outcrop Shrubland/ Rocky Outcrop Hermland Mosaic
- EVC 23: Herb-rich Foothill Forest
- EVC 83: Swampy Riparian Woodland
- Racecourse Grassland (mosaic EVC 23 & EVC 55)

**Details**

Mapping by: Karen McGregor & Colin Broughton  
 Date: 20/11/2015  
 Data Source: Aerial photography courtesy of NearMap

0 25 50 75 100 125 150 175 200m

Scale 1:4,000 (Page size A3)

**Disclaimer**  
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### 4.3 Vegetation Quality Mapping

To establish some baseline data regarding the 'ecological condition' of Hanging Rock, vegetation quality mapping of remnant indigenous ground-storey vegetation was undertaken, to provide indicative data on the extent and 'quality' of indigenous ground-storey vegetation cover across the Reserve.

The vegetation quality mapping compared the percentage of indigenous versus exotic ground storey vegetation cover present in different areas of the site. As the mapping was concerned with ground storey vegetation cover present; areas with large areas of rock were mapped as having a 'high' indigenous vegetation cover, even if there is only a small amount of actual vegetation present amongst the rocks.

Considering large areas of the reserve either have no remnant indigenous vegetation (the East Paddock), or they contain remnant trees with an exotic grassy/herbaceous ground-storey (the picnic areas and along Smokers Creek), it was determined that an additional 'remnant canopy' category would be added to recognise that many of these areas of the reserve did still contain ecological values, even if they did not contain indigenous ground-storey vegetation cover.

#### Areas Mapped within the Reserve

The areas with indigenous ground-storey vegetation that were mapped were the rock and its' slopes, the racecourse grassland, some small patches within the picnic areas and along Smokers Creek that had areas of Bracken, Cumbungi *Typha orientalis* or the revegetation around the pond to the south of the car parking areas (Dam 2); and the dam (Dam 4) in the north-west corner of the East Paddock that contained a high and diverse cover of indigenous wetland species.

The area of revegetation around Dam 2 was the only area of revegetation (non-remnant indigenous ground-storey vegetation) that was mapped within the Reserve.

As the ground-storey revegetation works along Smokers Creek were recent (2012 onwards) and had not become established, the weed cover still exceeded the revegetation. When the next vegetation quality mapping assessment is undertaken in five (2019) or 10 years (2024), these revegetation works should dominate the weed cover, and it should be possible to include these revegetation areas in the indigenous ground-storey vegetation quality mapping.

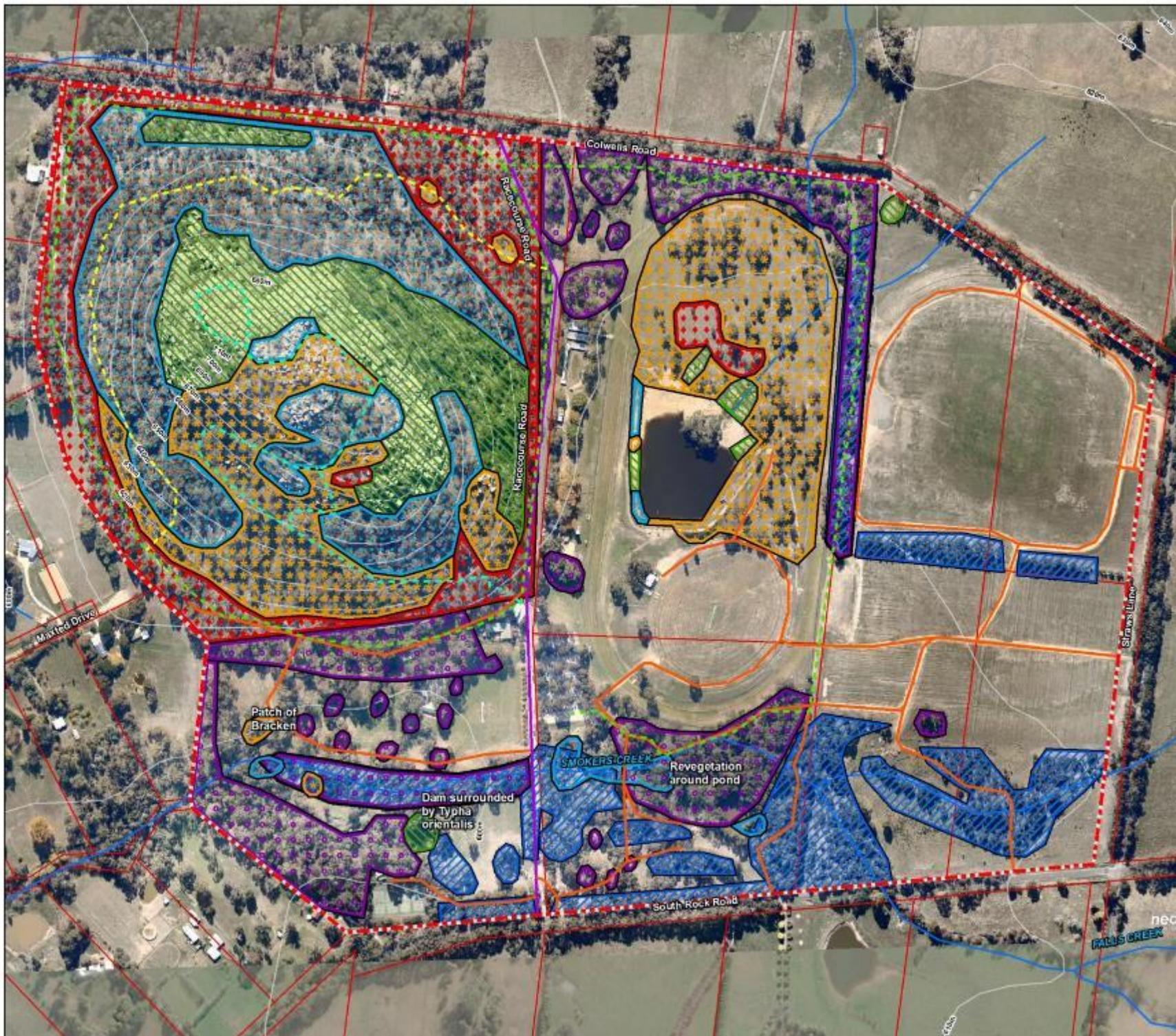
#### Results of the Mapping

The mapping illustrates that the 'core' area of the rock formation and its' northern slopes are in good ecological condition, which would be expected of a drier environment where it is harder for weeds to 'thrive'. The moister southern side has a lower indigenous vegetation cover, which is expected of moister areas which have been subjected to decades of impacts.

The higher vegetation cover in the racecourse grassland occurs around the racecourse dam margins. The core grassland area whilst containing a large diversity of indigenous species is degraded and infested with exotic grasses and herbaceous species.

*Map 5 on the following page depicts the indigenous ground-storey vegetation quality mapping within the Reserve.*

# Indigenous Groundstorey Vegetation Quality Hanging Rock Reserve



- Study site
- Contours (10m)
- Watercourse
- Parcels
- Roads**
- Management Tracks
- Racecourse Rd
- Walking tracks**
- Base walking track
- Upper base walking track
- Summit walking track
- Indigenous groundstorey vegetation cover**
- 0-25% indigenous groundstorey vegetation cover
- 25-50% indigenous groundstorey vegetation cover
- 50-75% indigenous groundstorey vegetation cover
- 75-100% indigenous groundstorey vegetation cover
- Remnant (<25% indigenous groundstorey vegetation cover) - Locations indicative
- Revegetation (<25% indigenous vegetation cover) - Locations indicative

**Details**  
 Mapping by: Karen McGregor & Colin Broughton  
 Date: 21/04/2015  
 Data Source: Aerial photography courtesy of NearMap

N

0 25 50 75 100 125 150 175 200 m

Scale 1:4,100 (Page size A3)

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## 4.4 Flora

A flora species list was collated across the Reserve. As outlined earlier, the flora species in the Reserve are presented in two different flora species lists:

- 1) List of all the flora species across the Reserve
- 2) Flora list for the racecourse grassland (including the northern margins of the racecourse dam)

In addition to compiling a flora species list, the information from previous flora lists from a number of sources has also been collated into the species lists for the entire site, and for the racecourse grassland.

Previous data was gathered from:

- Paul Foreman (2013). Preliminary Assessment of “Grassland’ Area within Hanging Rock Racecourse–Hanging Rock Community Recreation Reserve
- Barry Kemp and Tony Davis (1985). Available on Visit Macedon ranges website (courtesy of the 1993 Hanging Rock Recreation Reserve Management Plan (accessed October 2014).
- David Francis (2010). Flora list provided by Newham and District Landcare Group (NDLG)
- NDLG– observations (especially exotic flora) provided by Penny Roberts (Newham and District Landcare Group)

The aim of compiling all of the current and previous flora data into the one list was to provide one source for referencing the flora of Hanging Rock, and to provide a framework for future flora surveys.

The source (reference) and date of all the flora species listed has been noted in separate columns within the flora list/s.

The planted native and/or indigenous trees and shrubs; located along the creek, Racecourse Road and around the car parks; have not been included in the species list, as per database conventions.

Seedlings from any planted native and/or indigenous trees and shrubs that have grown and spread within the Reserve were recorded as naturalised species.

*All flora species recorded within the site are listed in Appendices 1 and 2.*

### 4.4.1 Significant Flora Species Recorded Within Hanging Rock

Of the indigenous species recorded within the Reserve, two rare and/or threatened flora species within Victoria (as defined by DSE 2005) were recorded: Dwarf Silver–wattle and Black Gum.

Descriptions of both these species are provided on the following page.

Due to vegetation fragmentation and clearing in the Hanging Rock region, most indigenous flora species are considered to be at least of local significance, and there are several species within the Reserve which are of Regional Significance and/or botanical interest, which are discussed in Section 4.4.2.

*The location of the following species is depicted in Map 6.*

### **Dwarf Silver-wattle *Acacia nano-dealbata***

A patch of Dwarf Silver-wattles were recorded near the eastern lookout on the rock formation. There were approximately 6 plants in the patch. It is likely there are other patches scattered around the sides of the rock formation, but no others were recorded.

Dwarf Silver-wattle is considered to be Rare within Victoria according to VROTS. It is not listed under the Federal *Environment and Protection Biodiversity Conservation* (EPBC) Act 1999, or the State *Flora and Fauna Guarantee Act* 1988.

As a VROTS (Victorian Register of Threatened Species) listed species, there are no legislative or permit requirements for this species.

### **Black Gums *Eucalyptus aggregata***

A patch of Black Gums were recorded in the East Paddock along Smokers Creek. There were approximately 10 saplings in the patch, and none were yet seeding.

The only known occurrence of Black Gums in Victoria is around Woodend. They are more commonly found in the central and southern tablelands of New South Wales (DSE 2004).

In the Woodend area all known occurrences of the species are within 4 kilometres of the Woodend township, along the Five Mile Creek floodplain and its' southern tributaries. Smokers Creek is a tributary of Five Mile Creek. The closest known naturally occurring Black Gums to the Reserve are located 2.5kms to the west, along Five Mile Creek on private land (NDLG 2015).

The Black Gums growing in the Reserve are an anomaly. They are all young trees that are similar in age to the adjacent planted species that have been installed along Smokers Creek. None of the Reserve Rangers', NDLG, Woodend Landcare or Robin Baker (of Acres Wild Nursery) have ever knowingly planted Black Gums within the Reserve or in that section of Smokers Creek.

According to one of the Rangers (G Bigolin pers comm.) the trees appeared after a controlled burn in that section of the East Paddock. All potential groups that could have planted these Black Gums (NDLG, Woodend Landcare and Wild Acres Nursery) are known though personal links with the NDLG to have not planted Black Gums at Hanging Rock. Therefore the origins of these plants are unknown (NDLG 2015). At this stage, as it cannot be determined if they are a remnant species that have regenerated from seed or not, they will be considered as remnant vegetation until it can be proven or otherwise.

The Black Gum is considered to be endangered within Victoria according to the VROTS, and is listed under the State Flora and Fauna Guarantee Act 1998.

Currently Black Gums are being considered by the Federal Department of Environment for listing under the EPBC Act.

As a Flora and Fauna Guarantee Act listed species growing on public land, a permit is required if any proposed works may kill, injure or disturb listed flora species.

#### 4.4.2 Flora Species of Botanical Interest at Hanging Rock

Aside from the two rare and/or threatened flora species that have been recorded, the following botanically interesting species grow within the Reserve.

##### **Snow Gums *Eucalyptus pauciflora***

There is a population of Snow Gums growing on the rock formation and in the racecourse grassland.

Snow Gums typically occur in woodlands and open woodlands at altitudes of 1,300–1,800 m (4,265–5,906 ft) in Victoria, Tasmania, New South Wales and the Australian Capital Territory. However there is also a lowland form which grows in lower altitudes in these three states and into Queensland and South Australia. Due to land clearing, few stands of lowland Snow Gums are thought to remain across the State.

However, according to the Newham and District Landcare Group, there are several patches of remnant Snow Gums on roadsides and on private land in the Newham area. Some believe they are remnant from the previous sub-alpine landscape that characterised the area during the last glacial period over 10,000 years ago. Patches are known to occur along Three Chain Road, Mowbrays Road, Dons Road, Hennebergs lane and Fincher Lane. Interestingly, the Alpine Shaggy-pea *Podolobium alpestre* has also been recorded on Three Chain Road, which is one of only two recorded locations outside the montane to alpine areas of eastern Victoria (NDLG 2015).

*The Snow Gums at Hanging Rock would be the lowland form, and as such need to be recognised and conserved for their botanical significance.*

*The Hanging Rock Australian Koala Foundation report (AKF 2008) recommended that the stands of local Snow Gums should be mapped for their habitat values and botanical significance.*

##### **Silver Banksia *Banksia marginata***

There is a patch of mature tree-form Silver Banksias growing near the summit of the rock formation. Silver Banksia's are more commonly recorded as shrubs, therefore a patch of mature Silver Banksia's in the tree form is considered to be botanically significant.

They are the only patch of this species within the Reserve.

In Victoria, Silver Banksia is predominantly coastal or near-coastal. It often grows as a large tree on the basalt plains west of Melbourne, but has almost disappeared from the plains due to clearing. It grows on a variety of soil types, from clay loams, shale and peaty loams to sandy or rocky soils composed of quartzite, sandstone, limestone or granite, although sandier soils predominate. The annual rainfall over its distribution ranges from 400 to 1000 mm.

*As the tree form of Silver Banksia's, they should to be recognised and conserved for their botanical significance.*

## Leafy Fireweed *Senecio squarrosus* A.Rich.

Leafy Fireweed was identified in the racecourse grassland, after a specimen was sent to the National Herbarium of Victoria for identification.

The form identified in the grassland has only been identified as a scattered occurrence across Victoria, and the closest recorded occurrence to Hanging Rock is in Kilmore, to the east of the site. There are only a few records in the greater Melbourne area (Australian Virtual Herbarium).

Leafy Fireweed is an erect to sprawling unbranched herb that grows annually from perennial underground stems. It grows in low lying areas and swamp margins of riparian woodland.

It is an uncommon plant within Victoria, but has not been listed as a rare and/or threatened species (Shire of Yarra Ranges).

*As there is a known population of 20–40 individuals within the racecourse grassland, and the species is of limited distribution, these plants need to be recognised and conserved for their botanical significance.*

### Regionally Significant Species

There are numerous flora species growing throughout the Reserve that would be considered of Regional Significance within the Central Victorian Uplands (CVU) bioregion. Species which have a frequency of occurrence of less than 5% in the CVU Bioregion are generally considered regionally significant. However, low frequency of occurrence can be due to insufficient sampling, so any analysis of frequency of occurrence data needs to be aware of these potential sampling inaccuracies.

A regionally significant flora species list was not compiled as a component of the EMP, however it is considered likely many of the recorded species would be regionally significant.

## 4.5 Fauna

The focus of the EMP fauna fieldwork was on establishing monitoring for avian species, undertaking incidental fauna observations, and mapping habitat for significant fauna species (based on the 5km database radius search using the Victorian Biodiversity Atlas). The EMP was not focused on undertaking detailed fauna surveys, or undertaking surveys for threatened species.

### Fauna Data Compilation

As such, the fauna species recorded as a component of the EMP fieldwork were limited. To compensate for this lack of data collection, fauna data has been compiled from a number of other sources including:

- The current nestbox and remote camera monitoring being undertaken by the MRSC
- Previous fauna survey data from the 1993 Management Plan (Loder and Bayly)
- Information available on the Hanging Rock website (Visit Macedon Ranges);
- Two bat surveys undertaken for the NDLG in 2008 and 2010
- Bird data from the Woodend Bird Observers Club
- Data from the annual koala counts
- Bird data from Albert Golden, and
- Observations from the long-term Reserve Ranger (G Bigolin).

A list of all of these records and observations has been compiled in Appendix 3 of this EMP.

The aim of compiling all of the current and previous fauna data into the one list was to provide one source for referencing the known fauna of Hanging Rock, and to provide a framework for future fauna data collation. The source (reference) and date of the fauna species recorded, has been noted in separate columns within the list.

The results of the habitat mapping and fauna data compilation, indicates that Hanging Rock supports a diverse ranges of fauna species and habitats.

### **Bird Species**

The diversity of bird species that have been recorded in the Reserve over the years by the Woodend Bird Observers Club, reflects the diversity of avian habitat available including rocks, cliff faces, forest, woodland, riparian and grassland (Donaldson; NDLG Newsletter No. 38, Spring 2013).

### **Habitat Elements**

The habitat elements observed within the Reserve included:

- Waterbodies (Racecourse Dam and the other four smaller dams)
- Riparian corridor (Smokers Creek)
- Open grassy areas (racecourse grassland, East Paddock, picnic areas)
- Forested areas (the base and slopes of the rock formation)
- Dense shrubby areas (around the southern slopes and base of the rock)
- Rocky areas and cliff faces, and
- Single and patches of Large Old Trees

Whilst the picnic areas are slashed, they are surrounded by large trees, thereby providing habitat for birds, arboreal mammals and bats.

*The collated fauna species list for the Reserve is presented in Appendix 3.*

*The threatened fauna species habitat assessment is depicted in Map 8.*

#### **4.5.1 Significant Fauna Species Recorded Within the Site**

There are records of several threatened fauna species which have been recorded in the Reserve over the years. Some of these species are resident or annual visitors, whilst some others have not been recorded recently.

Descriptions of these species are provided in Table 6 on the following page. Due to the number of threatened fauna species within the Reserve, descriptions will be limited to their status, habitat/area of the Reserve recorded in and usage of the Reserve (permanent, annual, periodic, occasional or vagrant).

Table 6. Significant Fauna Species at Hanging Rock

Common Name	Scientific Name	Status			Habitat	Probable/known usage of Reserve
		DELWP	FFG	EPBC		
<b>BIRDS</b>						
Grey Goshawk	<i>Accipiter novaehollandiae novaehollandiae</i>	vu	L		Woodland areas, but prefers areas with older trees and more 'wet forest' habitat, i.e. south of rock.	Occasional visitor
Australasian Shoveler	<i>Anas rhynchos</i>	vu			Racecourse dam.	Occasional visitor
Eastern Great Egret	<i>Ardea modesta</i>	vu	L		Racecourse dam and racecourse grassland, and potentially other waterbodies/pondages	Occasional visitor
Hardhead	<i>Aythya australis</i>	vu			Racecourse dam.	Occasional visitor
Brown Treecreeper (south-eastern ssp.)	<i>Climacteris picumnus victoriae</i>	nt			Woodland area on northern side of rock, mostly within box-ironbark vegetation.	Possibly resident / regular visitor
Latham's Snipe	<i>Gallinago hardwickii</i>	nt		M	Well-vegetated edge/patches of exposed mud on racecourse dam and occasionally on flooded grassland.	Occasional seasonal visitor (summer migrant)
White-throated Needle-tail	<i>Hirundapus caudacutus</i>	vu		M	Aerial space above the rock and other habitat.	Likely to be an annual seasonal visitor (summer migrant)
Swift Parrot	<i>Lathamus discolor</i>	en	L	EN	Within autumn-winter flowering eucalypt habitat throughout site, particularly when local blooms of Golden Wattle are present.	Probable annual seasonal visitor (Autumn/Winter)
Barking Owl	<i>Ninox connivens connivens</i>	en	L		All wooded habitat, particularly along edges adjacent to farmland (rabbits), foraging likely to be largely where acacias and older trees with hollows are present (where arboreal prey species are more likely to occur). Could potentially roost/nest in large trees with hollows surrounding the rock, particularly area just south of rock.	Occasional visitor
Powerful Owl	<i>Ninox strenua</i>	vu	L		All wooded habitat, foraging likely to be largely where acacias and older trees with hollows are present (where arboreal prey species are more likely to occur). Is known to regularly roost in Blackwoods throughout the reserve, and nest in large trees with hollows surrounding the rock.	Resident / regular visitor Some known roost trees grow near recreational areas

Common Name	Scientific Name	Status			Habitat	Probable/known usage of Reserve
		DELWP	FFG	EPBC		
<b>MAMMALS</b>						
Greater Glider	<i>Petauroides volans</i>	vu			Areas with larger, older trees with hollows particularly to the south of the rock	Resident
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	vu			Areas with larger, older trees, logs, hollows and crevices, such as the rock, and area of larger trees to the south of the rock.	Possibly resident / occasional visitor
<p><b>Conservation status of Threatened Fauna in Victoria (DELWP, ref. DEPI 2013)</b>  <b>ex:</b> Extinct, <b>rx:</b> Regionally Extinct, <b>wx:</b> Extinct in the Wild, <b>cr:</b> Critically Endangered, <b>en:</b> Endangered, <b>vu:</b> Vulnerable, <b>nt:</b> Near Threatened, <b>dd:</b> Data Deficient                      Definitions of Conservation Status Codes can be found on the DELWP website under Advisory List of Rare or Threatened Fauna</p> <p style="text-align: right;"><b>Conservation status under EPBC Act 1999:</b>  <b>EX:</b> Extinct, <b>CR:</b> Critically endangered, <b>EN:</b> Endangered, <b>VU:</b> Vulnerable and <b>CD:</b> Conservation dependant <b>M:</b> Migratory Species listed under the Act  <b>Conservation status under FFG Act 1988:</b> <b>L:</b> Listed, <b>N:</b> Nominated, <b>I:</b> Invalid or ineligible and <b>D:</b> Delisted</p>						

## 4.5.2 Iconic Fauna Species

There are several other 'iconic' fauna species that are not threatened species but should be considered as ecological values of Hanging Rock. These include the koala and peregrine falcon.

### Koala *Phascolarctos cinereus*

There was once a visible koala population at Hanging Rock and in the Macedon area. These numbers appear to have declined over the years, as reflected in the annual koala count data for the Reserve. It is possible that the Hanging Rock population was introduced into the Reserve in the 1990s and has declined back to its natural carrying population since then.

In 2008, the Hanging Rock Development Advisory Committee commissioned a report by the Australian Kola Foundation, to provide information with regards to koala habitat and habitat use in the Reserve and surrounding areas, and to suggest management strategies to address the apparent decline in the number of koalas using the Reserve.

The study concluded that between two to five koalas use the Reserve as part of their home range. It also concluded the Reserve contains over 23 hectares of high quality habitat with an additional 10 hectares available within 300 metres of the Reserve. In all, the area could support a minimum of **10 koalas** without over-browsing (AKF 2008).

The study concluded the two major factors in the long term population decline in the Reserve was that Hanging Rock was isolated from other preferred habitat areas, and was surrounded by high speed roads. Preferred habitat areas were defined as habitats composed of Manna Gums *Eucalyptus viminalis* and Snow Gum on volcanic substrates (AKF 2008). Unfortunately as the major corridors within the landscape are along drainage lines dominated by Swamp Gums, koalas would have to move along the road reserves or move from patch to patch of Manna and Snow Gums, making them vulnerable to attack.

Since the 2008 AKF report, the annual koala numbers have varied from one to nine individuals counted at the one time. The variability in numbers suggests that the koala population at the Reserve remains, but is either variable or not all seen at the one time. A recent survey (January 2015) recorded nine koalas, which is close to carrying capacity of the Reserve as determined by the AKF.

Table 7 below provides details of koala counts in the Reserve since 2001.

**Table 7. Hanging Rock Koala Count Data**

Year	Date	No of Counters	No of Koalas	Weather
2001	11-Dec-01	15	11	unknown
2002	03-Dec-02	11	5	warm, calm (approx 22 degrees)
2003	05-Dec-03	22	5	mild, slighty windy (approx 18 degrees)
2004	03-Dec-04	23	5	mild, slighty windy (approx 20 degrees)
2005	21-Dec-05	15	5	Mild, early morning showers (approx 18 degrees)
2006	08-Dec-06	50	4	Warm, Sunny (26 degrees)
2007	30-Nov-07	17	1	Warm, Sunny (27 degrees)
2008	28-Nov-08	23	7	Warm, sunny (25 degrees)
2009	20-Nov-09	20	2	Hot, Dry (33 degrees)

Year	Date	No of Counters	No of Koalas	Weather
2010	05–Nov–10	26	2	Warm, sunny (25 degrees)
2011	25–Nov–11	14	1	Overcast, drizzle (18 degrees)
2012	23–Nov–12	20	1	Fine, Mild (Low 20's)
2013	Oct–13	1	4	No formal count held – Visitor to Hanging Rock sited two mothers and babies in different locations within 1 hr.
2014	Aug–2014	?	3	Daytime survey
2015	Jan–2015	7	9	1 baby with mother observed 10PM to 12AM. Light wind, sky becoming clear, light rain, 15 degrees.

### Peregrine Falcon *Falco peregrinus*

There is a pair of Peregrine Falcons nesting at Hanging Rock. Peregrine Falcons reside where there are abundant and secure nest sites available. They are a mostly residential bird that feeds on small and medium-sized birds, rabbits and other smaller day active mammals. The falcons mate for life and the pair maintains a home range of 20–30 square kilometres. They are not typically nest builders, but lay their eggs in cliff faces, tree hollows or in large abandoned nests from other birds (Birds in Backyards website).

The presence of these falcons indicates another level of biological diversity within the Reserve and the use of specialised habitat niches. Whilst not considered a threatened species, it is important to recognise and conserve these breeding pairs, as an important component of the ecological values of the Reserve.

## 4.6 Bird Census Data

One monitoring tool that was implemented in the Reserve as a component of this EMP was the establishment of three bird census areas using the Birds Australia preferred 2 hectare search area bird census methodology. This method is based on a defined 2 hectare area and usually involves a 20 minute search, where all birds heard and/or observed in the pre-defined search area are recorded on the Bird Census form.

The three bird census areas were established in a variety of habitats across the Reserve and included:

- The racecourse dam and its' margins
- The 'woodland' area on the northern side of the rock
- The 'forest' area on the southern side of the rock

This EMP collected the initial data for these three areas, and the purpose of establishing the areas was to initiate regular bird observations in these areas. It is preferable that the surveys are undertaken on a quarterly basis; however the minimum would be on an annual basis.

The guidelines for the survey conditions include:

- Low wind day; that is wind velocity should be less than 10km/hour
- No rainfall; above a light intermittent drizzle
- No mist or fog; that would impede visibility
- Temperature above 10° C (or below average minimum for the season)

- Late spring/early summer survey; to be undertaken in the most optimal conditions in either November or December
- Survey within 3–4 hours of first light

Map 7 at the end of Section 4, depicts the three bird census locations.

Refer to Appendix 4 for the initial bird census data.

## 4.7 Summary of Hanging Rocks Ecological Values

As outlined throughout this Section of the EMP, there are numerous ecological values within Hanging Rock, with regard to its' landscape/geology, vegetation, flora and fauna species. The following Table provides a summary of the ecological values that are currently known within Hanging Rock.

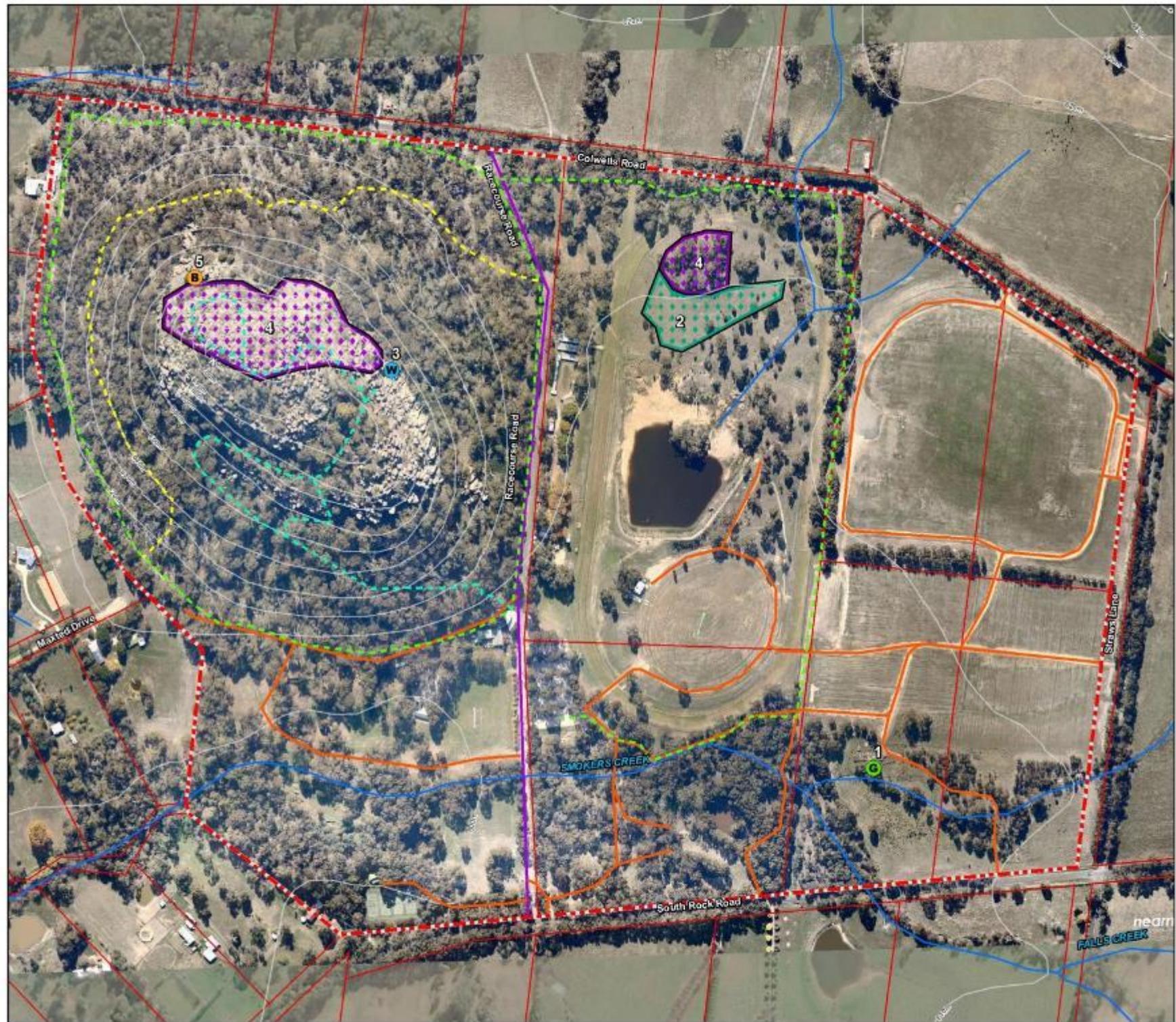
**Table 8. Ecological Values of Hanging Rock**

Ecological Value	Status	Location Comments
<b>Geology and Landscape</b>		
Rock formation	Heritage Overlay (HO88) Now included in the Victorian Heritage Register	One of the best known examples of a volcanic plug or mamelon in the world.
Racecourse dam	N/a	Provides a wetland environment for a variety of wetland birds and other species
Racecourse grassland	Considered of National significance in 1993 (Loder & Bayly), but condition has declined	An open woodland environment, with indigenous ground-storey vegetation, within the Reserve
Smokers Creek	N/a	Riparian link across the landscape between the Reserve and its surrounds
Large Old Trees	N/a	Growing across recreational areas of the Reserve Provide habitat for birds, bats and arboreal mammals
<b>Vegetation</b>		
EVC 23: Herb-rich Foothill Forest	Depleted in the CVU bioregion	Forest on southern slopes of rock.
EVC 55: Plains Grassy Woodland	Endangered in the CVU bioregion	Woodland on northern side of rock.
EVC 83: Swampy Riparian Woodland	Endangered in the CVU bioregion	Along Smokers Creek.
EVC 859: Montane Grassy Woodland/Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic	<b>EVC 859 Status not available</b> EVC 73: Least Concern (Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic) EVC 37: Vulnerable (Montane Grassy Woodland)	The rock itself.
<b>Flora</b>		
Dwarf Silver-wattle <i>Acacia nano-dealbata</i>	Rare within Victoria	Cliff face of rock formation
Black Gums <i>Eucalyptus aggregata</i>	Endangered within Victoria, Listed under Flora & Fauna Guarantee Act 1998.	East Paddock along Smokers Creek Unknown if they are planted or naturally regenerated
Snow Gums <i>Eucalyptus pauciflora</i>	Botanical interest as a healthy population of the lowland form	On the rock itself In the racecourse grassland

**Hanging Rock Reserve Environmental Management Plan: Part 1**

<b>Ecological Value</b>	<b>Status</b>	<b>Location Comments</b>
Silver Banksia <i>Banksia marginata</i>	Botanical interest as mature patch of tree-form	On the rock itself near the summit
Leafy Fireweed <i>Senecio squarrosus</i> <i>A.Rich.</i>	Botanical interest as uncommon in Victoria	Racecourse grassland
<b>Fauna– Threatened Species</b>		
Grey Goshawk <i>Accipiter novaehollandiae</i> <i>novaehollandiae</i>	Vulnerable in Victoria Listed under the FFG Act (1998)	Occasional visitor to forest south of the rock
Australasian Shoveler <i>Anas rhynchotis</i>	Vulnerable in Victoria	Racecourse dam
Eastern Great Egret <i>Ardea modesta</i>	Vulnerable in Victoria Listed under the FFG Act (1988)	Racecourse dam and racecourse grassland
Hardhead <i>Aythya australis</i>	Vulnerable in Victoria	Racecourse dam
Brown Treecreeper (south-eastern ssp.) <i>Climacteris picumnus</i> <i>victoriae</i>	Near threatened in Victoria	Woodland on northern side of rock
Latham's Snipe <i>Gallinago hardwickii</i>	Near threatened in Victoria Migratory species under the EPBC Act (1999)	Racecourse dam
White-throated Needletail <i>Hirundapus caudacutus</i>	Vulnerable in Victoria Migratory species under the EPBC Act (1999)	Aerial space above the rock and other habitat.
Swift Parrot <i>Lathamus discolor</i>	Endangered in Victoria Listed under the FFG Act (1988) Endangered species under the EPBC Act (1999)	Within autumn–winter flowering eucalypt habitat throughout site, particularly when local blooms of Golden Wattle are present.
Barking Owl <i>Ninox connivens</i> <i>connivens</i>	Endangered in Victoria Listed under the FFG Act (1988)	All wooded habitat
Powerful Owl <i>Ninox strenua</i>	Vulnerable in Victoria Listed under the FFG Act (1988)	All wooded habitat
Greater Glider <i>Petauroides volans</i>	Vulnerable in Victoria	Areas with larger, older trees with hollows, particularly to the south
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	Vulnerable in Victoria	Areas with larger, older trees, logs, hollows and crevices, such as the rock, and area of larger trees to the south of the rock.
<b>Fauna–Iconic Species</b>		
Koala <i>Phascolarctos cinereus</i>	Not listed as threatened in Victoria	Population has persisted, but numbers have been variable over the years. The January 2015 count recorded nine individuals, which is close to the Reserve's carrying capacity identified by the AKF.
Peregrine Falcon <i>Falco peregrinus</i>	Not listed as threatened in Victoria	Breed in the rock escarpment Indicate biological diversity through the use of habitat niches

# Significant Flora Locations Hanging Rock Reserve



**Legend**

- Study site
- Contours (10m)
- Watercourse
- Parcels

**Roads**

- Management Tracks
- Racecourse Rd

**Walking tracks**

- Base walking track
- Upper base walking track
- Summit walking track

**Significant flora locations**

- G Black Gums
- W Dwarf Silver Wattle
- B Silver Banksias
- Senecio squarrosus* A. Rich
- Snow Gums

**Details**

Mapping by: Karen McGregor & Colin Broughton  
 Date: 21/04/2015  
 Data Source: Aerial photography courtesy of NearMap





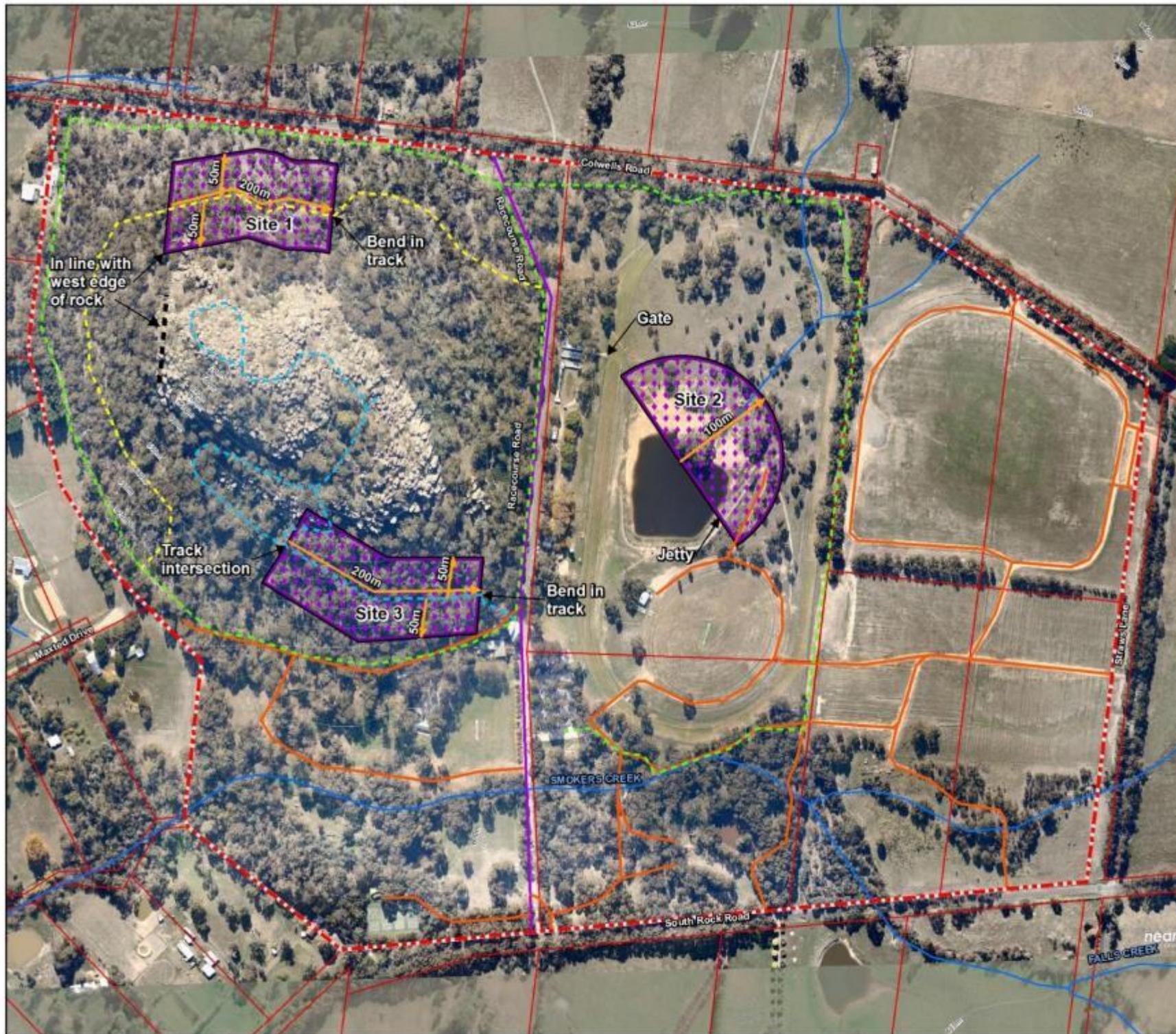
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# Bird Survey Areas Hanging Rock Reserve



**Legend**

- Contours (10m)
- Watercourse
- Study site
- Parcels

**Roads**

- Management Tracks
- Racecourse Rd

**Walking tracks**

- Base walking track
- Upper base walking track
- Summit walking track
- Bird survey areas (2ha)

**Details**

Mapping by: Karen McGregor & Colin Broughton  
 Date: 21/04/2015  
 Data Source: Aerial photography courtesy of NearMap

N

0 25 50 75 100 125 150 175 200m

Scale: 1:4,100 (Page size A3)

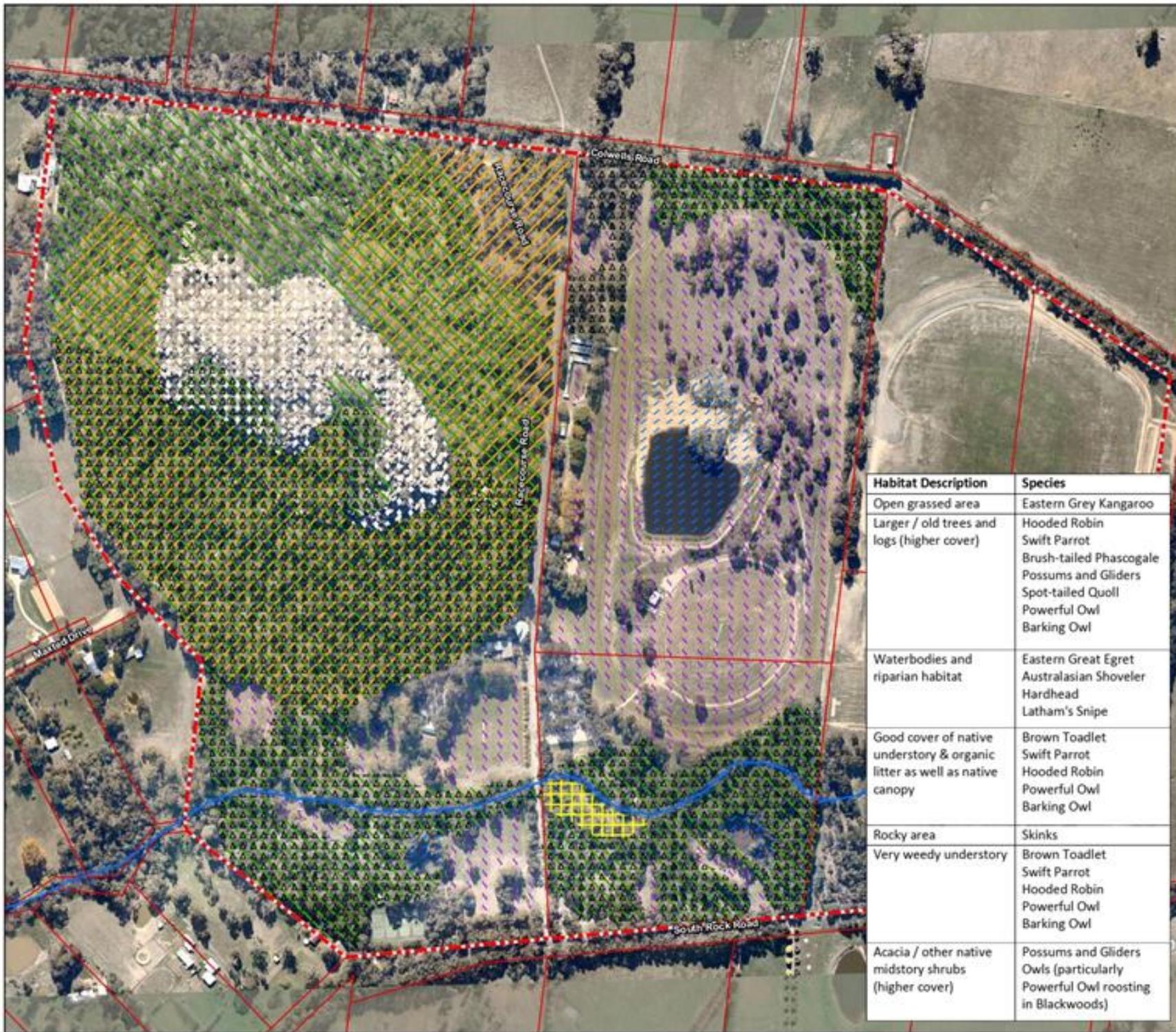
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near  
FALLS CREEK

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# Fauna Habitat

## Hanging Rock Reserve



**Legend**

- Creek
- Study site
- Parcels

**Fauna habitat**

- Open grassed area
- Larger / old trees and logs (higher cover)
- Waterbodies and riparian habitat
- Good cover of native understorey & organic litter as well as native canopy
- Rocky area
- Very weedy understorey
- Acacia / other native midstorey shrubs (higher cover)

Habitat Description	Species
Open grassed area	Eastern Grey Kangaroo
Larger / old trees and logs (higher cover)	Hooded Robin Swift Parrot Brush-tailed Phascogale Possums and Gliders Spot-tailed Quoll Powerful Owl Barking Owl
Waterbodies and riparian habitat	Eastern Great Egret Australasian Shoveler Hardhead Latham's Snipe
Good cover of native understorey & organic litter as well as native canopy	Brown Toadlet Swift Parrot Hooded Robin Powerful Owl Barking Owl
Rocky area	Skinks
Very weedy understorey	Brown Toadlet Swift Parrot Hooded Robin Powerful Owl Barking Owl
Acacia / other native midstorey shrubs (higher cover)	Possums and Gliders Owls (particularly Powerful Owl roosting in Blackwoods)

**Details**

Mapping by: Karen McGregor & Colin Broughton  
Date: 15/04/2015

N

0 25 50 75 100 125 150m

Scale 1:4,000 (Page size A3)

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## 5. PEST PLANTS AND ANIMALS

As Hanging Rock is located in a fragmented and predominantly cleared rural landscape, the impacts of pest plants and animals on the Reserve's ecological values will require an on-going management commitment.

With the reality of limited resources and budgets, on-going pest plant and animal management actions need to be well defined and targeted. They also need to be realistic and recognise that it will not be possible to return Hanging Rock to its' pre-European state. However it is possible to manage a reserve and its buffers, so that pest plant invasion is minimised.

Pest animal control will always be harder to achieve without undertaking major infrastructure investments such as constructing predator proof fencing, and then undertaking regular (daily or weekly) monitoring and maintenance of the fence.

This section of the EMP outlines and discusses the pest plant and animal issues at Hanging Rock. It also provides a series of management recommendations for the Reserve.

### 5.1 Pest Plants

#### General Information

The fieldwork and stakeholder consultations provided an overview of the pest plant issues (and their locations) at Hanging Rock; and the management actions and weed control programs that had been undertaken to date within the Reserve.

For such a large Reserve, with so many landscape and habitat types and recreational uses, the main observation from the fieldwork, was that Hanging Rock's recreational areas (the mown areas) were well maintained. The majority of pest plants were located around the rock, in the racecourse grassland, along Smokers Creek and in the unmown sections of the Reserve.

Whilst there was some woody and scrambler/climber (ie: Blackberry) weeds, the dominant weeds were grassy/herbaceous weeds, which existed across the Reserve. Grassy/herbaceous weeds are more difficult to control and eradicate than woody and scrambler/climber weeds.

Consultation with the NDLG, and the literature review, revealed that Smokers Creek was once 'choked' with a thicket of Blackberries \**Rubus fruticosus subsp. agg.*, Montpellier Broom \**Genista Monspessulana*, Holly \**Ilex aquifolium* and Portuguese Laurels \**Prunus lusitanica*. This thicket has been mostly removed. Native understorey planting to restore habitat along the Creek and stabilise the creek banks was initiated by Friends of Hanging Rock many years ago, and the extent of annual works has escalated dramatically since 2011 when the NDLG began annual works funded by 'Communities for Nature' grants (N&DLG, Spring 2013).

The Reserve Rangers undertake regular weed control of some weeds along the main tracks and high usage areas within the Reserve. Currently the amount of on-going weed control works undertaken is limited to managing small infestations in high usage areas. It is the weeds growing within the lower usage areas that are of more concern within the Reserve.

## Current Weed Control Works

In 2014/15, the NDLG in conjunction with the MRSC was in the process of undertaking a weed control program across the Reserve. Numerous weed species were being targeted including Holly, Spear Thistles, Slender Thistles, Portuguese Laurel, Common Elder, Gorse, Montpellier Broom, etc.

During the last few site assessments and meetings (January to April 2015), the evidence of this weed control work was visible in the form of sprayed and dying Thistles, chopped and poisoned Holly along the Summit walking track and patches of sprayed Arum Lilies and the cut and painted stumps of woody weeds along Smokers Creek.

This initial weed control work is focussed on targeting and controlling the existing weeds (woody weeds, thistles and some other species) growing across the Reserve. Follow up work for the whole of the reserve is planned for 2015–16 and the cost will be shared between NDLG and MRSC. This work is currently targeting the S1 and S2 weeds listed in Tables 9 to 11 on the following pages, as well as recurrent woody weeds and Thistles.

## Weed Prioritisation Assessment

No woody or scrambler/climbing weeds were identified as Keystone (large infestations that required strategic control and habitat replacement programs) during the site assessment.

The main weedy grasses: Brown-top Bent *\*Agrostis capillaris*, Sweet Vernal-grass *\*Anthoraxum odoratum*, Yorkshire Fog *\*Holcus lanatus* and potentially Fescue *\*Vulpia spp*, were identified as Keystone throughout the Reserve. They structurally dominate ground-storey vegetation in the grassland, some areas on and around the rock, and along Smokers Creek. Eliminating these weedy grasses and replacing their habitat values with indigenous species will be virtually impossible considering their extent and the modified landscape within and surrounding Hanging Rock.

Any control of these weedy grasses will need to be strategic, well targeted and backed up with other management actions such as re-instating the strip burns in the racecourse grassland and potential re-seeding programs with indigenous species.

The EMP fieldwork was primarily focussed in the areas with indigenous ground-storey vegetation as these are the areas that should be targeted for strategic weed control programs. These areas include the rock and its' surrounding slopes and base, and the racecourse grassland. The fieldwork also recorded weed 'infestations' in other areas across the Reserve, which was combined with information provided by the NDLG (Penny Roberts's pers. comm.). This data depicts the locations of the known weed infestations (primarily the S1 and S2 weeds) in Map 9 at the end of this Section.

Since the production of Map 9, further information has been provided by the NDLG (in October 2015) regarding the current status of some of the mapped weed patches, and the location of other weed patches. There is a difference between the mapped data and the actual works that have occurred on the ground since the first draft of the Hanging Rock EMP (January 2015), as there has been a major investment in weed control in the Reserve since the EMP fieldwork commenced in October 2014. The information in the EMP lags behind what is actually occurring on the ground. The further weed infestation and treatment information from the NDLG is summarised below (NDLG 2015):

- Arum lilies– there are four patches that were treated in 2015, and that need monitoring for potential re–growth
- In general, bulbous weeds are much more extensive than first thought in the East Paddock. They have been treated, but will need on–going monitoring
- The major infestation of Blue Periwinkle depicted in Map 9 has been treated, it will need to be monitored for any re–growth
- There are two other infestations of Blue Periwinkle in the south–west corner of the Reserve
- There is a patch of Arum Lilies on the western side of the north–south access route that is adjacent to the patches of Blue Periwinkle in the south–west corner
- Seedlings of the main woody weeds– Hawthorn, Holly, Briar Rose and Laurel; have been found in all areas to the south and east of the actual Rock
- Blackberry is also widespread to the south and east of the Rock, especially along the riparian zone
- There are also two large patches of Blackberry on the southern face of the Rock above the summit walking track, which were missed in the 2014/15 works.

In conjunction with mapping weed locations, weed prioritisation (based on the categories outlined in Section 3.5) for the weeds recorded within the Reserve was also undertaken.

The information in Sections 5.1.1 to 5.1.3 outlines the weed prioritisation for weeds across the Reserve.

*The location of the S1 and S2 weeds is depicted in Map 9 at the end of this Section.*

*The aim of the weed prioritisation is not to imply some weeds are not worthy of controlling, but to highlight the higher from the lower priorities for control.*

### 5.1.1 Racecourse Grassland

In the grassland, the vegetation cover is dominated by a weedy grasses and herbaceous species, with a scattered cover of indigenous ground–storey species. Whilst there is a good diversity of indigenous ground–storey species, they are surrounded by weeds. The exotic grasses are considered **Keystone** species that structurally dominate the grassland.

Apparently the extent of indigenous vegetation cover has reduced over the years due to the heavy grazing by kangaroos, and the cessation of the strip burning that used to be undertaken annually by the Reserve Rangers (A Walsh and G Bigolin pers. comm).

Whilst the kangaroos have altered the indigenous/weed cover balance of the grassland, it is unknown what would occur if this grazing was reduced.

The prime focus of immediate weed control works should be upon eliminating the existing woody weeds (and other S1 and S2 weeds) and then undertaking an annual ‘woody weed sweep’ to monitor and control any ‘missed’ plants or emerging seedlings.

As the Keystone grassy weeds are interspersed amongst the indigenous species, control of them is problematic. Further discussion of management of the grassland is provided in Section 8.2.2.

The location of the grassland weeds is not depicted in Map 9, as the dominant weeds grow across the entire grassland. They are not restricted to specific infestations. The woody and scrambler/climber weeds are mostly growing on the margins of Racecourse Dam.

Table 9 below provides weed prioritisation for the weeds recorded in the racecourse grassland.

**Table 9. Weed Prioritisation in the Racecourse Grassland**

Scientific Name	Common Name	Lifeform	Weed Category
<i>Romulea rosea</i>	Onion Grass	Bulbous	U
<i>Agrostis capillaris</i>	Brown-top Bent	Grass	K
<i>Aira spp.</i>	Hair Grass	Grass	U
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	Grass	K
<i>Bromus diandrus</i>	Great Brome	Grass	U
<i>Bromus hordeaceus subsp. hordeaceus</i>	Soft Brome	Grass	U
<i>Holcus lanatus</i>	Yorkshire Fog	Grass	K
<i>Dactylis glomerata</i>	Cocksfoot	Grass	U
<i>Vulpia bromoides</i>	Squirrel-tail Fescue	Grass	K
<i>Arctotheca calendula</i>	Cape weed	Herbaceous	S2
<i>Cirsium vulgare</i>	Spear Thistle	Herbaceous	S2
<i>Hypochaeris radicata</i>	Flatweed	Herbaceous	U
<i>Leontodon taraxacoides subsp. taraxacoides</i>	Hairy Hawkbit	Herbaceous	U
<i>Sonchus asper s.l.</i>	Rough Sow-thistle	Herbaceous	U
<i>Taraxacum officinale spp. agg.</i>	Garden Dandelion	Herbaceous	U
<i>Tragopogon porrifolius subsp. porrifolius</i>	Salsify	Herbaceous	S2
<i>Myosotis discolor</i>	Yellow-and-blue Forget-me-not	Herbaceous	U
<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	Herbaceous	U
<i>Cytisus scoparius</i>	English Broom	Woody	S1
<i>Genista monspessulana</i>	Montpellier Broom	Woody	S1
<i>Trifolium repens var. repens</i>	White Clover	Herbaceous	U
<i>Ulex europaeus</i>	Gorse	Woody	S1
<i>Vicia sativa</i>	Common Vetch	Herbaceous	U
<i>Lysimachia arvensis</i>	Pimpernel	Herbaceous	U
<i>Plantago lanceolata</i>	Ribwort	Herbaceous	U
<i>Acetosella vulgaris</i>	Sheep Sorrel	Herbaceous	U
<i>Crataegus monogyna</i>	Hawthorn	Woody	S1
<i>Rosa rubiginosa</i>	Sweet Briar	Woody	S1
<i>Rubus fruticosus spp. agg.</i>	Blackberry	Scrambler/ climbing	S1
Key to Weed Categories			
K- Keystone	S1- Small Patch	S2- Small Patch	U- Ubiquitous
Requires strategic control and habitat replacement for each identified species	Highest Priority for Control	Second Priority for Control	Scattered weeds of disturbed areas, hard to eliminate. Eliminate in high quality areas, Of lower priority elsewhere in the site

## 5.1.2 The Rock and Its Surrounds

Prior to the commencement of the current weed control program being undertaken by the NDLG and MRSC, there was a number of woody weeds (primarily Holly and Common Elder \**Sambucus nigra*) growing along the Summit Track. Most of these weeds have now been removed and/or controlled. The indigenous White Elderberry *Sambucus gaudichaudiana* was frequently growing adjacent to the weedy Common Elder, so care needed to be taken not to impact upon these plants during the weed control works.

The other main weeds observed along the track were patches of thistles: Winged Slender-thistle \**Carduus tenuiflorus* and Spear Thistle \**Cirsium vulgare*, which have also been controlled.

Information from the NDLG (P Roberts pers. comm) provided the location of two patches of less common/garden escape weeds: Valerian *Valerian officinalis* and Peruvian Lily *Alstroemeria aurea*.

Aside from these woody and herbaceous weeds that are only growing in small amounts or in specific locations, the dominant weeds around the base of the rock and other areas are grassy/herbaceous weeds. The majority of the grassy/herbaceous weeds are growing on the south of the rock in the deeper soils, which have had more human impacts. They are also growing in areas with very few adjacent indigenous ground storey plants. Any weed control in these areas will be problematic, as there are very few surrounding indigenous plants to colonise any controlled areas.

Table 10 provides weed prioritisation for the weeds recorded on and around the rock.

**Table 10. Weed Prioritisation On and Around the Rock**

Scientific Name	Common Name	Lifeform	Weed Category
<i>Alstroemeria aurea</i>	Yellow Alstroemeria	Bulbous	S1
<i>Agrostis capillaris</i>	Brown-top Bent	Grass	K
<i>Aira spp.</i>	Hair Grass	Grass	U
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	Grass	K
<i>Bromus diandrus</i>	Great Brome	Grass	U
<i>Briza maxima</i>	Large Quaking-grass	Grass	U
<i>Briza minor</i>	Lesser Quaking-grass	Grass	U
<i>Dactylis glomerata</i>	Cocksfoot	Grass	K
<i>Lolium perenne</i>	Perennial Rye-grass	Grass	K
<i>Vulpia bromoides</i>	Squirrel-tail Fescue	Grass	U
<i>Vulpia spp.</i>	Fescue	Grass	U
<i>Sambucus nigra</i>	Common Elder	Woody	S1
<i>Ilex aquifolium</i>	English Holly	Woody	S1
<i>Carduus tenuiflorus</i>	Winged Slender-thistle	Herbaceous	S2
<i>Cirsium vulgare</i>	Spear Thistle	Herbaceous	S2
<i>Hypochaeris radicata</i>	Flatweed	Herbaceous	U
<i>Sonchus asper s.l.</i>	Rough Sow-thistle	Herbaceous	U
<i>Sonchus oleraceus</i>	Common Sow-thistle	Herbaceous	U
<i>Stuartina muelleri</i>	Spoon Cudweed	Herbaceous	U
<i>Taraxacum officinale spp. agg.</i>	Garden Dandelion	Herbaceous	U
<i>Myosotis discolor</i>	Yellow-and-blue Forget-me-not	Herbaceous	S2
<i>Cardamine hirsuta s.l.</i>	Common Bitter-cress	Herbaceous	U

Scientific Name	Common Name	Lifeform	Weed Category
<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	Herbaceous	U
<i>Stellaria media</i>	Chickweed	Herbaceous	U
<i>Euphorbia peplus</i>	Petty Spurge	Herbaceous	U
<i>Genista monspessulana</i>	Montpellier Broom	Woody	S1
<i>Vicia spp.</i>	Vetch	Herbaceous	S1
<i>Quercus robur</i>	English Oak	Woody	S1
<i>Fumaria capreolata</i>	White Fumitory	Herbaceous	U
<i>Centaureum erythraea</i>	Common Centaury	Herbaceous	U
<i>Lysimachia arvensis</i>	Pimpernel	Herbaceous	U
<i>Acetosella vulgaris</i>	Sheep Sorrel	Herbaceous	U
<i>Prunus spp.</i>	Prunus	Woody	S1
<i>Rubus fruticosus spp. agg.</i>	Blackberry	Scrambler/ climbing	S1
<i>Galium aparine</i>	Cleavers	Herbaceous	U
<i>Valerian officinalis</i>	Valerian	Herbaceous	S1

#### Key to Weed Categories

K- Keystone	S1- Small Patch	S2- Small Patch	U- Ubiquitous
Requires strategic control and habitat replacement for each identified species	Highest Priority for Control	Second Priority for Control	Scattered weeds of disturbed areas, hard to eliminate. Eliminate in high quality areas, Of lower priority elsewhere in the site

### 5.1.3 Remainder of the Reserve

The weeds listed in Table 11 below were recorded in the picnic areas, along Smokers Creek, in the East Paddock and in the patch of bush at the northern end of the racecourse.

Most of these areas are maintained as mown/slashed lawn areas that are dominated by exotic grasses. The focus of weed control is on controlling any 'noxious' or environmental weeds which do not grow in lawns. The picnic areas, perimeter of the racecourse, racecourse parking areas at the northern end of the Reserve and the East paddock are all maintained as mown areas.

In the unmown areas, along Smokers Creek and around the four dams, the weed control focus should be on eliminating woody and scrambler/climber weeds, as well as invasive weeds such as Thistles and CaLP Act species. The unmown areas occur in the south-west corner of the Reserve, along Smokers Creek, to the south of the racecourse (along Smokers Creek and around Dam 1) and in the southern most area of the East paddock along Smokers Creek. These areas all contain remnant eucalypts, and some of them are currently being revegetated as habitat links.

The May Bush *Spiraea spp* (which was growing in the north-west corner of the Reserve, prior to preparation of this EMP) has been removed, but the area should be monitored for any re-infestations (P Roberts pers. comm.).

**Table 11. Weed Prioritisation for the Remainder of the Reserve**

Scientific Name	Common Name	Lifeform	Weed Category
<i>Allium triquetrum</i>	Angled Onion	Bulbous	S2
<i>Narcissus pseudonarcissus</i>	Daffodil	Bulbous	S1

**Hanging Rock Reserve Environmental Management Plan: Part 1**

Scientific Name	Common Name	Lifeform	Weed Category
<i>Arum Zantedeschia</i>	Arum lily	Lily	S1
<i>Cyperus eragrostis</i>	Drain Flat-sedge	Sedge	U
<i>Romulea rosea</i>	Onion Grass	Bulbous	U
<i>Agrostis capillaris</i>	Brown-top Bent	Grass	K
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	Grass	K
<i>Bromus diandrus</i>	Great Brome	Grass	U
<i>Holcus lanatus</i>	Yorkshire Fog	Grass	K
<i>Poa annua</i>	Annual Meadow-grass	Grass	U
<i>Vulpia spp.</i>	Fescue	Grass	U
<i>Conium maculatum</i>	Hemlock	Herbaceous	S1
<i>Ilex aquifolium</i>	English Holly	Woody	S1
<i>Hedera helix</i>	English Ivy	Scrambler/ climbing	S1
<i>Arctotheca calendula</i>	Cape weed	Herbaceous	U
<i>Cirsium vulgare</i>	Spear Thistle	Herbaceous	S2
<i>Sonchus asper s.l.</i>	Rough Sow-thistle	Herbaceous	U
<i>Sonchus oleraceus</i>	Common Sow-thistle	Herbaceous	U
<i>Taraxacum officinale spp. agg.</i>	Garden Dandelion	Herbaceous	U
<i>Bellis perennis</i>	English Daisy	Herbaceous	U
<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	Herbaceous	U
<i>Genista monspessulana</i>	Montpellier Broom	Woody	S1
<i>Trifolium repens var. repens</i>	White Clover	Herbaceous	U
<i>Ulex europaeus</i>	Gorse	Woody	S1
<i>Medicago spp.</i>	Medic	Herbaceous	U
<i>Fumaria spp.</i>	Fumitory	Herbaceous	U
<i>Geranium spp.</i>	Crane's Bill	Herbaceous	U
<i>Melissa officinalis</i>	Lemon Balm (planted?)	Woody	S2
<i>Prunella vulgaris</i>	Self-heal	Herbaceous	U
<i>Lysimachia arvensis</i>	Pimpernel	Herbaceous	U
<i>Eucalyptus globulus</i>	Southern Blue-gum	Planted (woody)	U
<i>Plantago lanceolata</i>	Ribwort	Herbaceous	U
<i>Rumex spp.</i>	Dock	Herbaceous	U
<i>Crataegus monogyna</i>	Hawthorn	Woody	S1
<i>Galium aparine</i>	Cleavers	Herbaceous	U
<i>Salix spp.</i>	Willow	Woody	S1
<i>Viola odorata</i>	Common Violet	Herbaceous	S2
<i>Lonicera spp.</i>	Honeysuckle	Scrambler/ climbing	S1
<i>Iris spp.</i>	Iris	Bulbous	S1
<i>Vinca major</i>	Blue Periwinkle	Scrambler/ climbing	S1
<i>Rubus fruticosus spp. agg.</i>	Blackberry	Scrambler/ climbing	S1
<i>Hyacinthoides hispanica</i>	Spanish Bluebells	Bulbous	S1
<i>Spiraea spp.</i>	May Bush	Woody	S1

**Key to Weed Categories**

<b>K- Keystone</b> Requires strategic control and habitat replacement for each identified species	<b>S1- Small Patch</b> Highest Priority for Control	<b>S2- Small Patch</b> Second Priority for Control	<b>U- Ubiquitous</b> Scattered weeds of disturbed areas, hard to eliminate. Eliminate in high quality areas, Of lower priority elsewhere in the site
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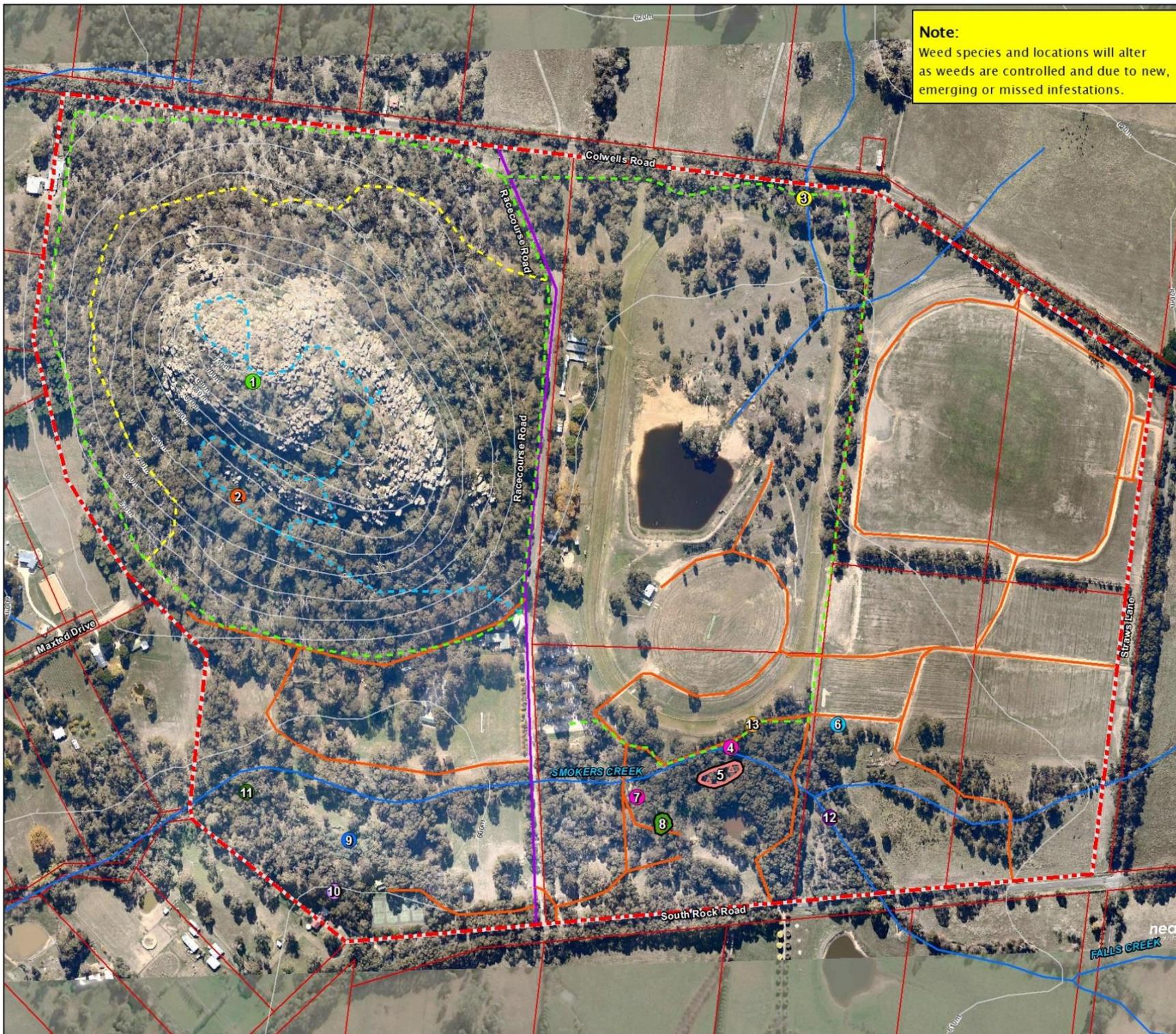
## 5.2 CALP Act Weeds

There are a number of invasive weeds listed under the *Catchment and Land Protection (CaLP) Act 1994* growing at Hanging Rock. Under the CaLP Act declared noxious weeds are categorised; depending on their known and potential impact and specific circumstances for each region; into State Prohibited Weeds (S), Regionally Prohibited Weeds (P), Regionally Controlled Weeds (C) or Restricted Weeds (R).

Table 12 below lists the declared noxious weeds observed at Hanging Rock.

**Table 12. Declared Noxious weeds occurring at Hanging Rock**

Scientific Name	Common Name	CaLP Act Control Category	Site Weed Prioritisation	Location within Reserve
<i>*Allium triquetrum</i>	Angled Onion	R	S2	Along creek
<i>*Carduus tenuiflorus</i>	Slender Thistle	C	S2	On rock
<i>*Cirsium vulgare</i>	Spear Thistle	C	S2	Across the reserve On rock Grassland
<i>*Conium maculatum</i>	Hemlock	C	S1	Along the creek
<i>*Crataegus monogyna</i>	Hawthorn	C	S1	Across the Reserve Grassland
<i>*Cytisus scoparius</i>	English Broom	C		Grassland
<i>*Genista monspessulana</i>	Montpellier Broom	C	S1	Across the Reserve Grassland
<i>*Rosa rubiginosa</i>	Sweet Briar	C	S1	Grassland
<i>*Rubus fruticosus agg.</i>	Blackberry	C	S1	Across the Reserve On rock Grassland
<i>*Ulex europaeus</i>	Gorse	C	S1	Across the Reserve Grassland



**Note:**  
Weed species and locations will alter as weeds are controlled and due to new, emerging or missed infestations.

**Locations of Weed Patches  
(Valid November 2014)  
Hanging Rock Reserve**

**Study site**  
 - Contours (10m)  
 - Watercourse  
 - Parcels

**Roads**  
 - Management Tracks  
 - Racecourse Rd

**Walking tracks**  
 - Base walking track  
 - Upper base walking track  
 - Summit walking track

**Weed patches**

- 1 - Valerian
- 2 - Peruvian Lily
- 3 - Hawthorns
- 4 - Arum Lilies
- 6 - Daffodils
- 7 - Arum Lilies
- 9 - Honeysuckle
- 10 - Iris
- 11 - Blue Periwinkle
- 12 - English Ivy
- 13 - Holly and Blackberry

5 - Arum Lilies, Spanish Bluebell  
 8 - Blue Periwinkle

**Details**  
 Mapping by: Karen McGregor & Colin Broughton  
 Date: 30/11/2015  
 Data Source: Aerial photography courtesy of NearMap

0 25 50 75 100 125 150 175 200m

Scale 1:4,100 (Page size A3)

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## 5.3 Pest Animals

As the focus of the EMP site assessment was upon habitat mapping, pest animal information was provided during the stakeholder consultations, via incidental observations or by the remote cameras. The main pest animals identified within the Reserve, and some information about them, is provided below.

- Rabbits**                    There is evidence of rabbit scratchings and warrens across the Reserve. It is difficult to determine if the paucity of ground-storey regeneration in some areas of the Reserve is due to rabbits or the grazing pressure from kangaroos and/or wallabies.
- Feral cats**                    Periodically cats are trapped by the Rangers, which are then taken to the Local laws Department for scanning (for micro-chips) and management.
- Domestic dogs**                The remote cameras have been capturing footage of domestic dogs that enter the Reserve at night time. Domestic dogs do feed on wildlife and their scent also disturbs the 'more sensitive' wildlife, especially ground dwelling mammals.
- Fallow Deer**                    The remote cameras have also detected one or two Fallow Deer. Deer are known for their impacts upon vegetation and along waterways. With such low numbers detected, their impacts are low at this stage.
- Black rats**                    The remote cameras (located at both ground and canopy level) have been capturing lots of photographs of Black Rats, suggesting a large population of them across the Reserve.
- Foxes**                         Foxes are known predators of native animals and known spreaders of weed seeds. They have a huge impact on native fauna across the State.
- Exotic birds**                    Exotic birds such as Blackbirds and Starlings have only been observed in small numbers at the Reserve, mainly around the picnic areas/along the southern boundary of the Reserve. These birds are associated with urban areas. As a rural bushland Reserve they are not expected to be in large numbers or to cause major impacts. However their numbers should be monitored to determine if they are increasing in population size. If they are, then they should be controlled before they become problematic.

### Control Programs

Control programs are currently (2014/15) being undertaken across the Reserve and surrounding road reserves for rabbits, which involved fumigating and closing their warrens. These programs have been relatively successful, resulting in a decline in observed rabbit numbers. Follow-up rabbit control is proposed for 2015/16

MRSC conducted a trial fox trapping program in mid-2015. No foxes were trapped, potentially due to the limited amount of time the traps were left in the environment to integrate with the landscape. .

At this stage, no control programs are being undertaken for any other pest animal species.

## 6. CULTURAL HERITAGE VALUES

As a 6 million year old landscape feature, Hanging Rock has both Aboriginal and European cultural heritage values.

Hanging Rock Reserve (the three Crown allotments) was included in the Victorian Heritage Register as a special place of cultural heritage significance in March 2015. The East Paddock is not included in the Victorian Heritage Register. As a special place of cultural heritage significance permission from Heritage Victoria is required for any proposed works in Hanging Rock Reserve, including the planting and removal of vegetation, that is not covered under the Permit Exemptions listed in the Decision of the Heritage Council (5 March 2015).

The information provided below summarises some of the Aboriginal and European cultural heritage information available regarding Hanging Rock.

### 6.1 Aboriginal Cultural Heritage Values

An Aboriginal Cultural Heritage Study was undertaken in 2014 as a component of constructing permanent infrastructure in the East Paddock.

The detailed results of the assessment are not public due to cultural sensitivities however evidence of aboriginal presence was determined and management processes put in place.

It appears there is little solid information available regarding Aboriginal uses of Hanging Rock apart from their presence. Hanging Rock sits in an area bounded by traditional lands of the Woiwurrung (or Wurundjeri), Dja Dja Wurrung and Taungurung,

There is evidence to suggest that Aboriginal people have lived in the Macedon Ranges region for at least 26,000 years.

The Wurundjeri people lived on the lands in and around the Yarra River and Maribyrnong watershed, which extended northwards to include the Macedon Ranges and the current towns of Gisborne, Heskett, Lancefield, Macedon, Riddells Creek and Romsey. Their lands also include the northern suburbs of Melbourne through to the Yarra Ranges.

Dja Dja Wurrung tribes covered a very large area of central Victoria, including land around the present towns of Woodend and Malmsbury and the west side of the Campaspe River around Karlsruhe and Kyneton.

Taungurung tribes lived on lands that include the townships of Kyneton and Karlsruhe on the east side of the Campaspe River, and range through to Rushworth and Euroa in the north, extending east to Mt Buller (Visit Macedon Ranges, 2014).

## 6.2 European Cultural Heritage Values

The following description provides a timeline of the ‘development’ of the recreation reserve and racecourse, and outlines some of the main events that have occurred at Hanging Rock.

The first European record of Hanging Rock was by Major Mitchell who named the formation Mount Diogenes. Hanging Rock later became part of the early settler Edward Dryden lands, and became known as ‘Dryden's Rock’.

In the 1860's Mr W Adams built the Hanging Rock Hotel to the west of the rock (the site is now at the crossroads of Coach and Colwells Roads). W Adams also owned land to the south–west of Hanging Rock (in the current picnic grounds at the southern base of the rock) and he began holding picnics and race days on this land from the 1860s. Adams acquired the allotment that contained Hanging Rock in 1869.

In 1870, the Government gazetted the 38 hectare allotment to the east of Hanging Rock (now the racecourse) as a recreation and water reserve. The allotment containing Hanging Rock was gazetted in 1884, and the combined sites were permanently reserved as a ‘site for Public Recreation and for affording Access to Water’. The Reserve was controlled by the Council of Newham and Woodend until 1959, when at the request of the Council three members of the Hanging Rock Race Club were added to the Committee of Management.

The racecourse was moved from south–west of Hanging Rock to its’ present location, in 1878. The Hanging Rock Racing Club was formed in 1885, and the race track was extended to its present form in 1911. Racing at Hanging Rock has been popular and well attended since the 1860's.

In the early days, various individual rocks within the formation were named according to local legends or their shape by early visitors to Hanging Rock, these include (as outlined in the Visitors Brochure):

- The Post Office (now the Letterbox): where passers–by tossed small stones into a hollow place
- Lovers Leap: a rock jutting out from the cliff,
- Queen Victoria's Monument: a replica of Queen Victoria in her robes
- McDonalds Look–out where McDonald, a Bush Ranger, was able to look out over the North–East between two rocks
- Morgan's Lookout, where bushranger Mad Dog Morgan was reputed to take refuge, had his look–out on the west side, from a hollow rock with an opening in it

Many of these names are still used to describe features of the rock today.

The other main significant historical event to involve Hanging Rock was the 1967 publication of Joan Lindsey's novel ‘Picnic at Hanging Rock’ and the production of the film ‘Picnic at Hanging Rock’ in 1975 (Visit Macedon Ranges website, 2014).

## 7. FIRE RISK MANAGEMENT

The need for fire risk management is integral to the overall management of Hanging Rock.

The Reserve and local area is covered by a *Bushfire Management Overlay (WMO or BMO)*, which is concerned with implementing bushfire protection measures through the use of vegetation modification and implementation of specific construction methods and standards within areas deemed “defendable space”, to reduce the risk to life and property.

A *Hanging Rock Reserve Fire Management Plan* (revised 2015), exists for the Reserve, along with the *Hanging Rock Emergency Management Plan* (MRSC, 2013).

The *Hanging Rock Reserve Fire Management Plan* (2015) details a number of risk management ‘controls’ which reflect the current utilisation of the Reserve. They also support the long term ecological objectives of the area which are a fundamental part of the public appeal/value of the site.

The *Hanging Rock Reserve Fire Management Plan (2015)* has adopted the management zones defined within this EMP, as the fire management ‘domains’ across the Reserve, for consistency across both plans.

### 7.1 Hanging Rock Emergency Management Plan

The *Hanging Rock Emergency Management Plan* is concerned with ensuring the safety and protection of on-site personnel at the Reserve by detailing the arrangements for the prevention of, the response to, and the recovery from, the emergencies that could occur.

Whilst not specifically related to fire management, a bushfire (or building fire) is one of the emergencies that could occur within the Reserve.

### 7.2 Hanging Rock Reserve Fire Management Plan

The *Hanging Rock Reserve Fire Management Plan* (2015) outlines that the Reserve has experienced little in the way of wildfire events, the one exception being 30 acres were burnt in 1898. However house fires and fires on properties in close proximity to the Reserve are relatively common. Ecological burning has occurred in the Reserve in two areas: the racecourse grassland (this burning ceased in the mid-2000’s) and to the south-west of the rock (once in 2005), below the summit walking track.

The objectives of the *Hanging Rock Reserve Fire Management Plan* are:

- Protection and preservation of life is paramount
- Issuing of community information and warnings detailing incident information that is timely, relevant and tailored to assist community members make informed decisions about their safety
- Protection of residential property as a place of primary residence
- Protection of assets supporting individual livelihoods and economic production that supports individuals and community financial sustainability
- Protection of environmental and conservation values that considers the cultural, biodiversity, and social values of the environment

## Fire Management Domains

12 fire management domains have been identified across Hangin Rock Reserve which mirrors the EMP management zones. In addition, the Fire Management Plan (FMP) identifies two zones outside of the Reserve. The fire management domains are:

- Core Conservation Zone 1 – The Rock and its Surrounds (CCZ1)
- Core Conservation Zone 2 – The Racecourse Grassland (CCZ2)
- Remnant Trees Conservation Zone 1 – North of the Race Track (RTCZ1)
- Remnant Trees Conservation Zone 2 – South West Corner of the Reserve (RTCZ2)
- Remnant Trees Conservation Zone 3 – Dam 1 Surrounds (RTCZ3)
- Remnant Trees Conservation Zone 4 – Southern Portion of East Paddock (RTCZ4)
- Smokers Creek Conservation Zone (SCCZ)
- Recreation Zone 1 – Unnamed, considered as East Paddock and parklands south of Hangin Rock (RZ1)
- Recreation Zone 2 – Tree Conservation Areas (RZ2)
- Fuel Management Zones – some boundaries (FRZ)
- Tree Safety Management Zones – Various paths and track (TSMZ)
- Dam Zones 1 to 5 (DZ1 to 5)
- Road intersections – zone outside of Reserve

An assessment of the potential loss scenarios (with Treatments and Control Priority), is presented for each of these fire management domains in Appendix 1 of the FMP.

Several of the fire management domains were identified as not requiring formal fuel reduction or fire management due to their limited extent or the potential for fuel reduction to significantly degrade the environmental values of these areas. These domains include:

- Remnant Trees Conservation Zone 1 – North of the Race Track (RTCZ1)
- Remnant Trees Conservation Zone 3 – Dam 1 Surrounds (RTCZ3)
- Smokers Creek Conservation Zone (SCCZ)
- Recreation Zone 1 – East Paddock and parklands south of Hangin Rock (RZ1)
- Recreation Zone 2 – Tree Conservation Areas (RZ2)
- Tree Safety Management Zones – Various paths and track (TSMZ)
- Dam Zones 1 to 5 (DZ1 to 5)

The FMP objective of ‘Prevent fire’ was determined for the following five domains and two areas outside of the Reserve:

- Core Conservation Zone 1 – The Rock and its Surrounds (CCZ1)
- Core Conservation Zone 2 – The Racecourse Grassland (CCZ2)

- Remnant Trees Conservation Zone 2– South West Corner of the Reserve (RTCZ2)
- Remnant Trees Conservation Zone 3– Dam 1 Surrounds (RTCZ3)
- Remnant Trees Conservation Zone 4– Southern Portion of East Paddock (RTCZ4)
- Road intersections– zone outside of Reserve

For each of these seven domains/areas outside of the Reserve, the following information has been provided in the FMP:

- The key environmental objectives
- The fire management objectives, and
- Key control measures.

Ecological burning has only been recommended in one of the fire management domains: the re-introduction of strip burning in the Racecourse Grassland on a 3–5 year rotational basis.

### 7.3 Bushfire Management Overlay (BMO)

Another component of fire risk management within Hanging Rock is the requirements of the BMO, especially with regard to defensible space around adjacent dwellings and public buildings.

Whilst defensible space requirements **only apply to new or proposed developments**, they are a useful tool for highlighting areas within a Reserve that are subject to planting restrictions and potential future vegetation modification requirements. They are also useful to highlight remnant bushland areas that could be impacted by any future proposed developments.

**Currently**, the existing public buildings within the Reserve **do not need** to meet BMO requirements. However if there is a planning and/or building permit application in the future to upgrade or replace any of these buildings, then BMO standards will need to be met. Considering this, it is logical to be aware of the potential for fuel reduction zones around the public buildings, to ensure any proposed revegetation works are strategically planned away from these buildings, so they do not need to be removed in the future.

Public buildings as identified from the previous *Draft Hanging Rock Reserve Fire Management Plan (2008)* are the: café/visitor centre, tennis clubhouse, racecourse clubrooms, cricket clubhouse and rangers' office/ workshop. As public buildings can be considered as 'places of assembly', if any future upgrade or replacement works are proposed, and a planning/building permit applied for, then they would need to be built/updated to (Building Attack Level) BAL 12.5.

Appendices 5 and 6 outline the Defensible Space Vegetation Management Standards and calculations for the public buildings within the Reserve. The defensible space calculations were based on meeting BAL 12.5. This results in a radius of 60 metres around the workshop and racecourse clubrooms, a radius of 62 metres around the Hanging Rock cafe and visitors centre, a radius of 40 metres around the tennis clubhouse, and no requirements for the cricket clubhouse.

As the defensible space requirements **only need to be implemented if there is a future application** to extend or re-build any of the buildings within the Reserve, they have not been included in the Fuel

Management Zones within the Reserve, and they have not been depicted in Map 10 at the end of this Section.

With regards to the dwellings located near the perimeter of the Reserve, any future proposed upgrades and/or replacement works to these dwellings should respond to the hazards surrounding the building. It is the onus of the landholders to ensure their fire risk is managed within their land, as Crown Land is not managed for individual site specific risk on private land. Therefore no future potential defensible space for these dwellings will be provided for in Hanging Rock Reserve.

## 7.4 Summary

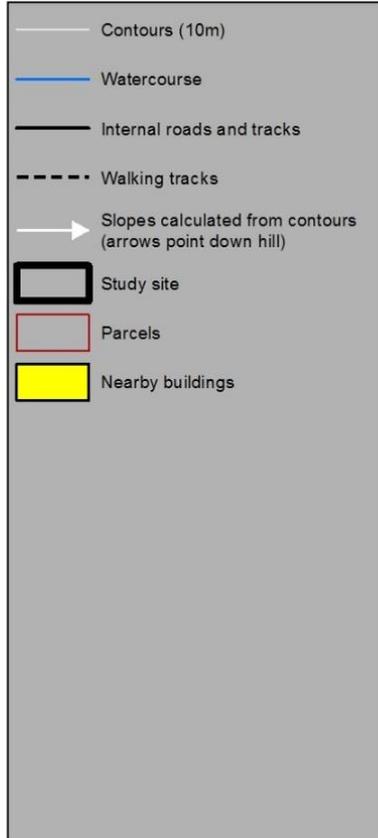
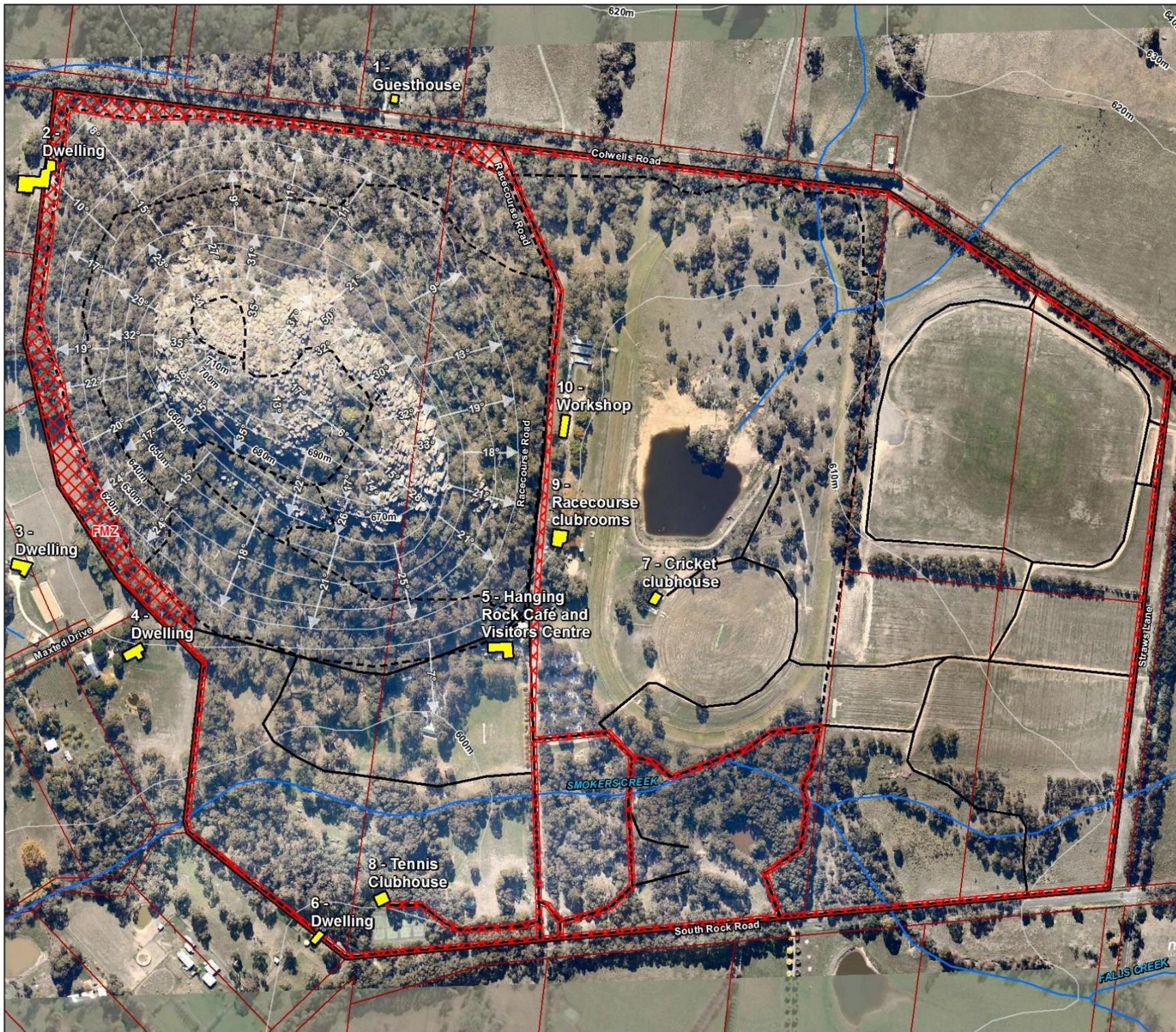
The focus of fire risk management within the EMP is upon collating the relevant data from the *Hanging Rock Reserve Fire Management Plan* (2015), the *Hanging Rock Emergency Management Plan*, utilising the relevant information from the *Bushfire Management Overlay*, observing the on-ground conditions and landscape context of Hanging Rock; and then utilising all this information to determine appropriate Fuel Management Zones within the Reserve.

The purpose of defining Fuel Management Zones at Hanging Rock Reserve is to ensure fuel loads are appropriately managed in these areas through regular slashing, and to limit future revegetation works. The Fuel Management Zones occur: around the perimeter of the Reserve, along the main management/walking tracks and along the internal road network.

The fuel reduction zones within Hanging Rock are outlined in Sections 7.3 and 8.3, and their location is depicted in Map 10 on the following page.

A more detailed discussion of fuel management is provided in Section 8.3 which is concerned with the Fuel Management Zones and the details of fuel management within the Reserve.

# Fire Risk Management Hanging Rock Reserve



**Details**  
 Mapping by: Karen McGregor & Colin Broughton  
 Date: 20/11/2015  
 Data Source: Aerial photography courtesy of NearMap  
 Scale 1:4,000 (Page size A3)

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## 8. HANGING ROCK ECOLOGICAL MANAGEMENT ISSUES

As outlined previously, Hanging Rock has numerous ecological values. However there are pressures upon these values, which have different levels of impacts, some of which are yet to be fully quantified (such as impacts to indigenous fauna), due to the lack of baseline monitoring data for the Reserve.

This Section of the EMP provides a detailed discussion of the identified risks to the Reserve's ecological values. Recommendations to be incorporated into the Reserve's management are outlined under the discussion of each risk. The risks were identified through fieldwork, and consultation with the internal and external stakeholders.

The recommendations (and others earlier in this EMP) have then been utilised to define management principles across the Reserve, which are presented in Part 2 of this EMP. To provide a framework for the effective implementation of these management principles, Management Zones have been designated across the Reserve based on areas with similar uses and purposes. A brief outline of these Management Zones is provided in Section 8.1, with more detailed information provided in Part 2 of this EMP.

The main risks to the Reserve's ecological values have been divided into categories based on: Vegetation/Flora Management, Fauna Management, Fuel Management, Car Parking and Tree Management, and 'other' management issues including an on-site depot/works yard. Many of the recommendations that follow the discussion of risks to the Reserve's ecological values refer to the Management Zones.

The management risks outlined in this EMP are current for 2014/15. As this EMP is implemented, and as the current management risks are addressed; other management risks may emerge. Therefore this EMP should be reviewed after 10 years (in 2025).

*It should also be noted that whilst all attempts have been made to consider current management risks and practices, there will be management issues that arise which could not be foreseen. Therefore the recommendations outlined in this EMP should not be considered to provide all of the details required for the ecological management of Hanging Rock Reserve.*

### 8.1 Management Zones

Overall five Management Zones have been identified, which reflect the ecological values, recreational uses or other areas in the Reserve with specific management requirements. There are sub-categories in some of the Management Zones. The Management Zones, with brief descriptions, are provided below:

#### 8.1.1 Conservation Zones

##### Core Conservation Zones (CCZs)

This applies to two areas of the Reserve:

- CCZ1: the Rock and its' Surrounds; and
- CCZ2: the Racecourse Grassland.

These two areas are the only areas within the Reserve with all three layers (canopy, shrub and ground storey) of indigenous vegetation present. They are the most 'intact' bushland areas within the Reserve.

### **Remnant Trees Conservation Zones (RTCZs)**

These are the areas of the Reserve that contain a remnant canopy layer and some shrubs, but are dominated by exotic ground-storey vegetation. This Zone applies to four areas of the Reserve:

- RTCZ1: The strip of bushland north of the race track
- RTCZ2: South-west Corner (an unmown area behind Smokers Creek)
- RTCZ3: Behind Dam 1
- RTCZ4: The southern end of the East Paddock

### **Smokers Creek Conservation Zone (SCCZ)**

This applies along the length of Smokers Creek and its' tributaries. The width of this Zone alters depending on the adjacent Management Zones and where it is located within the Reserve.

## **8.1.2 Recreation Zone (RZ)**

This applies to all the mown areas of the Reserve, and the specific recreational facilities such as the race track and facilities, the cricket club and oval and the tennis club and courts. The mown areas of the Reserve are utilised for a variety of recreational purposes including: picnicking; events such as the craft markets, classic car display, film night and camp out; the concerts (East Paddock) and car parking for the major events such as the concerts, classic car display and Hangin Rock Races.

### **Tree Conservation Areas (TCAs)**

Within the Recreation Zones, some groups of trees and/or mature single trees will be managed within Tree Conservation Areas (TCAs). The TCAs will be implemented across several years. Some areas have been identified for implementation in the next few years. Once these TCAs have been implemented, further TCAs may be implemented depending on a range of factors including the location of the trees/groups of trees, current management practices and the resources available.

## **8.1.3 Fuel Management Zones (FMZs)**

These Zones apply around the perimeter of the Reserve, along the main walking tracks and internal road network.

## **8.1.4 Tree Safety Management Zones (TSMZs)**

These Zones define areas within the Conservation Zones where the current tree safety management practices (arboricultural inspections and limb lopping as required) will continue. These areas are primarily located along the main walking tracks, and other high use areas.

### 8.1.5 Dam Zones (DZs)

There are five dams within the Reserve, most of which have water storage and/or ornamental functions. These dams also provide habitat and a water source for fauna.

## 8.2 Vegetation/Flora Management

### 8.2.1 Weed Control

#### Woody and Scrambler/Climber Weeds

Whilst a number of high priority weeds for control (S1 and S2) have been identified in all areas of the Reserve, these weeds predominantly occur as single infestations or in small numbers. There are no large scale woody or scrambler/climbing weed infestations within the Reserve.

With one to two years of dedicated weed control works, and then annual 'weed sweeps' to monitor for re-infestations and to control any 'missed' plants, the current woody and scrambler/climbing weed species will be eliminated.

#### Grassy/Herbaceous Weeds

The main weed issue at Hanging Rock is the Keystone weedy grasses (and potentially some Keystone weedy herbaceous species) that occur across the Reserve, but are most problematic in the areas with remnant indigenous ground-storey vegetation: the Racecourse Grassland, and in some areas of the rock and its' surrounds.

Control of these grasses is difficult as they are structurally dominant. As smaller plants that are harder to target individually, replacing their cover amongst scattered indigenous species is difficult. Large scale control of the Keystone weedy grass species would result in the loss of the scattered indigenous species, and the resultant germination from the seed bank is likely to favour weedy over indigenous species.

Weed control of Keystone grasses in other bushland reserves has been difficult to achieve without dedicated effort, high labour costs (in hours worked) and years of 'slow' and patient work. Controlled burns have been used with some degree of success; however the resultant germination of weed seeds after a burn can quickly out-compete the indigenous species, especially if there was a higher cover of weedy grass species to begin with.

The other partially 'successful' method is based on the Bradley method: determining the areas with the highest indigenous vegetation cover and concentrating on hand weeding and spot spraying of small areas within and surrounding these higher cover areas. This slowly increases the amount and extent of indigenous vegetation cover. This method is slow and can be problematic. Hand weeding is laborious, and the surrounding vegetation gets trampled.

It is genuinely difficult to recommend an appropriate method for controlling Keystone grasses due to the number of difficulties, including effectively targeting small plants. The use of 'grass only' herbicides can be effective if there are no indigenous grasses, and there is a high cover of adjacent indigenous species to replace the weedy cover.

Considering these concerns, grassy/herbaceous weed control recommendations are different for the two areas of the Reserve with remnant indigenous ground storey vegetation. More detailed information on the management of both these areas is provided in Section 8.2.3 below.

### Recommendations

- *Control all woody and scrambler/climbing weeds and thistles across the Reserve (Rec 1)*
- *Follow up with an annual 'weed sweep' to control any germinating or 'missed' plants (Rec 2)*

## 8.2.2 Bushland Management Techniques

All vegetation requires some degree of management, which is dictated by the EVC, level of disturbance (primarily weeds), soil type, and moisture levels. Vegetation management is complex and involves the interaction of numerous management actions.

Indigenous vegetation management is typically focused on bushland regeneration and/or revegetation techniques, or a mixture of both. Whilst not specifically outlined, the role of vegetation in providing habitat is considered within bushland management techniques. An outline of these two techniques is provided below as a basis for the Indigenous Vegetation Management outlined in Section 8.2.3.

### Bushland Regeneration

Bushland regeneration works are focused on undertaking long-term sensitive weed control works, to reduce and eventually eliminate weeds in areas with higher quality indigenous understorey vegetation, so that the extent of indigenous understorey vegetation increases in comparison to the extent of weedy vegetation. Bushland regeneration focuses on eliminating all weed types, with minimal to no soil disturbance, or disturbance to the surrounding indigenous vegetation.

A frequently utilised component of bushland regeneration is indigenous understorey vegetation quality mapping of bushland areas. The mapping is used to highlight the higher versus lower quality areas. Bushland regeneration works then focus on working from the higher to the lower quality areas. The aim is to 'conserve' the higher quality vegetation and then slowly work towards improving the lower quality areas. The mapping is used to plan bushland works and it can be used as a longer term monitoring tool.

The main bushland regeneration works are sensitive weed control either via spot spraying of grassy/herbaceous weeds, drilling and filling or cutting and painting of woody weeds (leaving the dead plant in-situ to still provide habitat and to reduce soil disturbance), cutting and painting or spraying of scrambler/climber weeds, and hand weeding of grassy/herbaceous weeds.

Any planting works are minimal and are always focused in lower quality areas. Planting works create soil disturbance which leads to an increase in weed cover, so they are only a minimal component of bushland regeneration works in strategic locations with lower indigenous understorey vegetation quality.

### Revegetation

Revegetation works are focused on replacing and/or restoring habitat via larger scale weed control and planting works. These works are focused on areas with minimal to no indigenous understorey ground-

storey vegetation. Revegetation works are typically a combination of planting indigenous understorey and/or shrub species amongst remnant canopy trees.

More recent restoration techniques (refer to the Grassy Groundcover project– Greening Australia) have focused on utilising horticultural techniques to undertake large scale understorey restoration works via scraping and direct seeding in weedy areas with minimal to no existing indigenous vegetation.

Considering the amount of remnant canopy trees at Hanging Rock with weedy ground–storey vegetation, the main revegetation works that are possible in the Remnant Trees Conservation Zone and along Smokers Creek, are weed control and planting of individual plants, to slowly increase the amount of indigenous ground–storey and shrubby vegetation.

On the rock itself, there is some scope for revegetation in areas that are eroding, where there is limited or no indigenous ground–storey vegetation. *It is important that appropriate, sensitive indigenous vegetation management techniques are applied by experienced bushland managers. It is also important to utilise the knowledge of the Reserve held by the Rangers in planning and undertaking management works.*

### Recommendations

- *Utilise bushland regeneration techniques in the two Core Conservation Zones with remnant ground–storey vegetation: the Rock and its Surrounds and in the Racecourse Grassland. No planting should be undertaken in these Zones, unless they are a component of strategic works in areas with lower (<25%) indigenous understorey vegetation quality (Rec 3)*
- *Focus revegetation in the Remnant Trees Conservation Zones along Smokers Creek, and in the Tree Conservation Areas within the Recreation Zones; all areas with <25% indigenous understorey vegetation quality (Rec 4)*

### 8.2.3 Indigenous Vegetation Management Objectives

The site assessment determined that there were six Ecological Vegetation Classes (EVCs) within Hanging Rock. The principles of bushland regeneration and/or revegetation apply across most vegetation types/ EVCs. However there are different objectives that apply to managing the bushland across Hanging Rock, depending on the ‘uses and purpose’ of each area of the Reserve.

The objectives, with a brief description, for each bushland area/EVC within Hanging Rock are provided below. This information is not a list of comprehensive management actions. The objectives have been determined based on the site assessments and consultation process.

#### Current Vegetation Management at Hanging Rock

To date, vegetation management at Hanging Rock has predominantly occurred via some controlled burns, limb removal from larger trees for safety along the walking tracks, fuel management activities, removal of fallen limbs, and scattered plantings.

Strategic bushland management processes are required that are guided by the use of appropriate bushland regeneration techniques; or by the EVCs; within the Reserve.

## Grassland Management

The racecourse grassland has resulted from vegetation modification over the last 100 years to maintain sight lines across the field. The original forest/woodland vegetation has been thinned, resulting in a diverse indigenous understorey with only some mature eucalypts, few shrubs and limited/controlled sapling regeneration.

Currently, the grassland has a weed dominated ground-storey (with exotic grasses and/or herbaceous species) that varies from patches with few/no indigenous species, to patches with lots of indigenous species. Overall the grassland has a high diversity of indigenous species amongst the weedy vegetation.

Anecdotally, the quality of the grassland has declined since the 1993 Management Plan (Loder and Bayly). Some of the contributing factors are the cessation of the annual strip burning program and the intense grazing by kangaroos. Strip burning of grassland is known to regenerate indigenous tussock grasses, reduce annual weedy grass cover and remove biomass to open up the inter-tussock spaces that are integral to germination and indigenous herbaceous species cover within grasslands.

As the balance of indigenous to weedy vegetation cover has tipped towards a higher weedy cover, it is unlikely that removing the kangaroos will result in an increase in the cover of indigenous species, as too many weedy species are now established.

Restoring a high indigenous vegetation cover across the grassland would require an on-going management and funding commitment (such as strip burning on a three to five year cycle). It is beyond the scope of this EMP to prepare a specialised management plan for the racecourse grassland that addresses weed management, biomass control and restoring indigenous cover.

The Grassland Management Plan should consider: other forms of biomass reduction, such as re-instating controlled burns or regular slashing (combined with spot spraying), and establishing monitoring plots to monitor the effectiveness of different weed control treatments/management actions (grazing versus grazing exclusion, strip burning versus no burning and hand weeding/spot spraying). Baseline data will need to be collected as a component of any monitoring program.

### Management Objectives

*To reduce the current weedy grass levels*

*To maintain the existing high diversity of indigenous grassland species*

*To increase the indigenous grassland vegetation cover.*

### Recommendations

- *Prepare a Grassland Management Plan (with reference to the previous Plan prepared in 1993) (Rec 5)*
- *Prepare and implement a Kangaroo Action Plan that reviews the carrying capacity of the reserve, including within the Grassland (refer to Section 8.4.5) (Rec 6)*
- *Undertake weed control on a quarterly, bi-annual or annual basis in accordance with the recommendations in Section 8.2.1 (Rec 7)*
- *Re-instate strip burning across the grassland, and undertake targeted weed control of particular species after the strip burns (Rec 8)*

## Swampy Riparian Woodland Management

Swampy Riparian Woodland throughout the Reserve is characterised by remnant eucalypts (Swamp Gums and some Candlebarks) with some shrubs (mostly Blackwoods) and a weedy understorey. In its current state this EVC has an intact canopy layer, some shrub layer and no understorey.

Most of the Swampy Riparian Woodland within the Reserve occurs in the picnic/recreation areas, at the southern end of the racecourse (below Racecourse Dam), in the southern portion of the East Paddock and along Smokers Creek. These are high use areas where a balance between conservation and recreational objectives is required.

There are two current management regimes across these areas; the mown recreation areas which are utilised for picnics and car parking during the major events, and the unmown areas which are mostly unmanaged.

Within this EMP, the unmown areas have been defined as Remnant Tree Conservation Zones (RTCZs), and they will be managed for their conservation values. These areas include:

- The strip of vegetation north of the race track (RTCZ 1)
- The south-west corner of the Reserve on the southern side of Smokers Creek (RTCZ 2)
- The area behind and around Dam 1 (RTCZ 3)
- The south-east portion of the East Paddock (RTCZ 4)

The mown areas will be managed as Recreation Zones. In the future, there may be scope to review the zoning of some of the Recreation Zone, but the current emphasis should be on ensuring the existing Conservation Zones are well managed, and the ecological values in these areas are conserved and enhanced before considering expanding into the Recreation Zones.

### Management Objectives

*To maintain the existing remnant canopy layer across the Reserve and to manage the mown areas for recreational uses*

*To manage the unmown areas (and designated sections of Smokers Creek) for ecological values*

### Recommendations

- *Undertake a staged annual program of implementing Tree Conservation Areas in the Recreation Zones (refer to Section 8.5.1) (Rec 9)*
- *Undertake on-going weed control on a quarterly, bi-annual or annual basis, as required (Rec 10)*
- *Undertake revegetation along Smokers Creek riparian zone where appropriate (Rec 11)*

## Herb-rich Foothill Forest Management

The main areas of Herb-rich Foothill Forest occur to the south and east of the rock, along Racecourse Road, in the strip of bushland between the northern end of the race track and Colwells Road and across the northern portion of the East Paddock. To the south and east of the rock, it is characterised by a eucalypt canopy, scattered shrubs and a Bracken *Pteridium escaletum* understorey. To the north of the race track it is characterised by a dense strip of eucalypts and shrubs with a weedy understorey. Along Racecourse Road it is characterised by scattered large remnant eucalypts amongst the racecourse facilities. The northern portion of the East Paddock is mostly cleared, with the remnants remaining in the surrounding road reserves. Some revegetation around the perimeter of the East paddock has utilised indigenous species compatible with Herb-rich Foothill Forest.

The area to the south and east of the rock has a higher indigenous ground-storey cover due to the dense Bracken cover, which reduces the light level available for weed seed germination. Bracken is a colonising plant that indicates a modified landscape that has been subject to past disturbance. However it also provides an effective vegetation cover for successive indigenous species to germinate and grow in.

Issues with Bracken are that many people view it as a weed, and it does provide rabbit harbour. From an indigenous vegetation management perspective, Bracken provides a good level of vegetation cover and it does decrease weed cover. However effective rabbit control is required as an integral component of any Bracken management.

### Management Objectives

*To maintain the existing canopy; to encourage regeneration of the canopy layer; and to increase the shrub and ground-storey layers in the Recreation Zones to the south and east of the rock, and to the north of the race track.*

*To maintain the existing remnant eucalypt layer amongst the racecourse facilities.*

*To utilise appropriate species from EVC 23: Herb-rich Foothill Forest in future plantings within the East Paddock.*

### Recommendations

- *Consider management techniques to increase the area of Bracken cover to the south and east of the rock (Rec 12)*
- *Undertake rabbit control to reduce rabbit harbour amongst the Bracken (Rec 13)*
- *Continue current tree maintenance amongst the racecourse facilities (Rec 14)*
- *Implement Tree Conservation Areas in the Recreation Zone to the north of the racecourse facilities, via a staged annual works program (refer to Section 8.5.1) (Rec 15)*
- *Undertake on-going weed control on a quarterly, bi-annual or annual basis, as required (Rec 16)*

## Plains Grassy Woodland Management

Plains Grassy Woodland occurs on the western and northern sides of the rock, to the west of racecourse Road. To the north it is characterised by a more open canopy, with scattered shrubs and a diverse

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indigenous grassy understorey. In spring, this area supports lilies and orchids. To the west it is characterised by a more open canopy, with a scattered shrub layer and a weedy ground-storey.

A small patch of Plains Grassy Woodland also occurs to the east of Racecourse Road adjacent to Colwells Road. This patch contains remnant trees and a weedy understorey.

Revegetation has occurred on the north side of the reserve/the rock within this EVC which comprises the native vegetation offset for vegetation clearances permitted along Straws Lane to facilitate road safety works. The vegetation in the offset areas will be managed via the Offset Management Plan (M Patrick and B Aquilina), that has been prepared for them. The fences surrounding the offset areas will be removed in the future once the plants are established and can withstand browsing by rabbits and Swamp Wallabies.

### **Tree Dieback**

There is some tree dieback on the northern side of the Rock, in the Plains Grassy Woodland patch. As discussed in Section 8.2.10, tree dieback is a landscape issue that is not restricted to Hanging Rock. Tree death may be attributable to a change in management/fire regimes, insect attack, susceptibility to wind through the loss of the shrub layers, or a myriad of other ecological reasons such as disease or overuse by particular fauna species. At this stage, there are no clear reasons why trees are susceptible to tree dieback in some areas and not in others.

Data is needed on the potential reasons for tree dieback, so it is recommended that a monitoring regime be instigated in this area of the Reserve, as outlined in Section 8.2.10, to gather data that may provide information on the causes of the tree dieback. Without data on what the causes may be, it is difficult to provide management responses to the issues.

### **Management of Weedy Ground storey Vegetation**

Another management concern is the large areas of exotic ground storey dominated by Sweet Vernal Grass to the west of Racecourse Road. As outlined in Section 8.2.1 under Grassy/Herbaceous weeds, there are no easy management responses to altering the composition of weedy to indigenous ground storey vegetation cover. Bushland management methods that are currently utilised include:

- Hand weeding and spot spraying with the aim of retaining and encouraging the spread of any existing indigenous ground storey plants, or
- Slashing exotic grasses with the aim of reducing seed set and slowing their spread.

Both methods are labour intensive, and success is varied depending on the amount of existing indigenous species present that can seed and spread into controlled/cleared areas. Other methods that are starting to be utilised include controlling larger weedier areas/scraping them and then re-seeding larger areas with indigenous seeds. This method has only been successful in paddock situations without existing indigenous trees and shrubs.

## Management Objectives

*To maintain the diverse understorey to the north of the rock through targeted weed control; and potentially some canopy and/or shrub thinning to maintain the open canopy, in the longer term*

*To reduce the weed cover to the west of the rock, whilst still maintaining the lower fuel loads required along the Reserve's perimeter for fuel management*

*To manage the patch of trees growing to the east of Racecourse Road; in a Tree Conservation Area*

*To gather data to determine why tree dieback is occurring in the area*

*To consider the most suitable management methods for reducing the exotic Sweet Vernal Grass cover and to increase the cover of indigenous ground storey species*

## Recommendations

- *Implement Tree Conservation Areas as shown on the Management Zones map (outside of the perimeter Fuel Management Zone) to manage the small patch of Plains Grassy Woodland occurring to the east of Racecourse Road (refer to Section 8.5.1) (Rec 17)*
- *Undertake on-going weed control on a quarterly, bi-annual or annual basis, as required (Rec 18)*
- *Implement tree monitoring in selected plots to monitor tree dieback (Rec 18a)*

## Montane Grassy Woodland/Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic Management

This mosaic of EVCs exists in a variety of conditions across the rock, mostly as a result of impacts from foot traffic. There are some areas with 'no' weeds and other areas that are completely dominated by grassy/herbaceous weeds. The rock is the dominant landscape feature of the Reserve, and it is climbed by most visitors to the Reserve. It is a high impact area, with a diversity of ecological values.

The rock has different patches of vegetation and/or areas of bare rock depending on the proximity of the rock to the surface, aspect, topography, and soil depth that allows vegetation to grow on the rock.

It is beyond the scope of this EMP to prepare a specialised management plan for managing the rock and defining visitor 'go' and 'no go' areas, as a method of retaining and increasing its' ecological values.

## Management Objectives

*To maintain the weed free and highly diverse areas of the Rock, that is the areas with a high (greater than 50%) indigenous ground-storey vegetation cover.*

*To work towards increasing the indigenous cover in areas with less than 50% indigenous ground-storey vegetation cover.*

## Recommendations

- *Prepare and implement a plan for the rock that defines visitor 'go' and 'no go' areas. (Rec 19)*
- *Establish monitoring plots to collect data on the effectiveness of undertaking different regeneration/revegetation methods to restore indigenous vegetation on the rock (refer to Section 9) (Rec 20)*
- *Undertake on-going weed control on a quarterly, bi-annual or annual basis, as required (Rec 21)*
- *Undertake strategic revegetation in areas with little or no understorey (Rec 22)*

## Transition Zone Management

This vegetation zone is located on the lower slopes to the north, west and south of the rock. It mostly occurs between the Upper Base Walking Track and the bottom of the rock.

This area contains some flora species common to both the Herb-rich Foothill Forest and Plains Grassy Woodland EVCs, but does not 'fit' the characteristics of either EVC.

This area has a dense shrub layer, which provides good habitat for arboreal mammals such as the Sugar Gliders.

## Management Objectives

*To maintain the habitat values of this vegetation, whilst reducing weed cover.*

## Recommendations

- *Undertake on-going weed control on a quarterly, bi-annual or annual basis, as required (Rec 23)*

## 8.2.4 Revegetation Works and Programs

### Current Revegetation at the Reserve

Planting/revegetation has been undertaken across all areas of the Reserve, for many years, mostly on an ad hoc or reactive basis.

Due to the number of kangaroos and wallabies within the Reserve, most plantings are 'protected' inside exclusion fences or tree guards. Any future revegetation will also need to be protected from grazing.

### Future Revegetation at the Reserve

Utilising the bushland management techniques outlined in Section 8.2.2, any future revegetation works should be limited to areas with no remnant indigenous ground-storey vegetation, except for the eroded areas on the rock. In the two Core Conservation Zones: 1a (the Rock and its Surrounds) and 1b (the Racecourse Grassland), the focus of management is on bushland regeneration rather than revegetation works, except to stabilise erosion, as required.

Any future revegetation at Hanging Rock should only occur in the Remnant Trees Conservation Zone, along Smokers Creek, in the Tree Conservation Areas or in the Recreation Zone. It should be part of a strategic plan based on the EVC present (including suitable species and planting densities). With regard to erosion on the rock, any revegetation should be limited and combined with monitoring.

Considering the high tree cover across most of the Reserve (not including the East Paddock), and the variety of recreational uses; revegetation needs to be strategic to ensure it is providing the best possible outcomes. There are several types of revegetation/plantings suitable within the Reserve:

- Landscape plantings (along the main entrance, around the car park and visitor centre, around some of the picnic areas, and the recreational areas and facilities).
- Habitat plantings along Smokers Creek
- Habitat plantings in the Remnant Trees Conservation Zones (2a, 2b, 2c and 2d)
- Shade and amenity plantings in the East Paddock, and
- Infilling of the shrub/ground-storey layers in the Tree Conservation Areas
- Habitat plantings at the rock's summit where no ground cover is present, to stabilise erosion

Non-invasive exotic species can be planted around the café/visitor centre in keeping with the existing beds, and in the East paddock for shade. Any exotic species should be referenced to the *Central Victorian Weed Guide* (MRSC) and *Environmental Weed Invasions in Victoria* (Carr et al, 2002), to determine if they are considered invasive or environmental weed species.

In some circumstances, limited revegetation may be appropriate in areas with less than 25% indigenous ground-storey vegetation cover in the Core Conservation Zones. However this revegetation would have to be a component of a strategic plan to increase habitat, restrict access up on the rock, stabilise erosion or to re-introduce particular habitat elements into the EVC or as a component of monitoring plots. No planting should occur in the Core Conservation Zones without consideration of the potential impacts (soil disturbance and increased weed cover), versus any perceived benefits.

Revegetation Templates based on EVCs and appropriate planting densities need to be prepared for each EVC within the Reserve (refer to Section 8.2.5).

The development of management principles for each Management Zones, and utilising the indigenous understorey vegetation quality map (refer to Map 5) are new management tools that can now be used to direct any future proposed offset works in the Reserve.

### **Offset Plantings at Hanging Rock Reserve**

In early 2014, offset plantings and an exclusion fence were installed in exclusion plots on the north side of the Rock. The offset plantings were to offset vegetation removal along Straws Lane.

The intent of including revegetation as a part of native vegetation offsets is to increase habitat and biodiversity values in areas that have limited to no existing habitat values. Considering the extent and diversity of existing indigenous vegetation within the site, it is questionable whether revegetation would contribute to the increase in overall habitat values within the Reserve as required to meet the State Government's requirements for native vegetation offsets. In areas with existing indigenous ground-storey cover, plantings may cause some damage to this cover. This includes in the Remnant Trees Conservation Zones with less than 25% indigenous ground storey vegetation cover.

Hangin Rock is not considered a suitable site for offsetting, as one of the aims of offsets is to permanently secure land and/or remnant bushland as habitat into perpetuity. As Hangin Rock is a publicly owned reserve, the vegetation within the Reserve is already 'secured' from a legal perspective. In terms of Victoria's biodiversity, it is far better to offset into land that is not already legally 'secure' and to increase the areas of bushland retained into perpetuity in the State, than to offset into existing reserves.

### Landscaping in the East Paddock

Currently an East Paddock Landscape Plan is being prepared to guide the future development of the East Paddock with regards to the facilities and landscaping required to enable picnicking and events. It is envisaged that the East Paddock will also be available for school and other groups in the future.

Revegetation/plantings in the East Paddock will primarily be for shade and amenity for picnicking, events and concerts, and they will be limited to trees and/or shrub species. While indigenous species in the East Paddock would provide the best habitat and ecological outcome, including some exotic (non-environmental weeds) species that provide shade does not significantly undermine the ecological values of the Reserve, given that the East Paddock comprises cleared farm land that has been designated as a Recreational Zone.

Indigenous shade trees should include Blackwoods, Manna Gums and Swamp Gums, or suitable species from EVC 83: Swampy Riparian Woodland (southern end), and EVC 23: Herb-rich Foothill Forest, (northern end), of the East Paddock.

### Recommendations

- *Limit future revegetation to areas with less than 25% remnant indigenous understorey vegetation cover (Rec 24)*
- *Revegetation Templates based on EVCs and appropriate planting densities should be prepared for each EVC within the Reserve (refer to Section 8.2.5) (Rec 25)*
- *Exotic/native (non-invasive) plants can be used if required for landscaping around the car park, café/visitor centre and in the East Paddock; however the preference is for indigenous plants. (Rec 26)*
- *Ensure any indigenous shade trees included in the East Paddock Landscape Plan (in preparation) are from the appropriate EVCs (Rec 27)*
- *All revegetation in the Recreation Zones may be subject to aboriginal assessments in the future for tree safety purposes (Rec 28)*

### 8.2.5 Revegetation Templates

Revegetation templates suitable for each EVC are required to provide guidance for suitable species and the planting densities within the Reserve. Revegetation templates are required for:

- EVC 83: Swampy Riparian Woodland
- EVC 23: Herb-rich Foothill Forest
- EVC 55: Plains Grassy Woodland
- EVC 859: Montane Grassy Woodland/Rocky Outcrop Shrubland/Rocky Outcrop Herbland Mosaic
- The Transition Zone

Whilst DELWP has prepared revegetation templates for EVCs, these are generic templates that have been prepared for all vegetation types across Victoria. The templates do not consider local conditions; mosaic EVCs; or instances such as the Transition Zones between two EVCs that occurs along the western side of the Reserve. The DELWP generic templates also do not consider suitable revegetation (with regards to appropriate species and densities) in patches with an existing dense canopy cover, limited shrub cover and little to no indigenous ground-storey cover.

Revegetation along Smokers Creek should be based on EVC 83: Swampy Riparian Woodland. Revegetation in the Recreation Zone should be based on EVC 83: Swampy Riparian Woodland or EVC 23: Herb-rich Foothill Forest, depending on the location within the Reserve. Revegetation in the Tree Conservation Areas should be based on EVC 83: Swampy Riparian Woodland or EVC 23: Herb-rich Foothill Forest, depending on the planting location within the Reserve

Revegetation Templates for the Transition Zone would need to be determined based on site specific information from the two adjacent EVCs.

Whilst no revegetation should be undertaken within the Racecourse Grassland or the Rock and its' Surrounds, if required as a component of strategic management works (such as where no or less than 25% indigenous ground storey is present), then an appropriate species list would need to be based on site specific information and suitable ground-storey species from the two adjacent EVCs. No trees or shrubs should be included in the Template for the Racecourse Grassland.

## Recommendations

- *Develop EVC templates for the EVCs/vegetation communities occurring at Hangin Rock, to account for the site specific conditions, prior to undertaking any further revegetation works (Rec 29)*

## 8.2.6 Monitoring of Regeneration/Revegetation

### Monitoring Plots

During the consultation process, both the MRSC Natural Resources Officer and a member of the NDLC raised concerns regarding the extent of erosion and weedy areas on the rock, and the difficulties with managing these areas. The prime areas of concern were adjacent to the track around "Stonehenge" and leading up to "The Saddle".

There was some concerns regarding how to best revegetate these areas and what techniques would be the most appropriate for use on the rock. It was also discussed that depending on the success of these areas, then there was the potential to increase efforts on the rock into the future. It was acknowledged that undertaking works on the rock was difficult due to logistical issues.

Due to the pressures from grazing by Wallabies (and other fauna), high visitor numbers on the rock, people straying from the track and the difficulties with getting equipment up onto the rock, a number of monitoring plots could be established to monitor the effectiveness of bushland regeneration versus revegetation techniques. This could then indicate which would be the most suitable management strategy for undertaking works across the rock.

Four potential monitoring locations were determined that were mostly located in weedy areas. These locations are shown on Map 12 at the end of Section 8. A mixture of regeneration and/or revegetation techniques would be undertaken in these locations. Exclusion fencing would be required around each monitoring plot to eliminate grazing pressure.

The following techniques were discussed:

- Establishing small 10m x 10m monitoring plots with exclusion fencing
- Gathering baseline data in each plot on:
  - Species present (indigenous and exotic)
  - Cover of each species present (based on the Braun blanquet scale)
  - Cover of bare earth, leaf litter and bryophytes/lichen, weed versus indigenous species

For the revegetation plots:

- Undertaking weed control across the plot (avoiding any indigenous species)
- Installing plants
- Keeping records of plant species and numbers installed
- Undertake regular maintenance (weed control)
- Monitor plot annually for species present, and cover of items monitored for baseline data

For the regeneration plots:

- Install markers next to all existing indigenous plants
- Undertake slow strategic and targeted weed control to encourage the spread of adjacent indigenous species
- Continue quarterly targeted hand weeding and spot spraying around indigenous plants
- Monitor plot annually for species present, and cover of items monitored for baseline data
- Utilise the markers to determine if seed has spread from existing plants to colonise the adjacent areas

It is expected that the regeneration plots will be slower to increase indigenous vegetation cover, but will require less maintenance works and should have a higher indigenous cover in the longer term.

The revegetation plots should be quicker to establish, but will require more work and it will be harder to control weeds around the plants in the longer term.

Trialling both techniques will provide MRSC and NDLG with data to determine the most appropriate bushland management techniques, for these areas.

Due to tree dieback issues or a high cover of exotic ground storey vegetation cover in areas of the Conservation Zones, monitoring plots should also be installed at other locations around the Reserve to trial what are the best bushland management methods for the different bushland management issues and areas of the Reserve.

Whilst installing monitoring plots can be intensive and a longer-term proposition; considering the amount of areas with tree dieback or a high cover of exotic ground storey vegetation cover in areas of the Conservation Zones; it will be more beneficial to bushland management in the longer term if data is gathered for specific areas of the Reserve. This will allow the proposed bushland management methods to be site specific, and may eliminate wastage of time and or labour in pursuing bushland management methods that are not appropriate to certain areas of the Reserve.

### **Grassland Monitoring**

Grassland monitoring should be undertaken to trial the effectiveness of different management methods, to determine what is most effective within the site.

Some potential monitoring trials are outlined below. Before any are commenced, baseline data such as photo points, species lists and cover/abundance data will be required.

#### Sensitive hand weeding

- Next spring, sensitive hand weeding should be undertaken around a few patches of indigenous wildflowers to provide more bare ground for seed set
- These patches should be monitored (photo points, flora surveys and cover/abundance per species) prior to work, and 6 months after work to determine success or not of works, and any potential impacts
- If successful, continue strategy slowly across grassland
- If unsuccessful, plan alternative works

#### Establishing grazing versus non-grazing plots

- To monitor the effects of kangaroo grazing
- To determine if kangaroo grazing should be removed from the grassland; or what is 'balance' of grazing required?
- Another form of biomass control will probably be required in the non-grazing plot
- Control of any S1 and S2 grassland weeds will be required in both plots

### **Recommendations**

- *Install monitoring plots prior to undertaking any revegetation/regeneration works on top of the rock for erosion control purposes. Prior to undertaking any works, baseline data should be collected. Data should then be collected on an annual basis, depending on the projected timeline of the project. (Rec 30)*
- *Investigate potential monitoring techniques for establishing the most appropriate management techniques for the grassland, based on the data collected. (Rec 31)*
- *Prepare a Flora Monitoring Plan to guide monitoring plots, techniques and locations across the Reserve (Rec 31a)*

## 8.2.7 Black Gums

As outlined in Section 4.4.1, there is a patch of young Black Gums in the southern section of the East Paddock along Smokers Creek. It is not known whether these plants are naturally occurring, as there is no known history of them being planted within the Reserve.

Aside from this patch, the next closest known naturally occurring Black Gums are located 2.5km west of the East Paddock along Five Mile Creek on private land. At this stage, it is not known whether Black Gums naturally occurred in the Hanging Rock area or not. Further research may be required to determine this.

### Recommendations

- *Base plantings along Smokers Creek on EVC 83: Swampy Riparian Woodland and do not plant Black Gums unless further research determines whether this species occurred naturally in the reserve or not. (Rec 32)*

## 8.2.8 Tree/Limb Loss and Removal – Stockpiles

### Tree Safety Maintenance Works

Currently aboricultural assessments and limb lopping/removal are undertaken, for public safety, across many of the multi-use areas of the Reserve, as required within the annual tree maintenance budget. The areas of the Reserve in which this occurs mostly correlate with the mown areas including the picnic/recreation areas, along the main walking tracks, in the car park, in and around the cricket oval, and in the mown area to the north of the racecourse facilities.

All trees located within these areas have been assessed by an arborist, and there is a census of all mature trees. On an 'annual' or 'as needs' basis, unsafe and/or dead trees/limbs within the mown areas and along the main walking tracks are assessed for safety and the limb/tree removed if deemed a safety risk by the arborist. The cut limbs are currently then stockpiled across the Reserve for later disposal.

### Natural Tree/Limb Loss

In conjunction with the tree safety maintenance works, other limbs and/or trees also fall following storm events. It is estimated that between 10–20 tonnes of limb/tree matter is generated annually from the natural loss of limbs/trees following storm events (A Walsh and G Bigolin pers comm.).

Material from naturally fallen limbs and trees has previously been stockpiled across the Reserve for later disposal, generally to be reused for barriers or burnt. As both lopped and fallen limbs were stockpiled previously no distinction was made between the material from indigenous and exotic trees.

It is recommended that across the reserve root balls and tree stumps resulting from lopped or fallen trees should be retained in-situ. These serve useful habitat and ecological functions. If they are considered a safety hazard or need to be removed for any other reason in the Recreation Zones, removal could be considered to the on-site depot or Council's Transfer Station.

## Concerns regarding the Existing Stockpiles

At the commencement of the preparation of this EMP, one of most discussed management issues was the stockpiling of these limbs and how the re-use and/or disposal of removed and/or naturally fallen limbs could be better managed. This has resulted in changes in management practices where removed/naturally fallen limbs in the Conservation Zones will remain in-situ (or removed to the side if they have fallen over one of the tracks or into the Fuel Management Zones). In the Recreation Zones, the larger logs (with a diameter greater than 40cm) will be used as barriers, and smaller logs will be mulched. No logs from the Recreation Zones will be placed within the Conservation Zones, as moving larger logs into the Zone could result in vegetation and soil disturbance.

These new limb management practices will eliminate the need for new stockpiles in the public areas of the Reserve.

However there are currently still a number of stockpiles across the Reserve which need to be managed. Previously the use of stockpiles caused a number of issues including:

- Habitat loss, due to the removal of lopped/fallen green material from areas rather than leaving it in-situ
  - This has now been addressed through retaining them in-situ in the Conservation Zones and re-using them in the Recreation Zones
  - Material from exotic trees will continue to be stockpiled and either re-used for firewood at the site or burnt. This material will be stockpiled away from the public areas of the Reserve in the on-site depot (refer to Section 8.6.10).
- The impact of the stockpiles and burn offs on the indigenous ground cover where they are located
  - There will be no future stockpiles in the public areas of the Reserve
  - The current stockpiles will have some of the larger logs removed and re-used if appropriate, and the residue will be burnt
  - Any stockpiles in the on-site depot will be located on a compacted, gravel surface so they will not impact on ground-storey vegetation
- The creation of harbour for pest animals as a result of stockpiling vegetation
  - This has now been addressed through retaining them in-situ in the Conservation Zones and re-using them in the Recreation Zones
- The visual impact of the stockpiles
  - This has now been addressed through retaining them in-situ in the Conservation Zones and re-using them in the Recreation Zones
  - Any stockpiles in the on-site depot will not be visible to the public

## Extent of Lopped Limb Removal

Whilst the extent of naturally fallen limbs/trees cannot be controlled, there is scope to reduce the extent of habitat loss and stockpiling across the Reserve.

As outlined above, any lopped and/or naturally fallen limbs in the Conservation Zones will now be retained in-situ. In some cases there may be a need to reposition some logs and branches to facilitate access and movement of fire response vehicles.

In the Recreation Zones lopped and/or naturally fallen limbs will be re-used or mulched. There will be no future stockpiles in the public areas of the Reserve.

If there is material that cannot be re-used (or it comes from an exotic tree), then it will be stored in the on-site depot and disposed of either as firewood for the site or burnt.

Due to the requirements to reduce the risks for users of the Reserve, tree safety maintenance works will continue in the Recreation Zones and in the Tree Safety Management Zones adjacent to the walking tracks/internal roads in the Conservation Zones (refer to Map 11).

Tree safety management works do not currently occur away from the main walking tracks in the unmown areas of the Reserve, around the Rock and its' Surrounds and along the less frequented sections of Smokers Creek. However naturally fallen limbs are currently removed from these areas and stockpiled. From now on, naturally fallen limbs will be retained in these areas.

Tree removal and thinning does occur in the grassland, as a component of race track management, not for safety purposes. Due to the presence of the grassland, which would not respond well to smothering by lopped limbs remaining in-situ, all lopped material will need to be removed from the grassland. This material will be re-used in the Recreation Zones of the Reserve as appropriate.

## Recommendations

- *Retain fallen branches in-situ in the Conservation Zones except if they have fallen across a track*
  - *If they fall across a track, remove to side of track, undertaking on-site visual assessments to ensure logs are not placed in areas with good quality ground-storey vegetation (Rec 33)*
- *Continue current practice of removing fallen/lopped limbs in the Recreation Zones, for aesthetic and slashing/mowing purposes*
  - *Re-use larger logs as barriers to define perimeters of Tree Conservation Areas and Management Zones*
  - *Re-use smaller limbs for mulch*
  - *Store any unusable/exotic material in on-site depot (refer to Section 8.6.10), for later disposal which could include burning or removal to a Council Transfer Station (Rec 35)*
- *Continue the current management practice of safety inspections and tree/limb removal as required, in the Recreation and Tree Safety Management Zones (Rec 36)*
- *Root balls and tree stumps resulting from lopped or fallen trees should be retained in-situ. If they are considered a safety hazard or need to be removed in the Recreation Zones, removal could be considered to the on-site depot or Council's Transfer Station. (Rec 36a)*

### 8.2.9 In-situ Limb Retention

As outlined in Section 8.2.7, management practices in the Reserve have been altered so that fallen branches in the Conservation Zones will be retained in-situ except if they have fallen across a track. If they have fallen across a track, they will be removed to the side of the track. On-site assessments should be undertaken to ensure logs removed to the side of the track, are not placed in areas with good quality indigenous ground-storey vegetation.

Retaining fallen limbs in these Zones will reduce the need for stockpiling and will eliminate dragging fallen limbs across other vegetation, which can lead to vegetation damage.

#### Concerns with Retaining Fallen Limbs In-situ

Whilst fallen limbs provide habitat for ground dwelling fauna species, there has to be a balance between log habitat and ground available for vegetation cover. If there are too many fallen limbs there is the potential that the existing ground-storey vegetation cover will be smothered and there will be less area available for seeds to germinate in. There is also potential increased fuel hazard risks (refer to Sections 7 and 8.3) from a dense log cover.

To provide guidelines regarding appropriate log densities in the Conservation Zones, the log density benchmarks available for the EVCs within the Reserve will be utilised as a guide to assess log densities in the Conservation Zones. The log densities provided in the EVC benchmarks are generic densities that apply to all examples of that EVC within a bioregion. They have not been determined for each specific patch of bushland, therefore they can only be utilised as a guide.

Log densities directly correlate to canopy health and density, bushland with a dense canopy naturally has a higher on-ground log density, as more limbs fall than in bushland with an open canopy.

Table 13 provides the EVC benchmark densities provided by DELWP, and it also provides an increased on-site log density which has been determined based on the dense canopy cover present across the Conservation Zones at Hanging Rock. The log densities are provided as a metre figure for every 1,000m<sup>2</sup>. To visually estimate log density on-the-ground, assessors typically imagine a 10m x 10m square area, that is representative of the general log cover in an area, and then 'count' every metre of log in that area. A log is defined as a limb that is greater than the width of your forearm. Once a figure has been determined, it is then timed by 10 to obtain the log density per 1000m<sup>2</sup>.

If the on-ground log densities exceed the densities provided in Table 13, then some log removal from the Conservation Zones may be appropriate, depending on the extent of logs present, the width (dbh) of the logs present, and the quality and extent of the ground-storey vegetation present. If it is deemed that the log density is too great, then some log removal may be appropriate.

If logs are removed, then on-ground judgements are required to ensure good quality indigenous ground-storey vegetation is not impacted by the removal of these logs, and only smaller logs should be removed, as larger logs provide more habitat and there would be OH&S issues involved with handling larger logs. If any logs are proposed for removal, all removal should be undertaken by hand to minimise damage to adjacent vegetation, and to ensure only smaller logs are removed.

Any removed logs would have to be removed from the Conservation Zone and taken to the on-site depot for mulching or disposal if they are not appropriate for mulching.

### Benchmark Log Densities

The benchmark log densities for the EVCs within the Reserve are defined according to the metres of log (which are branches with a circumference greater than 15cm) for every 1000m<sup>2</sup>. As the benchmark densities are low, the provision of higher densities has been included in the on-site density estimates due to the dense canopy cover present in the Conservation Zones at Hanging Rock.

As outlined previously, the densities in Table 13 are a guide.

**Table 13. Suitable On-site Log Densities**

EVC	DELWP Benchmark Density	Hanging Rock On-site Density
EVC 23: Herb-rich Foothill Forest	20m/0.1ha	50m/0.1ha
EVC 55: Plains Grassy Woodland	10m/0.1ha	25m/0.1ha
EVC 83: Swampy Riparian Woodland	20m/0.1ha.	50m/0.1ha
EVC 859: Montane Grassy Woodland/Rocky Outcrop Shrubland/ Rocky Outcrop Herbland Mosaic	EVC 73: Rocky Outcrop Shrubland/ Outcrop Herbland Mosaic = 5m/0.1ha EVC 37: Montane Grassy Woodland = 15m/0.1ha	12–30m/0.1ha

### Recommendations

- *Utilise the log densities in Table 13 to determine appropriate log densities across the Reserve*
  - *If the densities are exceeded, use on-ground judgements to determine if log removal is required*
  - *If log removal is undertaken, ensure good quality indigenous ground-storey vegetation is not impacted by the hand removal of any logs (Rec 37)*
- *Consider fuel levels in determining log densities (Rec 38)*

### 8.2.10 Loss of Large Old Trees on the Rock

The decline in the number of large old trees growing on the rock was observed by the number of large stumps or dead trees across the rock, especially around ‘Stonehenge’, the ‘Central Forest Area’ and ‘The Saddle’ areas of the rock (refer to the *Hanging Rock Information Brochure*). Upon closer inspection, there was evidence of insect ‘attack’ on many of the dead, and still living, trees.

People who have been associated with the rock for several years have commented that the canopy and number of large old trees has declined. Apparently some areas of the rock that were once in perpetual shade are now not in shade, due to the decline in tree numbers (A Walsh pers. comm.).

The decline in large trees is an observed phenomenon across the landscape; it is not restricted to Hanging Rock. It is unknown what can be done to ‘halt’ this decline. There are numerous theories such as drought, increased exposure to wind due to loss of surrounding vegetation, ecosystem changes, insect attack or reduction in birds and arboreal mammals utilising the trees and feeding on insects.

A monitoring program is recommended to 'track' the decline in tree numbers on the rock and to determine whether: it is on-going, at what rate, and what is observed as potentially 'causing' it? A monitoring program would raise awareness of the issue, so people who are familiar with the rock and spend time at the Reserve, can provide anecdotal evidence and observation; that may assist in collecting data on the decline. A component of any monitoring would be to ensure people were kept informed regarding the latest knowledge on the general landscape decline of large trees.

A monitoring program could include:

- Data for each tree on the Rock including: diameter at breast height (dbh), health of canopy (based on habitat hectare methodology of <30% canopy cover, 30–70% canopy cover and >70% canopy cover), evidence of insect attack, degree of insect attack (percentage of trunk covered in insect bore holes)
- The location and a photograph (that shows canopy) should be collected for each tree
- Data should also be collected on the surrounds of each tree...is it amongst other vegetation, isolated, on edge of rock (exposed to strong winds) or sheltered, etc?
- Data should be collected every 5–10 years, or when a large tree falls down, to ensure on-going monitoring and to collect useful data
- Monitoring could be undertaken by the Friends Group or the NDLG, once the base monitoring has been established
- Collecting the baseline data could be a student project undertaken in partnership with a TAFE or University

### Recommendations

- *Raise awareness of the issue with the Friends of Hanging Rock, NDLG and other community groups associated with the Reserve, and ask them for observations, etc. (Rec 39)*
- *Instigate a monitoring program for all trees growing on the rock (Rec 40)*
- *Consult with an entomologist concerning the insect attack on the large trees to determine what type of insects they may be, and whether they are responsible/contributing to tree decline, or not (Rec 41)*

## 8.3 Fuel Management

On-going fuel management is required around the perimeter of the Reserve, along the main access network (roads and walking tracks), to ensure fire risk is minimised through maintaining low fuel loads in designated areas of the Reserve.

Within this EMP, Fuel Management Zones have been defined across Hanging Rock (refer to Map 10), according to pre-existing zones and fuel reduced areas. The objective of designating Fuel Management Zones is to define the exact location and extent of these areas, to ensure that other land management uses (such as revegetation) do not overlap with fuel management practices.

The width of the perimeter Fuel Management Zones has been increased along the western and northern perimeters of the Reserve, to extend to the inner edge of the Lower Base Walking Track, for ease of

management in an area which has been assessed as having poor quality (<25%) indigenous ground-storey vegetation cover.

This will not have any significant impacts on indigenous vegetation in this area, as this area already has poor indigenous ground storey vegetation cover (less than 25% cover), and the existing shrubs and trees are already managed in a fuel reduced state. Essentially there are no changes in the management practices already undertaken between the Lower Base Walking Track and the perimeter fence.

The main management change is that the area is being officially mapped as a Fuel Management Zone, and that no revegetation is to occur in this Zone.

The guidelines for vegetation management to reduce and retain lower fuel loads are presented in the management principles for the Fuel Management Zones in the Part 2 of the EMP, in Appendix 5 of the EMP: Part 1. The location of the Fuel Management Zones in the Reserve, are depicted in Maps 10 and 11.

Reference also needs to be made to the fire management objectives and key fire management controls outlined in the *Hangin Rock Fire Management Plan* (2015).

### **Current Fuel Management Works**

Around the perimeter of the Reserve, the vegetation in the existing fuel management areas is slashed to 10cm or less at the beginning of the Fire Danger Season, and during the season as required. Slashing in early Spring and mid to late Summer is recommended to enable any existing wildflowers to flower.

Smaller logs/twigs and branches are also removed from these areas, to maintain the area in a fuel reduced state. Larger logs are retained. There are scattered existing trees and some shrubs, which are either isolated shrubs or they occur in clumps which are separated from other shrubs/clumps of shrubs. The lower branches on some trees have been removed so they do not create a 'ladder' for fuels, or hinder the management of understorey vegetation. In some instances larger logs have been moved if they hinder machinery or are an OH&S risk.

### **Recommendations**

- *Continue existing fuel management works along the perimeter of the Reserve (Rec 42)*
- *Undertake any slashing in early Spring and mid to late Summer (Rec 42a)*
- *Extend the perimeter of the Fuel Management Zone to the inner edge of the lower base walking track in CCZ1 (Rec 43)*
- *Extend the perimeter of the fuel management zone beyond the inner edge of the base walking track in one location, to incorporate the defensible space for an adjacent dwelling (Rec 44)*
- *Do not undertake new revegetation or plantings in the defensible space around the public buildings, (Rec 45)*

### 8.3.1 Base Walking Track (and Fire Risk) Management

The *Hangin Rock Reserve Fire Management Plan* (2015) outlines Key Controls for CCZ1 – The Rock and its Surrounds as:

1. Ensure the “Base Walking Track” (referred to as the Lower Base Walking Track in this EMP) is maintained such that it facilitates movement of large format fire vehicles, namely:
  - a. Vegetation and branches are removed to create an envelope of 4.5m wide x 4.5m high along the track itself.
  - b. Trees are evaluated for their potential to “fall” on crews working in the Area (Refer to the Tree Management Zones discussion in the Environmental Management Plan).
  - c. Passing bays are provided to allow trucks to pass each other. CFA Guidelines require passing bays for vehicles every 200m as a minimum. Each bay should be 20m long and 6m wide.
2. Ensure the “Upper Base Walking Track” is maintained in a manner that permits movement of 4WD types vehicles (e.g. Slip on types and Command Vehicles). This requires:
  - a. Vegetation and branches are removed to create an envelope around the track of at least 3m wide x 3m high.
  - b. Trees are evaluated for their potential to “fall” on crews working in the Area (Refer to the Tree Management Zones discussion in the Environmental Management Plan).
  - c. Passing bays are provided at 200m centres as a minimum capable of allowing two 4WD vehicles to pass and turn around. This may take the form of a tee-type intersection or larger open areas.

#### Discussion of Potential Impacts from the Key Controls

With regards to widening both walking tracks and installing passing bays every 200m for fire safety purposes, the following considerations are required:

- As depicted in the Indigenous Ground-storey Vegetation Quality Map (refer to Map 5), the indigenous vegetation along the Lower Track is much lower quality than along the Upper Track.
  - Whilst the majority of vegetation near the Lower Track is lower quality, there is an area along the northern perimeter, with greater than 50% cover on the track’s northern side.
  - If the widening works were ground-truthed with an ecologist, then the impacts could be minimised by restricting works to the areas of lower quality on the southern side of the walking track.
  - Any passing bays should be constructed on the perimeter fence side of the Lower Walking Track in areas with less than 25% indigenous ground-storey vegetation cover.

Implementing the fire management tracks could have minimal to no impacts along the lower track, if they are designed and planned with ecological advice.

- Whilst the proposed widening of the Upper Track (3m) is less than the Lower Track (4.5m), impacts will be greater due to the higher indigenous ground-storey cover along the Upper Track

- From a vegetation management perspective, widening the Upper Track will have ecological impacts; therefore it needs to be considered if the benefits of the impacts outweigh the costs.
  - If there was a fire, then more vegetation alongside the Upper Track will be impacted, and fauna will also be impacted.
  - Fire trucks will access the track regardless and may cause even greater damage.
  - There is the potential that there will never be a fire, so the works will never have been required.
  - Aside from the actual vegetation removal, the use of machinery to undertake vegetation removal may introduce weed seed along the track, which will slowly degrade the indigenous ground storey vegetation quality over time.
- Therefore the widening works and passing bay locations should also be ground-truthed with an ecologist or an MRSC Environment Department Officer with knowledge of indigenous vegetation to minimise impacts and avoid as much higher quality indigenous vegetation as possible
- Any vegetation removal should be undertaken using hand-held machinery that is cleaned prior to use.
- Any spoil from the track widening should be removed from the area and taken to the works depot.
- Any vegetation that is removed should be deposited in areas with less than 25% indigenous ground storey vegetation cover

Other issues to consider are potential construction impacts including:

- the actual construction of the track (it needs to be undertaken by a company that can work in sensitive sites with minimal to no impacts),
- storage of the construction materials (outside of Conservation Zones only), and
- the use of machinery and granitic sands/other track materials that is soil pathogen and weed free.

For these proposed works a Planning Permit would be required for any proposed loss of vegetation, and a Construction Hazard Management Plan (CHMP) for the actual works. A permit would also be required from Heritage Victoria.

### Recommendations

- *Prior to undertaking any widening works or constructing the passing bays, an on-ground assessment is required to determine the most suitable areas from an ecological perspective, in areas with the lowest indigenous ground-storey vegetation quality possible (Rec 46)*

## 8.4 Fauna Management

### 8.4.1 Limb/Tree Lopping, Arboreal Fauna and Pruning Techniques

One key ecological concern with regard to limb removal due to tree safety management works, is the impacts on fauna especially birds, bats and other arboreal mammals; with regard to the gradual loss of habitat and the inadvertent potential to injure or kill animals present in lopped limbs.

Many dead and/or larger limbs contain hollows or cracks, and smaller limbs can also contain cracks. Numerous Australian fauna species are dependent on hollows and/or cracks for roosting and breeding. Many Australian fauna species are also nocturnal, so it is likely that they will be sleeping during daylight hours when limb/tree removal works are undertaken.

In the cooler months some species, such as bats, also enter a state of torpor. It is unlikely these species would have the time to waken and react if their home was being removed in winter.

**It is critical that limbs and/or trees be inspected for the presence of fauna prior to undertaking any removal works.**

If fauna presence/use is detected then depending on the species and use, it may be appropriate to:

- Postpone the limb removal until any nesting species have left the nest (this would involve installing a temporary 'no go' zone under/around the affected tree/limb)
- Decide not to proceed with the limb removal
- Translocate the animal to an adjacent tree/habitat (following DELWP guidelines)
- If possible, retain the section of removed limb with a hollow, and securely install it as an additional, 'natural' nest box in an adjacent healthy tree/limb.
- If this is not feasible, limbs removed should be kept intact where possible, and placed on the ground to help establish large hollow log habitat in areas where none are present.

#### **Pruning Techniques– For all Arboreal Mammals**

There is advice available on pruning techniques that retain hollows or provide the opportunity for new hollows to occur (Australasian Bat Society website). These have been copied into Appendix 7, from the link: [https://docs.google.com/folderview?usp=sharing&id=0B0xd-xB2\\_AJwRlp6aE1icnd4NVk](https://docs.google.com/folderview?usp=sharing&id=0B0xd-xB2_AJwRlp6aE1icnd4NVk)

Information regarding pruning tips for bat habitat provided below is from the Australasian Bat Society. *These pruning tips are applicable to all arboreal mammals and tree hollows.*

#### **What do I do if I find a bat while pruning?**

Avoid pruning trees when female bats use hollows as maternity roosts (November – January), as large groups of females and their young (potentially hundreds of bats) may be killed when the branch or tree is felled.

1. If you notice microbats while pruning a tree – stop work immediately!

2. Avoid handling bats if possible, as they may carry the Australian Bat Lyssavirus, if unavoidable use gloves to avoid being bitten. Put bats into a cloth bag or other secure container until help can be obtained.
3. If you find bats within a section of lopped branch or trunk, lower the section to the ground or lean it against another tree, and leave it for at least 24 hours, to give any uninjured bats the chance to escape.
4. Do not leave bats out in the open or exposed on the ground, as they are vulnerable to predators such as birds and cats.
5. If there are any bats that appear injured or do not fly away, contact a wildlife shelter for assistance (call 'Help for Wildlife' – 0417 380 687 or 'Wildlife Victoria' – 1300 094 535). The bats can be collected and assessed for injuries and then released that night.

### **Tips for pruning branches**

1. DO leave as much of the branch as feasible while still considering public safety, and only remove branches that are considered unstable or prone to failure.
2. DO check for any hollows on the branch, and cut the branch well above any hollow you find.
3. DON'T remove the entire branch at its base, because leaving a stump may provide a hollow that bats and other species can use.
4. DO cut branches on an angle so that any remaining hollows don't fill with water when it rains.
5. DO try coronet cuts instead of traditional chainsaw cuts which result in an unnatural flat-plane surface. Coronet cuts are designed to mimic natural branch breakage, and provide more opportunities for micro-organisms to colonise and aid hollow development. Branches can be partially cut and then left to fall naturally, or where tree limbs are removed, a chainsaw can be used to carve a range of shapes which imitate natural fractures.

For more information on this technique, see the Arboricultural Information Exchange <http://www.aie.org.uk/vault/nfp.htm>

### **Limb/Tree Fauna Inspections**

Guidelines and procedures for fauna inspections prior to limb/tree removal works need to be developed and instigated to remove the potential for inadvertent harm to arboreal fauna during any tree maintenance works. They should include protocols for the handling and the potential re-location of any displaced fauna species within the Reserve. These protocols may vary depending on the species detected (birds, bats and/or arboreal mammals) and use (roosting or breeding). The annual limb inspections and removal works should be timed for the warmer months, and only urgent limb removals undertaken during the cooler months.

Currently all limb removal work in the Reserve is undertaken by arborists. Therefore procedures need to be developed to ensure arborists are aware of potential fauna habitat issues and that fauna inspections prior to limb removal are automatically undertaken in the Reserve. Procedures could be incorporated into contracts, be part of an induction process or put into the Job Safety Analysis (JSA).

Some fauna management guidelines for future limb/tree removal works include:

- Adopt the pruning techniques recommended by the Australasian Bat Society

- Aim to undertake limb removal in warmer months when fauna is more active
- Aim to only undertake urgent limb removal works in the cooler months
- Create noise disturbance prior to limb removal to encourage fauna to waken and leave the affected tree/limb
- If fauna is breeding, postponed limb removal until young have left the nest

### Recommendations

- *Ensure fauna inspections are undertaken prior to undertaking limb/tree removal works. (Rec 47)*
- *Incorporate pre-works fauna inspections into all planned limb removal works in the Reserve (Rec 48)*

## 8.4.2 Indigenous Fauna Management at Hanging Rock

### Indigenous Fauna at Hanging Rock

There are many indigenous fauna species that have been detected/recorded at Hanging Rock (refer to Appendix 3), including:

- 100+ bird species,
- 23 mammal species (including nine bat species),
- Three reptile species,
- One amphibian species and
- Three invertebrate species.

In addition, twelve of these species are considered to be threatened in Victoria, five are listed under the *FFG Act (1988)*, two are listed as migratory species under the *EPBC Act (1999)*, and one is listed as endangered under the *EPBC Act (1999)*.

The collated fauna lists presented in Appendix 3, illustrate that Hanging Rock has high faunal diversity, which is a reflection of the variety of habitat available across the Reserve, including: cliff faces, rock formations, large old trees with hollows, forest, open woodland, dense shrubby areas, riparian strips, riparian woodland, grassland and dams. Most of this habitat has been modified to some degree.

### Current MRSC Fauna Surveys

MRSC is undertaking a number of fauna monitoring and surveys within the Reserve, these include:

- Nest box surveys
- Spotlighting surveys, including January 2015
- Remote fauna camera surveys
- Owl Pellet dissections
- Anecdotal observations, and
- Bat surveys planned for March 2015 (W. Terry pers. comm.).

These fauna surveys/monitoring complement previous spotlights and surveys in the Reserve. As outlined in Section 4, most of the data from previous surveys is 'lost', and is now mostly anecdotal evidence.

Without on-going fauna data, it is difficult to comprehensively quantify the existing faunal values of the Reserve. This means faunal values may be ignored during some management actions (through lack of knowledge), which could have unforeseen impacts on particular species or numbers of species

### Indigenous Fauna Management

Some challenges with indigenous fauna management that have been highlighted during the EMP fieldwork and consultations include:

- The lack of baseline data on extent and diversity of fauna/individual species, in the Reserve
- The lack of information regarding the presence, or abundance of smaller (ground-dwelling) mammals, reptiles, amphibians and invertebrates
- The number of, and the current state, of nest boxes scattered across the Reserve
  - The Reserve has an abundance of natural hollows in the larger eucalypts, and often nest boxes can harbour pest animals species to the detriment of indigenous fauna
  - The nest boxes should be inspected regularly for pest animal usage
- The lack of a central data collation and management system to store and analysis information collected from previous surveys, and to coordinate future on-going surveys
- Maintenance of the perimeter fence
- Pest animal management
- Managing threatened species versus managing overall faunal habitat values
- Domestic dogs and cats entering the Reserve at night
- Dogs on lead within the Reserve
- Kangaroo and Swamp Wallaby numbers
- The reduction in Koala numbers
- Potential impacts of removing weedy habitat, and
- Lack of information about the impact of major events on native wildlife

Many of these issues are addressed separately throughout Section 8.4.

One key theme for all bushland management is how can the extent and diversity of indigenous fauna within a Reserve be determined and then all of the habitat/management requirements for all the species detected, be collated to produce a coherent set of indigenous faunal management guidelines? This is an issue for Hangin Rock and all bushland reserves.

Indigenous fauna management is complex; many species are interconnected (especially through the food cycle), and there is a general division between generalist and niche fauna species. There are a general suite of fauna that is present across most landscapes that can adapt to human disturbances and modified landscapes. Generally fauna management does not need to consider these species. It is the niche habitat species that require understanding and specialised management, and it is these species that are generally hard to detect within a reserve.

To understand the fauna in a bushland reserve requires on-going targeted surveying, that is appropriate for the species being surveyed for, and the on-going management of a data collation system.

At Hanging Rock, fauna presence and habitat it is not restricted to the Conservation Zones. They utilise the variety of habitat that is available across the Reserve. In general, fauna management applies to all of the Management Zones at Hanging Rock.

### Recommendations

- *Develop a Fauna Monitoring Action Plan for the reserve to facilitate collection of ongoing data and information about the presence/ absence of species, population densities and population changes. (Rec 49)*
- *Develop and implement a data management system to facilitate the collection of the data from fauna observations and surveys. This may include maps, GIS layers and other databases. (Rec 50)*
- *Utilise fauna data when undertaking major works to determine if additional fauna assessments and mitigation measures are required. (Rec 51)*

### 8.4.3 Threatened and Iconic Species Management

Twelve threatened species that reside within or utilise the Reserve, have been recorded to date. These species utilise different habitats across the Reserve: racecourse dam, racecourse grassland, aerial space, winter-flowering eucalypts, woodland and forest habitat, large old trees with hollows, logs and rocks.

Information on particular ‘iconic’ or threatened species recorded within the Reserve is presented below. Some of this information illustrates that management practices can have unintended consequences, which can impact on threatened and iconic species.

With most of the threatened fauna species, monitoring has been recommended as the initial option, as more needs to be known about these species and their usage of the Reserve before specific management recommendations can be made. Once more information is known about each of these species, a Threatened Fauna Species Management Plan could be prepared.

#### 1) Powerful and Barking Owls

Powerful owls are known to roost in many sites across the Reserve, and have been observed to rear two fledglings annually.

On-going observations and monitoring of the Owls would inform whether this breeding continues into the future. This monitoring could include use of remote cameras, spot light nights and daytime observations.

The Barking Owl (which has been recorded in the Reserve) has similar habitat requirements to the Powerful Owl. It is not known whether the Barking Owl resides/breeds within the Reserve or occasionally utilises it as part of their home range.

### Recommendations

- *Incorporate monitoring of the Powerful and Barking Owls into the Fauna Monitoring Plan for the reserve. (Rec 52)*

## 2) Wetland Birds and Racecourse Dam

Four threatened wetland bird species that have been recorded utilising the racecourse dam: the Australasian Shoveler, the Eastern Great Egret, the Hardhead and Latham's Snipe. All of these species are temporary, or in the case of the Snipe, migratory, visitors to the dam.

As the dam is primarily utilised for 'watering' the racecourse track and the East Paddock, its water levels fluctuate over the year, and it can dry up some years. This means the dam is not viable permanent habitat for most wetland bird species. It should be noted that Latham's Snipe utilises recently-exposed mudflats and grassland adjacent to dams.

Increased water storage and supply is required in the Reserve to "drought proof" the race course as there have been previous years when race meetings have had to be cancelled. Increased supply would also assist in irrigating the East Paddock for concerts. Increased water storage could be achieved through the provision of a recycled water pipeline from Woodend and would require on-site storage of the recycled water either via the dam or tanks.

Fauna use of the racecourse dam needs to be considered with any future plans for the dam, including maintaining the existing wetland flora and riparian habitat for wetland birds.

If increased water storage for the Reserve could be met via the use of water storage tanks rather than dams, the racecourse dam could primarily become wetland habitat.

Additional monitoring of the reserve's wetland birds would be useful to help determine the habitat requirements of wetland birds using racecourse dam and whether these species favour static or fluctuating water levels. This information could be used to determine the minimum water levels required in the dam at any time of the year to provide suitable wetland bird habitat.

### Recommendations

*Incorporate monitoring of wetland birds into Council's Fauna Monitoring Plan for the reserve. Include use of the bird census survey areas defined for the EMP (refer to Map 7). (Rec 53)*

## 3) Koalas

The koala is an 'iconic' species in the Reserve, and previously there was some concern about the apparent decline in koala numbers. According to research by the Australian Koala Foundation (2008), when there was an observed decline in koala numbers, there is sufficient habitat to support a minimum of 10 koalas in the Reserve and local area, but the annual koala count numbers show fluctuating numbers within the Reserve (refer to Table 7). The most recent count in January 2015 recorded nine individuals, which is close to the carrying capacity of the Reserve.

The 2008 AKF report recommended a number of research actions to:

- Determine the koala population in the surrounding areas,
- Determine koala 'crossing points' across roadways, and
- Map koala fatalities.

This information was considered necessary before considering any 'reintroduction' programs into the Reserve (as per the 2008 AKF report).

The death, or decline in the health of preferred foraging trees (Manna and Snow Gums), such as through events like major storms, may also have some influence on the Reserve's current koala carrying capacity.

#### Recommendations

- *Incorporate data collection on koala numbers, movements and fatalities in the local landscape into Council's Fauna Monitoring Plan for the reserve. Refer to the AKF's report for guidance. (Rec 54)*

#### 4) Peregrine Falcons

Currently another 'iconic' species, the Peregrine Falcon, nests in the cliff faces of Hanging Rock. It's nesting area, which is clearly visible from the east paddock, should be protected from any human activity.

#### Recommendations

- *Protect the peregrine falcon's nesting area from human activity such as rock climbing (which is currently prohibited). (Rec 55)*

#### 5) Other Threatened Species

Other threatened species recorded at Hanging Rock include:

- Grey Goshawk (occasional visitor, and recently recorded during a spotlight survey in January 2015)
- Brown Treecreeper (resident in woodland on the northern side of rock)
- White-throated Needle-tail (aerial space above Reserve)
- Swift Parrot (occasional or regular (?) visitor during autumn-winter when eucalypts are flowering)
- Greater Glider (two family groups have been observed in the Reserve)

Brush-tailed Phascogale (have been recorded previously, but have not been observed recently. Not known if they still reside within the Reserve. Additional monitoring of these threatened species would help determine what management actions are required to protect and enhance existing populations of these species.

#### Recommendations

*Prepare and implement a Fauna Monitoring Plan for the reserve, including identification of resource requirements, to determine the presence/absence, population and locations of previously recorded threatened species such as Greater Gliders and Brush-tailed Phascogales (Rec 56)*

### 8.4.4 Fauna Data Management and Knowledge Gaps

Numerous spotlight walks, and other fauna surveys have been undertaken in the Reserve over many years. It has been difficult to gather all of the data from these sources for the EMP. This highlights a lack of appropriate data collection and storage/retrieval methods.

Currently, most of the fauna knowledge for the Reserve is held by the Head Ranger, some MRSC officers and people associated with the NDLG, Friends of Hanging Rock and local bird observers.

In conjunction, fauna monitoring needs to be appropriate for the species being surveyed, and the data needs to be stored appropriately and consistently. Baseline fauna surveys to provide presence/absence, population densities and locations data; is essential to being able to effectively monitor fauna changes in the Reserve over time. It is also essential to monitoring the impacts of management practices on fauna.

This EMP has attempted to collate the fauna information that could be sourced (refer to Appendix 3). This information should be utilised to 'store' data from future surveys and as a component of an effective fauna data management system, which will also act as a valuable reference resource. The management and maintenance of a fauna data management system will require an on-going commitment from MRSC.

Ideally the fauna data management system (or part thereof) would be a community resource, and linked with established fauna databases, such as DELWP's Victorian Biodiversity Atlas, the Atlas of Living Australia and BirdLife Australia's Atlas of Australian Birds – this will ensure data accuracy, verification and approval, and access to metadata resources.

The fauna data collated in Appendix 3 highlights knowledge gaps within the reserve; there is little (or no) information on smaller (ground-dwelling) mammals, reptiles, amphibians and invertebrates.

There is also little data on fungi throughout the Reserve.

## Recommendations

- *Develop an effective fauna data management system that stores the results from fauna surveys in a format that can be easily accessed by Council staff, including the Reserve Rangers, and can be used to analyse population trends and changes. (Rec 57)*
- *Consider creating a community based fauna data management system, that is linked with established external fauna databases (Rec 58)*
- *Prepare and implement a Fauna Monitoring Action Plan that includes actions to target fauna knowledge gaps (Rec 59)*
- *Investigate opportunities to undertake fungi surveys within the Reserve, potentially in partnership tertiary institutions and existing networks utilising the established 'FungiMap' ([www.fungimap.org.au](http://www.fungimap.org.au)) (Rec 60)*

## 8.4.5 Kangaroos and Swamp Wallabies

### Kangaroo Numbers

There has been an overall increase in kangaroo numbers throughout the Macedon Ranges Shire in the last 10 or so years. This has led to a corresponding increase in kangaroo numbers at Hanging Rock.

The general Hanging Rock area, with its large open cleared grassy areas and easy access to water (dams) is conducive to kangaroos. Prior to dams, which provide permanent water sources, kangaroos numbers were managed according to the food and water resources that were naturally available. With the advent

of dams, food and water has become readily available, which has led to an overall increase in population numbers in areas with lots of available water.

Currently, there is a sizeable Eastern Grey Kangaroo population in the Reserve (estimated at between 200–300 kangaroos), that is centred in the racecourse grassland and East Paddock during the day, but which graze in the picnic areas around the Rock (outside opening hours) as evidenced by the large amount of scats across the lawn. Many people connected with the Reserve consider that the population is too large. However, there is no evidence to back up these assertions.

Anecdotally, the kangaroo grazing has reduced mowing costs around the racecourse over the past few years, due to the increase in numbers (A. Walsh pers. comm.). The kangaroos also graze on revegetation, causing the rangers and NDLG to establish 'graze-proof fencing' around their plantings.

The main evidence of overgrazing within the Reserve is in the racecourse grassland. Currently it is not known whether there is a 'kangaroo problem' in the Reserve, and if so, what should be done to manage it. Conversely if kangaroo numbers are reduced, it is not known how this would impact existing management requirements relating to the native grassland or the East Paddock.

Kangaroo management is problematic. Some people advocate culling. However unless kangaroo management is undertaken on a landscape level, and alterations are made within the landscape to reduce/eliminate the factors which are causing kangaroo numbers to increase, then culling is a temporary measure at best, which has a host of associated issues, one being it can be considered inhumane by some community members.

Aside from the expensive option of constructing a kangaroo proof perimeter fence, and then managing the population contained within the Reserve (which also has a host of management considerations), there are no immediate or practical solutions to the perceived kangaroo problem at the Reserve.

Potentially limiting access to the racecourse and other dams within the Reserve could control the kangaroo population, however other fauna species also rely on the dam, so limiting access could have unforeseen faunal impacts to a wide variety of species.

### **Swamp Wallabies**

There is also concern about the Swamp Wallaby numbers. Wallabies are a cryptic species that tend to reside singularly in dense bushland. It is surmised that Wallabies are a management issue, as young plantings around the Rock have been eaten or damaged by browsing, and subsequently have to be protected.

### **Major Events**

Kangaroos are a management issue during the two annual races, as the presence of kangaroos on the track necessitates race stoppage, due to the potential for injury to kangaroos, horses or jockeys. For this reason, the kangaroos are locked out of the East Paddock using the high perimeter fences and gates prior to the races, under arrangements prepared in conjunction with DELWP. A high, perimeter fence has been purposely constructed between the racecourse and the East Paddock, and the fence is patrolled for kangaroos during race days.

Consideration is also given to kangaroos during the concerts and other major events, as they can be easily startled and have been observed amongst parked cars, causing potential safety issues for the kangaroos and the public.

The Reserve's managers have been observing the kangaroos and their actions during the major events, and have commenced a number of actions to better manage the kangaroos during the main events based on the success of the plan implemented by the racing club.

These actions have included installing a gate at the south-east corner of the race track, to aid kangaroo movement into the Conservation Zone to the south of the race track, and security and signage to prevent human incursion into the areas used by the kangaroos during major events.

Higher fencing and gates may also be installed along the boundary between the mown and unmown southern portion of the East Paddock (near the creek area) to prevent the public from disturbing kangaroos resting in the area. Access will be available out of this area for the kangaroos to the south, east and west during concerts.

### **Monitoring and assessment**

An assessment of Kangaroo and Swamp Wallaby numbers and the site's carrying capacity for these species would help determine appropriate management actions to protect the site's native vegetation and ensure the safety of kangaroos and the public during major events. This could include transect counts to estimate population density as well as other monitoring techniques, such as the installation of wildlife cameras at the racecourse and the site's water sources.

### **Recommendations**

- *Prepare and implement a Kangaroo Action Plan that reviews the carrying capacity of the reserve and identifies appropriate actions to manage population numbers (if required) and kangaroo management during major events. (Rec 61)*
- *Investigate and implement the installation of fencing and gates along the boundary between the mown and unmown southern portion of the East Paddock (near the creek area) to prevent the public from disturbing kangaroos resting in the area during major events. (Rec 61a)*

### **8.4.6 Nest Boxes**

There are numerous nest boxes located throughout the Reserve, which have been installed by the rangers and community volunteers over the last 20 years. There are a number of bat boxes to the south of the racecourse, which were donated by (the then) DEPI and installed by the Rangers. Until recently, it appears that the nest boxes were not inspected (W. Terry pers. comm.).

The number of nest boxes within the Reserve is surprising, considering the number of large old trees that are likely to contain hollows. According to the MRSC Environmental Programs and Education Officer:

- There are only about 10 nest boxes in the reserve targeting gliders/possums
- A large proportion of the nest boxes are 'bat boxes'

- All of the nest boxes have glider nests present, suggesting that while there are many hollows, there may be a limitation on a particular hollow feature, e.g. entrance location and dimensions, hollow depth and quality, etc.
- The boxes (for the bats/gliders/possums) have been designed to deter invasive species
- Even if the nest boxes are not being used by animals, they are considered an excellent tool for raising awareness about the importance of hollows; particularly in areas of high public usage

Nest boxes (even empty ones) serve multiple purposes, including monitoring for species, and providing habitat and education opportunities for the community about the role of hollows (W. Terry, pers. comm.).

MRSC plans to inspect all nest boxes in the Shire regularly. One of the purposes of the nest boxes is to monitor for elusive species, such as the Phascogale. A pole-mounted inspection camera will be used to check inside each box, so no ladders are needed, which reduces OH&S concerns and reduces impacts on animals that may be present within the boxes.

Once annual inspections of the nest boxes are commenced, it needs to be an on-going commitment. If nest boxes are not monitored and maintained, there is little purpose in installing them, unless there are clear objectives to provide habitat for certain species (that is backed up by research).

Apart from the monitoring program the nest boxes should remain undisturbed.

Opportunity also exists to utilise the nest boxes as a community engagement tool by involving local schools and community groups in the inspection program and by installing wildlife cameras within or outside the boxes to capture activity and broadcast it within the visitor centre or on Council's website. Signage along the walking tracks near the nest boxes would also enhance community knowledge about their purpose and function.

### Recommendations

- *Prepare and implement a Fauna Monitoring Action Plan that includes a regular monitoring regime for existing nest boxes and that explores opportunities to utilise small wildlife cameras within the nest boxes that broadcasts footage to the visitor centre and, potentially, Council's website (Rec 62)*
- *Install signage along the walking tracks under some of nest boxes, to provide information about their use in the Reserve. (Rec 62a)*

### 8.4.7 Bats

Two previous bat surveys in 2008 and 2010 recorded nine species of bats in a small area of the Reserve, along the lower section of the Summit Walking Track. Bats were trapped below canopy level. All of the species recorded roost and breed in hollows or crevices of dead or alive trees. Essentially two types of bats were recorded: bats that forage amongst the vegetation, and bats that fly and forage above the canopy.

24 White-striped Freetail Bats were recorded in the 2008 survey. Detecting such a large number of this species, which is an above canopy foraging species, indicated that a maternity site was located near the survey site. It was surmised that it is likely that there is large old tree with a large hollow in it is trunk, that could house up to 100 bats, located near the lower end of the Summit Walking Track. This tree would be a significant breeding site within the Reserve for the White-striped Freetail Bats (pers comm. L

Lumsden). The maternity site should be protected from any inadvertent management practices (ie: limb lopping or controlled burns) that could impact upon breeding for the White-striped Freetail Bat.

As only a small portion of the Reserve has been surveyed, it is probable due to the number of large old trees scattered across the Reserve that bats roost and breed in several sites across the Reserve.

General information about bats and their roosts is provided below:

- In Australia, most “microbats” (small, insect-eating bats) rely on shelters like tree hollows as a place to roost, where they can rest and find protection from predators and extreme daytime temperatures.
- Bats use roosts for shelter during the day, and also at night when they rest between feeding excursions.
- During the breeding season, female bats will group together in maternity roosts to raise their young. Groups of breeding females are often found within the trunks and branches of trees, while males find shelter under shedding bark.

Many bats like to use a number of roost sites, moving between them on a regular basis, so it’s important to have many suitable roost trees for bats to use (Australasian Bat Society).

#### **Recommendations**

- *Prepare and implement a Fauna Monitoring Action Plan that includes regular bat surveys for population numbers and species and which aims to locate the maternity site/s so it can be protected. (Rec 63)*

#### **8.4.8 Major Evening Events: Noise, Light and Fauna**

A number of evening events are held at the reserve through the warmer months of the year. These include the annual film night and campout in the main reserve and large concerts in the East Paddock. Other evening events have been held over the years such as a Carols by Candlelight and Commonwealth Games celebrations.

The potential impact on fauna should be considered, and has to date included: not allowing concerts during the breeding season for the Powerful Owls (between April to September), ensuring that any lighting used is low key and not of the laser variety around the rock itself, and ensuring that the areas Kangaroos are resting in is not disturbed by the public with security and the like. There are currently only a handful of evening events and this is not expected to increase substantially.

Whilst it is not possible to predict the impacts of noise and light on every fauna species, some generalisations can be made:

- Some species (such as the Eastern Grey Kangaroos) can become habituated to human noise (pers comm A O’Malley)
- Static lighting is likely to have less impact than non-static lighting as fauna (bats) can avoid the lit area for the duration of an event (pers. comm L. Lumsden)
- Any pyrotechnics should avoid noise impacts

- The use of lights/noise should be limited to the warmer months when most fauna (bats) is more active, so they can move away from the area easily (pers. comm L. Lumsden)
- As most nocturnal fauna (bats) leaves their roosts/nests during the dusk period (from early to late dusk), any fireworks should be timed for after dusk, when the vast majority of species have left their roosts and can safely move to alternative areas for the evening (pers. comm L. Lumsden)
- Without baseline data for all the species that exist at Hanging Rock, it is impossible to predict the effects of the concerts on all species.
- As previously recommended further fauna surveys are needed to gather baseline data, and then research on specific species may be required.

### Recommendations

- *Take into account the following principles when planning major night time events:*
  - *Limit use of animated lighting (e.g. flashing, strobe or laser lights) on areas inhabited by wildlife*
  - *Avoid use of pyrotechnics with significant noise impacts*
  - *Aim to avoid use of fireworks in the cooler months and before dusk (Rec 64)*
- *Prepare and implement a Kangaroo Action Plan that includes considerations in regard to Kangaroos and public during major events. (Rec 65)*
- *Prepare and implement a Fauna Monitoring Action Plan that aims to assess whether the major events held at the site have an impact on native wildlife within the reserve. (Rec 65a)*

### 8.4.9 Pest Animal Management

Pest animal management is difficult in most bushland reserves, unless they have predator proof fencing.

There are a large variety of pest animals and it is not always possible to control all of the pest animals present and the threats they pose. Therefore pest animal management needs to be targeted depending on what ecological/management objectives are to be achieved, such as threatened species management, asset protection or specific threats.

The remote cameras at the Reserve have shown some interesting results, such as the presence of black rats, rabbits, foxes, blackbirds, cats and an absence of small native mammals, such as Antechinus species and the Bush Rat. Some information on each of these pest species is provided below:

- Foxes – known predators and carriers of weed seeds
- Rabbits – observed continuously, even after several targeted fumigation programs in 2014. It is assumed there is a large population amongst the Bracken on the southern and eastern slopes of the Rock.
- European Blackbirds – observed throughout the Reserve, are known to displace indigenous birds
- Cats – both feral and domestic are regularly recorded and are highly likely to be preying upon many small animals and/or causing pathogenic disease or deaths in larger animals

- Black Rats – possibly out-compete native Bush Rats and Antechinus species for food and habitat.
  - The remote cameras pick up large numbers of Black Rats around the Rock in the bushland areas. They are also likely preying upon native birds and small mammals.
  - Multiple rats have been recorded at ground level and on lower branches of trees.
  - To date, no Bush Rats or Antechinus species have been found– and it is questioned whether this is due to the presence and abundance of Black Rats (W. Terry pers. comm.).

At this stage only rabbit and fox control has been undertaken in and around the Reserve, and whilst rabbit numbers have reduced, the fox trapping trial was not successful.

It is unlikely that European Blackbirds or Black rats will be controlled, unless a specific threat from them is identified as an outcome of the Fauna Monitoring Action Plan that has been recommended in this EMP.

With regards to cats, feral and domestic cats are currently managed via the existing cat trapping program run through MRSC (refer to Section 8.4.10).

For successful pest animal control programs, initial pest animal numbers are needed, and once control has occurred, monitoring to follow up on post-control numbers is required to determine if the program has been successful. Once numbers have been reduced/eliminated, then on-going control is required to ensure other pest animals do not move into the area/reserve.

Successful pest animal control programs are on-going and resource intensive, and unless they are undertaken in conjunction with other management practices such as eliminating pest animal harbour or constructing predator proof fences, then it is questionable in some circumstances how effective pest animal management is, especially if there is a lack of baseline data available on the diversity of indigenous fauna species present and their population numbers.

There is the potential that scat analyses can be utilised, in conjunction with other pest animal control methods, to determine what pest species (specifically foxes and/or feral cats) are eating, which can also provide useful information for pest control programs.

Information on specific pest animal control methods for rabbits and foxes is provided below:

### **Rabbits**

Rabbit control is best achieved when done as part of a synchronously coordinated rabbit control program undertaken throughout the local area. Management of rabbits across a site also needs to involve an integrated approach using a combination of methods most suitable to the site. Potential methods include baiting, warren destruction, fumigation and others.

It is imperative that during any rabbit control regime, precautions are taken to reduce the impacts to native vegetation and native wildlife and domestic animals. These precautions include:

- use an appropriately qualified service provider experienced in various techniques for rabbit control
- consider the impacts of warren destruction on indigenous vegetation that is present and Aboriginal cultural heritage values

- if ferreting is to be undertaken consider the potential impacts of ferret escape and ensure adequate measures are in place to prevent/manage ferret escape
- if baiting is undertaken the service provider should ensure:
  - the amount of poison used is suitable to the number of rabbits that are present (only possible after an assessment of the rabbit population)
  - the use of bait stations, such as cage like structures to exclude large mammals given that baits, particularly carrots, can be attractive to marsupials
  - bait stations are placed in the area of rabbit feeding activity and not next to the burrow entrance
  - collection of any uneaten baits the morning after baits are laid
  - collection of any dead animals that are present across the site
  - signage at entrances to the site and on information boards to alert users that poisoning will occur up to one week prior and the date that it has occurred
  - following up baiting with an integrated long-term control regime that could potentially include fumigation or warren destruction.

It is imperative that any contractors or other personnel undertaking rabbit control do so in accordance with statutory requirements. This includes any training and permit requirements associated with the purchase and application of rabbit poisons and baits, along with record keeping requirements. The delegated land manager has the ultimate responsibility for ensuring that any contracted or voluntary works comply with all statutory and legislative requirements associated with pest animal control.

### **Foxes:**

Foxes are known carriers and spreaders of weed seeds. It is thought that foxes are the biggest spreaders of blackberries within Victoria. They are also harmful to livestock and indigenous fauna.

Control of foxes requires an integrated approach coordinated with land managers in the surrounding area. The major methods of fox control include shooting, soft-jaw trapping and baiting by a licensed pest controller. All of these methods need to be undertaken by appropriately skilled and qualified personnel. They must have appropriate training and certification regarding baiting in particular. They also need to use their skills and experience to choose the most appropriate control methods

There are also concerns with baiting programs (especially) for foxes, as baiting can impact on domestic dogs and some indigenous fauna species, especially if undertaken in reserves close to residential properties.

### **Recommendations**

- *Collect baseline data on fauna present (both indigenous and pest animal species) within the Reserve, population numbers and population locations as a part of implementing the Fauna Monitoring Action Plan (Rec 66)*
- *Prepare and implement a pest animal management program to target specific species as required (Rec 67)*
- *As a part of implementing the pest animal management program, monitor the outcome of pest animal control to determine if pest animal numbers have reduced and if the objectives of the control program have been achieved. (Rec 68)*

- *As part of any fox control program, do not undertake fox baiting in the Reserve due to the proximity of surrounding properties and domestic animals (Rec 69)*
- *Undertake community engagement when implementing pest animal control works to facilitate participation of surrounding land owners. (Rec 70)*

#### **8.4.10 Domestic Dogs and Cats entering the Reserve at Night**

The remote cameras also detected domestic dogs and cats entering the Reserve at night from adjacent properties. They primarily enter via holes under the perimeter fence. Many of these holes have been created by wombats that leave the Reserve at night, to drink from nearby dams on residential properties.

At Hanging Rock, all of the dams are located in the southern portion of the Reserve, or in the racecourse, away from the western and northern slopes of the Rock. Therefore fauna residing in this section of the Reserve tend to seek water from adjacent properties, causing constant holes in and under the perimeter fence, which then allows domestic animals to enter the Reserve.

The issue of maintaining the perimeter fence versus not blocking water access for indigenous fauna is problematic. A key issue is that domestic dogs and cats should not be entering the Reserve at all.

Any solutions to this issue need to be undertaken in cooperation with the adjacent landholders. It is likely some of them are unaware their domestic animals can enter the Reserve at night. Others may be unaware of their impacts, and others may be aware of their impacts but not convinced, or concerned.

Some potential solutions to the issue could involve: on-going education and consultation with the adjacent landholders, or improving the perimeter fence (refer to Section 8.4.12).

An associated issue concerns investigating and installing a 'northern' water point in the Reserve which could be used by fauna, to reduce the number of holes being created in and under the fence (refer to Section 8.4.11).

With regards to cat control, both feral and domestic cats are currently managed via the existing cat trapping program run through MRSC.

#### **Recommendations**

- *Continue to implement shire-wide campaigns encouraging land owners to secure their pets. (Rec 71)*
- *Monitor the perimeter fence regularly and undertake maintenance works as required to prevent access by domestic dogs and cats from adjacent areas. (Rec 72)*
- *Consider upgrading perimeter fence to a full predator proof standard to further restrict entry (Rec 73)*

#### **8.4.11 Northern Water Source for Indigenous Fauna**

As outlined in Section 8.4.10, one of the main issues with maintaining the perimeter fence along the western and northern boundaries of the Reserve is that indigenous fauna (in particular wombats) create holes under the fence to access water from the nearby dams.

It has been suggested that creating a water source in this area of the Reserve may solve this issue (W. Terry pers. comm.). It is an innovative solution. However, a number of matters would need to be resolved to implement this idea, including identifying a suitable location for the water source, determining an appropriate size and establishing a mechanism to replenish the water source.

### Recommendations

- *Investigate establishing a water source on the northern side of the reserve. (Rec 74)*

## 8.4.12 The Perimeter fence

Prior to the 1993 Management Plan (Loder and Bayly), there was only limited fencing around the Reserve's perimeter. It was a recommendation of that Management Plan that the current perimeter fence be installed.

The perimeter fence is not based on current predator-proof fencing designs, and it is not effective in preventing the access of cats or dogs (and potentially other pest animals) into the Reserve. The fence also contains barbed wire along the top, which results in it being wildlife-unfriendly.

Predator proof perimeter fencing is currently being used to manage pest animals, to increase indigenous fauna species numbers and diversity, and to maintain populations of threatened fauna species in many areas of Australia (and New Zealand). Predator-proof fences are generally successful at managing and increasing the diversity and numbers of indigenous fauna (including threatened) species.

However there are a number of considerations associated with these fences- aside from their construction costs, the fences need to be inspected daily and maintained regularly and pest animal control programs are needed inside the fences to eliminate all existing pest animals species (mostly feral cats, foxes, deer and rabbits).

In the next 5-10 years, another perimeter fence of a different predator-proof design that caters to a variety of management needs should be investigated for Hangin Rock. Until then, the barbed wire along the top of the fence should be removed.

Determining an appropriate new fence design will depend on the objectives of the perimeter fence, which could include:

- To define the perimeter of the Reserve
- To prevent access of pest animals
- To allow free movement of indigenous animals

### Recommendations

- *Remove all barbed wires on fences around and within the Reserve (Rec 75)*
- *Prepare a Perimeter Fence Plan (including for the East Paddock) which identifies the aims of the perimeter fence and provides an appropriate design to achieve these aims. Conduct research into successful reserve fencing as required. (Rec 76)*

### 8.4.13 Dogs on lead within the Reserve

Dogs are currently allowed in the Reserve on a lead, however there is limited or no signage stating they should be on-leash at all times. There are also no 'dog poo' bags/disposal bins available.

Dogs have the potential to chase wildlife, and their poo and scent marking act as 'predator scents' to many indigenous fauna, which may alter their behaviour and movement patterns.

It is recommended that dogs be restricted from entering the Core Conservation Zones – i.e. The Rock (CCZ1) and the Racecourse Grassland (CCZ2) within the Reserve and that the on lead policy be enforced in all other areas.

Implementing this approach will require additional signage notifying visitors where dogs are/are not permitted. It is also recommended that the Reserve Rangers be designated as "authorised officers" who would provide them with the powers to issue official warnings and fines under Council's local law if required.

#### Recommendations

- *Install additional signs advising:*
  - *that dogs are prohibited from entering the Core Conservation Zones*
  - *that dogs must be on the lead at all times in all other areas (Rec 77)*
- *Designate the Reserve Rangers as "authorised officers" capable of enforcing Council's local law (Rec 78)*
- *Review the policy of allowing dogs into the Reserve, if a predator-proof fence is constructed around the Reserve (Rec 79)*

### 8.4.14 Lighting and other infrastructure

Lighting is known to have impacts on bat species in urban areas that are photosensitive. Street lights are known to alter some bat populations; with the light intolerant species losing their habitat range and, conversely, the light tolerant species increase their range.

In October 2014 lighting was installed around the car parking and along the southern section of Racecourse Road for use during major events. The lighting installed was low impact and only provides light to a small part of the reserve (in the Recreational Zones) for a few evenings each year. Therefore bats should be able to avoid the lit areas.

Overall, the existing lighting is not likely to have a significant impact on wildlife in the reserve due to its low intensity and infrequent use. Any change to this lighting, or any new lights or infrastructure proposed should consider possible faunal impacts. One way to ensure this occurs would be to refer proposed infrastructure proposals to Council's environment staff. Comments from a qualified zoologist may also be useful in some cases.

## Recommendations

- *Utilise the data collected as a part of the Fauna Monitoring Action Plan when planning infrastructure projects. (Rec 80)*
- *Refer infrastructure proposals for the site to Council's environment staff for comments as required. (Rec 81)*
- *Undertake targeted faunal impact assessments of proposed infrastructure works as required. (Rec 82)*

### 8.4.15 Disposal of Deceased Animals

Due to the fauna population within the Reserve, there are approximately 5–10 dead larger animals annually (especially kangaroos, wombats and koalas) whose remains need disposing of. Currently the pouches of deceased marsupials are checked, and their bodies are disposed of within green waste stockpiles for future burning.

The bodies of smaller animals are generally not a problem as they are not often located near the walking tracks or in the Recreation Zones. For example, Swamp Wallabies are a cryptic species; they usually die away from areas with high human activity.

Possible alternatives to stockpiling include removing their remains with the general rubbish and disposing of them at the Council waste facility, burying them in pits away from public areas or disposing of any bodies in any waste piles that accumulate in the on-site depot. It is likely that disposal will be opportunistic depending on when animals die and what resources are available to dispose of their bodies at that time.

## 8.5 Car Parking (Major Events) and Tree Management

### Car Parking

All of the Recreation Zones are currently maintained for use as overflow car parking during the major events hosted within the Reserve. Numerous large old trees and groups of trees are located in the Recreation Zones. For the majority of the year, the main areas of the Reserve that are utilised are the picnic grounds to the south of the Rock. However for approximately 2 to 4 days/events a year, most of the Reserve is utilised for car parking.

One of the management challenges within the Reserve is the conflict between the habitat values of the trees in the Recreation Zones and the need to manage these trees for public safety. Large areas of the picnic grounds to the south of the Rock, to the north of the racecourse facilities and along Smokers Creek are maintained for public safety.

### Width of Riparian Zone

From an ecological perspective, a 30 metre wide riparian corridor is desirable for the length of Smokers Creek. As depicted in the Management Zones map, a 30 metre wide riparian corridor has been designated for approximately three quarters of the length of Smokers Creek (and its' tributaries) within the Reserve. For the remaining quarter of the creek, that is adjacent to the main picnic grounds to the south of the Rock, the riparian zone has been defined as six metres (6m) wide.

The narrower riparian zone in the recreation area aims to preserve the recreation functions of the open picnic areas, maintain access to the creek for visitors in select areas and to maintain the picnic character of the reserve as observed from the main access road. As stated in the Project Brief, one objective of the EMP is:

*To establish a prioritised program of management actions aimed at conserving and enhancing the site's environmental values while managing environmental risks and maintaining the reserve's recreation and tourist functions*

If works focus on weed control and revegetation in the proposed riparian zones, that dramatically improve the habitat values of the corridor whilst also providing an aesthetic landscape feature, then consideration could be given towards increasing the riparian width corridor to 30 metres for the full length of Smokers Creek within the Reserve, in the future.

### **Tree Management**

In conjunction with potential limb lopping, most of the Recreation Zone (especially the picnic grounds to the south of the Rock) is maintained as manicured parkland with large trees and lawns. Most of the trees are currently mown underneath. .

Due to the recreational uses and major events within the Reserve, limb/tree assessment and potential limb lopping will continue to occur in the Recreation Zones. Macedon Ranges Shire Council has a duty of care for users of the Reserve, and is obliged to undertake tree maintenance for public safety when deemed appropriate by an arborist.

Whilst it will not be possible to eliminate limb assessments and potential removal from the Recreation Zones, there are a number of other management strategies that can be adopted to improve habitat and tree management within the Recreation Zones, which are provided in dot points below, and then described in further detail:

- The creation of Tree Conservation Areas around some groups and/or single trees growing in the Recreation Zones (refer to Section 8.5.1)
- Undertaking fauna assessments prior to limb lopping works
- Altering limb pruning techniques to reduce habitat loss in lopped limbs
- Mulching around the base of trees, and ceasing mowing
- Council investigating the option of leasing or purchasing adjacent land (if it is on the market) to provide other options for car parking during major events and to potentially increase the extent and number of Conservation Zones within the Reserve.

### **8.5.1 Tree Conservation Areas**

Whilst the current limb/tree assessment and limb lopping/tree removal public safety management works will continue in the Recreation Zones; staged Tree Conservation Areas will be implemented around certain groups and/or single of trees across the Recreation Zones.

Implementing Tree Conservation Areas (TCAs) will involve:

- Defining the perimeter of the TCAs with suitable large limbs

- The perimeter will be determined based on adjacent site conditions including existing tracks, gates and other infrastructure
- Most of the perimeters will be located within the drip-line of the trees although in some cases this may not be possible if the drip-lines extend over walking tracks, existing formed car parks or if they will significantly reduce the recreation or open parkland landscape values of the reserve.
- Once defined, mowing within the TCAs will cease and the TCAs will be mulched or planted with native ground cover and shrub species
- Smaller fallen and/or lopped limbs will remain or be relocated (from adjacent mown areas) into the TCAs as appropriate
- Larger fallen/lopped limbs may be moved and utilised around the perimeter of other TCAs or Management Zones as appropriate.

As the perimeter of the TCAs will be generally located in the drip-line of the trees, the current limb/tree assessment and lopping/tree removal management works will continue around the TCAs as required.

Whilst the TCAs will not eliminate limb lopping/tree removal management works, they will ensure large mature trees, or groups of trees, are primarily managed for conservation purposes in the Recreation Zones. Mowing underneath will be eliminated, understory will be planted and habitat for ground dwelling fauna will be created.

The implementation of TCAs will be a staged process that is dependent on the availability of resources (large limbs to define the perimeter of the TCAs), staff time and budget. For the next four years (until 2019) Reserve management will be allocating funds annually to implement the TCAs.

The location of initial TCAs (which have been determined through on-site meetings as a component of this EMP), are presented in Map 11. Once the initial TCAs have been implemented, future TCAs may be implemented depending upon a number of factors including significant trees to be 'protected', the current Reserve uses, resources and budget. Irregular access to maintain existing uses may still be required in some TCAs, ie: the loading ramp in one TCA at the northern end of the racecourse may still be required periodically to unload/load horses into floats during the two annual racing events.

### Recommendations

- *Commence TCA implementation in 2015/16 financial year (Rec 84)*
- *Commence and sign post a large limb stockpile suitable for use to define perimeters of TCAs and other Conservation Zones as an interim measure until the on-site depot is functional. Once the on-site depot is functional, large limbs will be stockpiled in the depot, and then won't need to be signposted (Rec 85)*
- *Stockpile mulch from indigenous green matter for use in TCAs and under trees in Recreation Zones as an interim measure until the on-site depot is functional. Once the on-site depot is functional, mulch will be stockpiled in the depot*
- *Design and install appropriate signage to identify some TCAs and outline their function (Rec 87)*
- *Install understory plantings (indigenous shrubs and understory plants) in TCAs, suitable to EVC with appropriate planting densities (Rec 88)*

- *The large limb and mulch stockpiles may be located in low-usage areas of the Recreation Zones (until the on-site depot is constructed) or in the on-site depot/works yard (Rec 89)*

### 8.5.2 Mulching around the Base of Trees

Best practice tree management has resulted in many urban parkland managers mulching around the base of trees. Mulching is undertaken to conserve water by lowering evaporation. Mulch also adds organic matter to the soil. As it breaks down, it gives soil properties to retain nutrients and water. Mulch also suppresses weeds. As grass often does not grow that well under trees, mulch can be more visually appealing than bare earth. Some principles for the use of mulch include:

- Good organic mulch should be used. The mulch needs to be coarse to allow water penetration. Ideal mulch is limbs from indigenous trees that have been chipped and are 2–5mm in size
- Mulch should be approximately 100mm deep
- No weed species, exotic species or Pine trees should be used as mulch

Considering the large numbers of trees growing in the Recreation Zones in the Reserve, it may not be practical to mulch around the base of every tree. The priority would be to mulch around trees in the high usage areas, and around isolated trees such as the larger trees near the cricket club.

#### Recommendations

- *Replace the lawn directly under selected trees throughout the Recreation Zone with indigenous mulch. The mulch should be extended out to the tree's drip lines where this does not significantly reduce the area available for recreation. Commence in the picnic areas to the south of the Rock, and slowly work eastwards and to the north*

### 8.5.3 Adjacent Land Purchases

MRSC purchased the East Paddock over 20 years ago, to alleviate the picnicking and event pressure on the sensitive crown land reserve to the south of the rock by providing suitable unencumbered recreational space further to the east of the original reserve. The purchase also ensured that the reserve was not surrounded by residential development as it now is on three sides. The purchase has also allowed for the expansion of habitat areas particularly for kangaroos.

Council should consider purchasing any appropriate adjacent land that comes on the market surrounding Hanging Rock for the same reasons as above.

The purchase of any additional land could be utilised to provide some car parking for major events, so that more areas within the current Hanging Rock Reserve, could become Conservation Zones if they are not required for recreational purposes.

#### Recommendations

- *Consider purchasing any suitable land adjacent to the Reserve if it becomes available*

## 8.6 Other/General Management Issues

### 8.6.1 On-the-ground 'Demarcation' of Management Zones

The extent of the Management Zones and some of the Tree Conservation Areas is depicted in Map 11. However it will not be evident for land managers, volunteers, contractors and the other (recreational) users of Hanging Rock where these zones actually occur on the ground.

There was some discussion during the external stakeholder consultations, that installing markers to define conservation areas would lead to a permanency, which meant there were no future options for these areas to be altered or enlarged. However as was evident during the New Years' Day races and the Classic Car Display, the car parking is often undertaken by volunteers from the Country Fire Authority (CFA) or State Emergency Service (SES) who have little or no exposure to the daily management of the Reserve. Therefore without markers defining the boundaries of the Conservation Zones or Tree Conservation Areas, it is difficult for volunteers to know the areas to avoid, and what areas cars can be parked in.

Some Management Zones are already well defined (the Rock and its' Surrounds), partially defined (the racecourse grassland) or not at all defined. The following Zones/Areas require on-ground markers to define their extent:

- The southern end of the Racecourse Grassland,
- The perimeter of Smokers Creek
- The perimeter of all Trees Conservation Areas within the Recreation Zones
- The South-West Corner Conservation Zone
- The Conservation Zone behind Dam 1
- The northern perimeter of the Conservation Zone in the south-east section of the East Paddock

#### Recommendations

- *Incrementally install markers (bollards, fencing, rocks or fallen/removed large limbs), around the perimeter of all the Conservation Zones and Tree Conservation Areas (TCAs) as resources allows. Manage and maintain the markers as required. (Rec 92)*
- *Review the perimeter of each Conservation Zone periodically (every ten years), and make any additions to reflect site conditions, as appropriate (Rec 93)*

### 8.6.2 Dam/Water Management and Usage

The Racecourse Dam has been used for an extensive period to provide water for the race track and picnic areas. The use of dam water to irrigate a small section of the East Paddock commenced much more recently with the concert events. The dam is 'filled' every spring from run-off and water pumped from Smokers Creek under licence agreement when the creek is flowing. The dam also has habitat values: four threatened wetland bird species have been recorded using the dam on a casual basis. Kangaroos and other fauna species also utilise the dams.

The other four dams are much smaller, and are not utilised for watering areas of the Reserve. The three smaller dams along Smokers Creek (or its' tributaries) were created as small water storages. Dams 1 and 3 have a high cover of Cumbungi around their perimeter. Dam 2 to the south of the car park is primarily ornamental and is being revegetated by NDLG. There is a small island in both Dams 1 and 2. Dam 4 (in the north-west corner of the East Paddock) has a high cover and diversity of indigenous wetland plants. It is generally only full in winter and during wet periods (G Bigolin pers. comm.).

Smokers Creek was once a permanent creek that flowed all year around (G Bigolin pers. comm.). However the creek now often stops flowing over summer, which is potentially due to a range of factors including reduced water flows into the entire catchment and the construction of dams across the landscape.

The managers at Hangin Rock are concerned about long-term water storage and usage, especially for the East Paddock. There is discussion about using recycled water from the Woodend sewerage treatment plant .which is most likely to require large tanks for storage purposes. Mixing recycled and fresh water would alter the natural composition of racecourse dam which could impact aquatic ecology of the water source. This could, in turn, impact the function of the dam as a water source for birds and mammals.

Any plans to alter the current usage and/or storage capacity of racecourse dam needs to consider the fauna usage of the dam and the wetland habitat it provides. Any planned usage of recycled water needs to consider potential impacts to the area's flora and fauna. At this stage there is little data on what animals (indigenous and pest) utilise the dams, the frequency and when (time and season).

### Recommendations

- *Assess the potential fauna and flora impacts of any potential changes to the size or composition of the site's existing water storage. (Rec 94)*
- *Manage the racecourse dam for its wetland habitat and retain this water storage even if alternative water storage facilities are developed in the future (e.g. tanks). (Rec 95)*
- *Undertake an ecological assessment of Smokers Creek, including evaluation of the quantity and timing of stream flows. (Rec 95a)*
- *Revegetate Dam 4 to increase its' ecological values, and to increase the ecological values of the nearby Remnant Trees Conservation Zone 1 (RTCZ1), at the northern end of the racecourse. Maintain the Fuel Management Zone between Dam 4 and the perimeter of the Reserve. (Rec 95b)*

### 8.6.3 Communication with Adjacent Landholders

Adjacent landholders and their land management practices have an impact upon the Reserve, especially with regards to pest plants and animals, and domestic animals (cats and dogs) entering the Reserve. Whilst the smaller rural-living subdivisions along the western, southern and northern perimeters of the Reserve could be considered to be incompatible with conserving and enhancing the ecological values of the Reserve, it is too late to alter this situation unless the Government made a commitment to repurchase these properties over time. These impacts have to be accommodated into the on-going ecological management considerations for the Reserve.

Discussions regarding the 'Communities for Nature' grants revealed that NDLG is in consultation with many of these landholders, and they are working cooperatively to manage their land (undertaking weed control or installing habitat revegetation) for the ecological values of the Reserve (P Roberts pers. comm.). This is an on-going process and requires on-going commitments and funding from the NDLG and relevant land owners. The NDLG is optimistic about this ongoing commitment due to the strength of the group and the community around Hanging Rock Reserve.

Education and consultation needs to be incorporated into ecological management and planning, especially with regards to domestic animal incursions into the Reserve. Working in cooperation with the adjacent landholders on pest plant and animal management will lead to a decrease in these issues for both parties.

Adjacent landholders should be provided with a forum to discuss their interests/concerns regarding these 'shared' management concerns, as their views could provide alternative methods for addressing and managing some of these impacts to the ecological values of the Reserve.

Sections 8.4.9 and 8.4.10 include recommendations to engage surrounding land owners in conducting complementary pest animal control works and in responsible pet ownership.

#### **8.6.4 Erosion on the Rock**

There are some small areas of erosion on the rock formations and adjacent to the summit walking track. The main cause of erosion is the number of people who climb the rock on a daily basis. Observations of people on the rock illustrate that 80–90% of people follow the summit track and don't tend to stray off the track until they reach the chained area where it is harder to determine the actual track route.

The evidence of the amount of European foot traffic over the past 100 years is evident when comparing the surface rocks around 'Stonehenge' and 'The Saddle' that have been constantly trampled (worn with no lichen) with rocks that are not trampled (covered in lichen, and don't appear 'worn').

To date, erosion has been managed by: defining the actual track (and sealing it), installing some fencing and using large fallen logs to define the edges of the track/'no go' areas which have been also planted. This has managed and minimised the erosion in the highest impact areas. It is the erosion in the lower impact areas that is more difficult to manage. There are areas on the rock where the soil has eroded over many decades due to foot traffic and it is lower than the surrounding soil.

The main method for managing erosion is to continue the current management practices, to increase the signage (arrows) leading to the summit (so less people stray from the track) and to investigate installing temporary fencing or monitoring plots in some areas to monitor both weed control/planting works and to control erosion through reducing access and dense plantings.

Climbing the rock is one of the main reasons most visitors visit Hanging Rock. The majority of people will remain on the main track if it is well-defined and easy to follow. It is the majority of foot traffic that has the greatest impacts, so managing its extent and location will manage most of the impacts.

In this regard there have been previous proposals to create safe viewing areas. This should be supported as it will further reduce the amount of people wandering off the defined paths to seek views of the surrounding country side.

There will always be some people who go 'off track and explore. If the numbers of these people can be minimised, then their impacts can also be minimised. The fine line between minimising impacts and not prohibiting off-path movement, needs to be considered with all decisions regarding people movement management on the Rock

### Recommendations

- *Install more arrows along the summit walking track especially in the 'rocky' areas where there is no constructed walking track (Rec 96)*
- *Consider the creation of defined viewing areas to direct and control people movement. (Rec 97)*
- *Continue using large fallen logs to define edges of the track/'no go' areas, as appropriate (Rec 98)*
- *Consider strategic revegetation for dense plantings to discourage people from going off track, using appropriate species (based on the EVC Revegetation Templates) (Rec 99)*
- *Install monitoring plots (refer to Section 10 and Map 11 for locations) to manage erosion/people leaving the track, and to monitor different vegetation management techniques (Rec 100)*

### 8.6.5 Future Recreational Opportunities

At times, MRSC is approached by private companies wanting to undertake managed activities in the Reserve such as rock climbing or a tree-top adventure course.

As outlined previously, rock climbing used to be allowed at the Reserve, and there are Peregrine Falcons that nest on the east face of the rock. In some other reserves, rock climbing is managed so that there is an annual period when there is no climbing due to Peregrine Falcons nesting. In popular rock climbing destinations such as Mount Arapiles, there are other impacts from rock climbers such as trampling and erosion, and markers being left across the rocks.

Other activities such as a tree-top adventure course, requires installation in large trees which could impact the use of these trees by native fauna.

While these activities could expose more people to the natural values of the Reserve and provide additional income, there are a number of impacts that would need to be investigated, including the effects on the reserve's vegetation, wildlife and car parking demand.

As the objective of the Conservation Zones is to manage these zones to conserve and enhance their ecological values, these activities should be restricted to the Recreation Zones. Some low impact conservation and passive recreation activities may be undertaken in the Conservation Zones such as night walks and orienteering. Any new recreation activities proposed for the Conservation Zones that may impact the ecological values of the reserve should be subject to a full ecological assessment and approved by Council's Environment Unit.

### Recommendations

- *Focus future recreation activities in the Recreation Zones. (Rec 101)*
- *Undertake an ecological impact assessment for future recreation activities, as appropriate, as a part of the investigation process and refer proposals to Council's environment unit for approval. (Rec 102)*

### 8.6.6 Signage and interpretation

Currently there is very little interpretative signage/information about the ecological values of Hanging Rock, except for some displays in the Visitors Centre. The role of interpretive signage is to educate the public about the history and ecological values of the site.

To increase the general public's focus on the Reserve's ecological values, some interpretive signs should be installed in key 'high usage' areas of the Reserve. These signs could be complemented by other interpretive information such as online walking guides, brochures and booklets.

Signs about appropriate behaviours may also be required in some areas.

It may also be appropriate to install signs regarding the management zones across the Reserve, to educate the public about the objectives and management of different sections of the Reserve.

An Action Plan should be developed that plans and details the design and location of any signage, including objectives for installing signage. Signs need to be visually attractive, concise and well located to be effective.

Consideration should also be given to allowing local community groups to use the existing notice board to advertise their activities.

#### Recommendations

- *Consider new signage and other interpretive information and activities that raise awareness about the natural and cultural values of the site and advise visitors about permitted and prohibited activities. (Rec 103)*
- *Provide access to the existing noticeboard to local community groups to enable them to promote their activities. (Rec 104)*

### 8.6.7 Managing Heritage Values

As outlined in Section 6, there are numerous Aboriginal and European cultural heritage values associated with Hanging Rock. A review of the European cultural heritage values of the site was recently conducted by Heritage Victoria as a part of their assessment of the site's nomination to the Victorian Heritage Register. A copy of this assessment is available on the Victorian Heritage Database.

Aboriginal Cultural Heritage values are managed under the Victorian Aboriginal Heritage Act 2006. This Act requires a Cultural Heritage Management Plan to be completed for proposed high impact activities. Other management actions that result in ground disturbance (such as some rabbit control works as well as pathway construction etc) may require a permit under the Act.

To reduce the need for Cultural Heritage Management Plans and permits, it is recommended that a full study of the site's Aboriginal cultural heritage values be undertaken. This study should identify areas of potential significance or sensitivity and set out recommendations to mitigate any impacts to the sites Aboriginal cultural heritage values associated with new uses or activities as well as the site's routine management.

Consultation with relevant Aboriginal groups will be required as a part of any Aboriginal heritage study.

### Recommendations

- *Commission a full Aboriginal Cultural Heritage Study of the reserve in collaboration with relevant aboriginal groups (Rec 105)*

### 8.6.8 Machinery Maintenance and Hygiene

Ensuring that all machinery that enters and is used within the Reserve is cleaned (in an appropriate wash or brush down facility), and is soil and weed free, is one of the main management tools for controlling the introduction of any future weed invasions or soil pathogens into the Reserve.

It is not planned to provide water to the on-site depot/works yard at this stage, therefore a brush down facility is required, or the existing stand pipe near the racecourse buildings should be used for brush/wash down. At a brush down area, brushes or high pressure air is used to remove seeds from vehicles/machinery, that then drop to the ground. When they germinate, they are sprayed to eliminate them and to prevent them from seeding.

This applies across the Reserve, not just in the Conservation Zones, as retrospectively managing noxious weed invasions from 'dirty' machinery is expensive.

Council is currently in the process of developing vehicle hygiene processes and procedures for relevant Council staff and contractors. These processes and procedures will be incorporated into relevant weed control and slashing tenders as required. The standard operating procedures and check lists developed should be provided to staff and contractors who bring machinery into the site.

### Recommendations

- *Identify and signpost a clean down area for machinery entering the site. (Rec 106)*
- *Ensure Council staff and contractors entering Hanging Rock are included in Council's vehicle hygiene program. (Rec 107)*

### 8.6.9 Maintenance of Drains and Waterways

The main waterway in the Reserve is Smokers Creek. There are also the five dams. Racecourse Road has gravel drainage channels on either side of the road which lead into Smokers Creek. There are other smaller channels located across the site which also lead into Smokers Creek or the dams.

An issue observed during the fieldwork and raised during the consultation process was the current management practice of spraying these drains with herbicide. There are ecological concerns with herbicide use and the residue from herbicides going into Smokers Creek and other waterways. Other ecological concerns relate to prevention of erosion and water quality.

It was also observed that the banks of Smokers Creek around Dam 2 were also regularly sprayed and bare. There were discussions regarding the balance between maintaining clean aesthetically pleasing areas around high use areas and the effects of herbicide on waterways. It was also observed that the

pipe leading from Dams 2 to 3 had been exposed during woody weed removal works, and that the area required works to address the erosion on the surrounding banks and the aesthetics of the pipe.

The following Figures 3 and 4 below depict different management approaches to the banks of Smokers Creek in different areas of the Reserve. It was determined that a weedy cover was preferable to sprayed creek banks, and that the sprayed banks would be revegetated and spraying would be minimised.



**Figure 2.** Sprayed Creek Banks



**Figure 3.** Vegetated Creek Banks

## Recommendations

- *Cease spraying herbicide in drains and channels across the site unless otherwise approved by Council's Environment Unit (Rec 108)*
- *Ensure any herbicide that is utilised is 'waterway friendly' (Rec 109)*
- *Prepare a Landscape Action Plan for Dam 2 and the pipe leading to Dam 3 to provide a framework for indigenous riparian plantings along the creek (Rec 110)*
- *Consider the maintenance aspects of drainage along Racecourse Road when it is upgraded, to eliminate spraying (Rec 111)*

### 8.6.10 Fire wood

As discussed in Section 8.2.7, most of the lopped/naturally fallen limbs that are currently stockpiled for disposal will now be treated separately according to where they are removed from or where they have naturally fallen.

Any removed/naturally fallen limbs in the Conservation Zones will be retained in-situ, unless they have fallen over a track or if on-ground log densities well exceed those outlined in Section 8.2.8, Table 14.

In the Recreation, Tree Safety and Fuel Management Zones lopped/naturally fallen limbs/trees will be managed according to size (diameter) and location. Larger limbs will be utilised to define the perimeters of Management Zones/Tree Conservation Areas, as barriers or for other appropriate uses. Smaller limbs will be mulched. For the Tree Safety and Fuel Management Zones that are adjacent to the Conservation Zones, most material will be deposited into the Conservation Zones as appropriate (ie: only in areas with poorer quality indigenous ground-storey vegetation cover).

Whilst these practices will manage most of the lopped/fallen limb matter, there will still be some material that cannot be utilised for these purposes. This includes green matter from exotic trees, leaves, small twigs and branches that are too small to be used as barriers but are too big to be mulched. This material will be re-utilised where possible, including for use as firewood at the site, or stockpiled and disposed of in the on-site depot. Any material used for these purposes will only be sourced from the Recreation, Tree Safety and Fuel Management Zones

### Recommendations

- *For logs/green matter that cannot be used for log barriers or mulch in the Recreation, Tree Safety and Fuel Management Zones, re-utilise as firewood at the site or stockpile and dispose of in the on-site depot, including via burning, mulching and/or removal to Council Transfer Station.*
- *For fires lit as part of public events, the firewood shall be collected from a designated stock-pile*

## 8.7 On-site Works Depot/Storage Yard

One issue which arose during both the fieldwork and consultation process was the stockpiling of green matter, materials and waste (old picnic tables, pipes, etc) in some areas of the Reserve. These stockpiles were creating pest animal harbour and were considered an eyesore.

As the Reserve did not have a depot/works yard, the Rangers were selecting areas for stockpiles that were away from the highest use areas, but were still visible for park users that moved beyond the high use areas. Currently the Rangers store their machinery in the shed amongst the racecourse facilities and they utilise The Hut as an office. However there is no yard for the storage of materials, the rubbish bins used during events and to stockpile green matter and mulch.

The construction of a works depot/storage yard is an essential component of the on-going (ecological) management of Hangin Rock. The works depot will provide a discrete area for the Rangers to undertake many of their daily work practices, and to store materials.

A works depot/storage yard will be constructed in the East Paddock on the edge of the south-east Conservation Zone in an area that currently contains soil/mulch/gravel stockpiles. The area is easily accessible off existing internal roads. The depot area is on flat ground, it is located close to the main management activities of the Reserve, and it is visible from a security perspective. There are a few existing planted trees/shrubs in the depot/works yard that will be protected in planting bed/Tree Conservation Areas. The depot-works area is approximately 2000m<sup>2</sup> or 0.2ha.

*Refer to the Management Zones map for the depot location.*

The depot will be also used to store materials for contractors/construction works being undertaken in the Reserve. Screening plantings using appropriate indigenous species (refer to the Revegetation Templates), may be installed around the perimeter of the depot, if required. Fencing around the depot will either be solid (or wire with shade cloth attached), so it is not easy for the public to view activities in the depot. The fencing should also include a skirt to exclude rabbits.

## 8.8 Summary of Management Issues

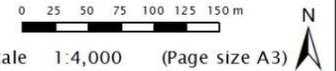
As outlined in the Introduction to this Section of the EMP, this detailed discussion, of the management issues associated with the ecological values of the Reserve has been utilised to define management recommendations, principles and actions that will become the framework to guide the ecological management of the Reserve within designated Management Zones.

The comprehensive management principles and actions for each Management Zone are provided in the accompanying *Hanging Rock Environmental Management Plan: Part 2*.

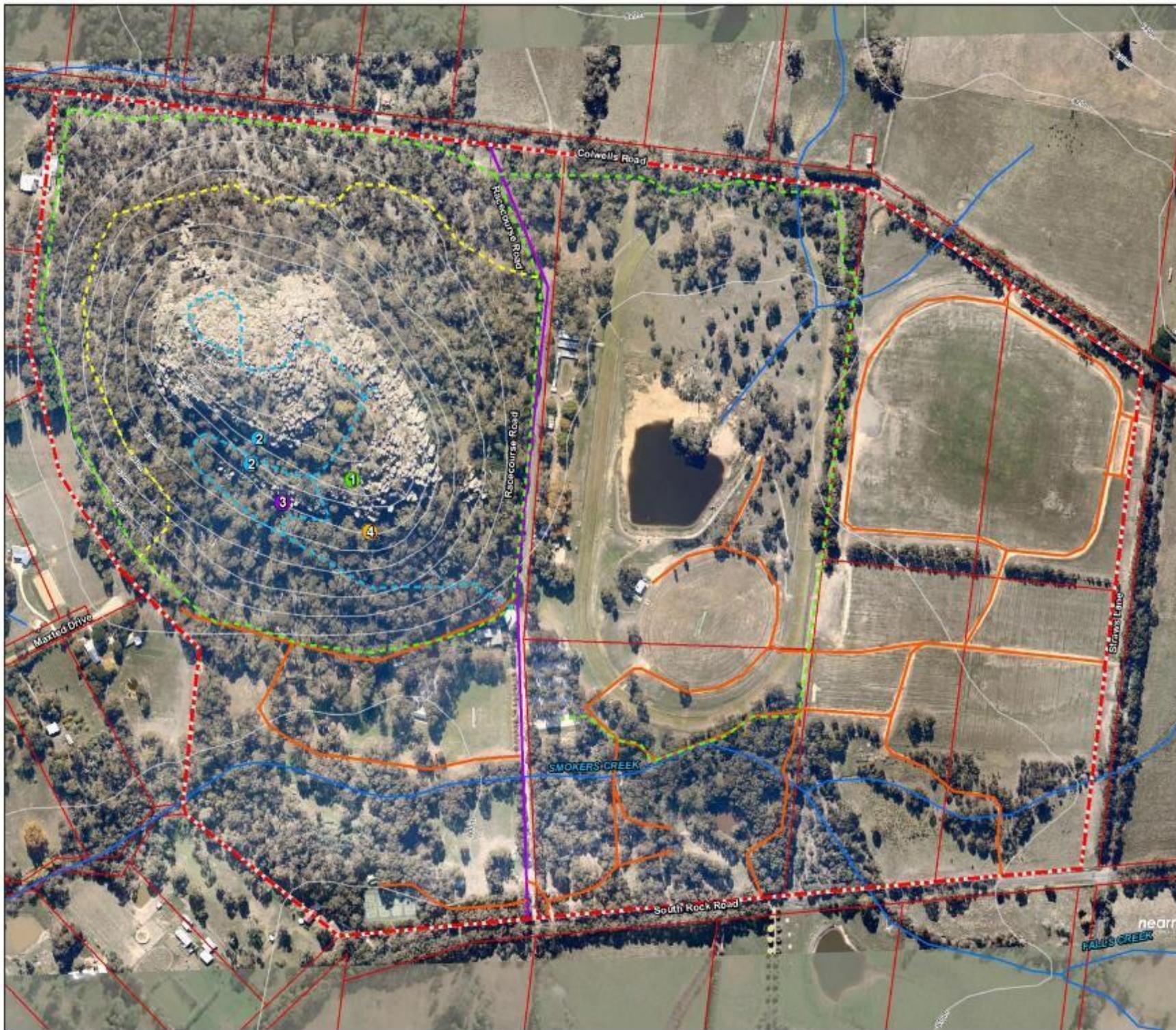


## Management Zones Hanging Rock Reserve

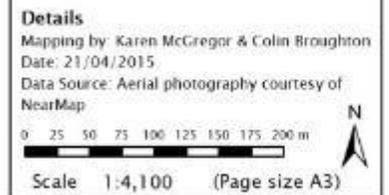
- Management Tracks
- Racecourse Rd
- ✕✕ Internal fence
- Watercourse
- Study site
- ▭ Parcels
- Core Conservation Zones (CCZ)**
  - CCZ 1. The rock and its surrounds
  - CCZ 2. Racecourse grassland
- Remnant Tree (exotic groundstorey) Conservation Zones (RTCZ)**
  - RTCZ 1. North of racetrack
  - RTCZ 2. South-West corner
  - RTCZ 3. Dam 1 surrounds
  - RTCZ 4. Southern portion of East Paddock
- Smokers Creek (riparian) Conservation Zone (SCCZ)**
  - SCCZ. Smokers Creek (3m or 15m buffer)
- Recreation Zones (RZ)**
  - RZ 1. Recreation Zones
  - RZ 2. Tree Conservation Areas
- Fuel Management Zones (FMZ)**
  - FMZ. Fuel Management Zones
- Tree Safety Management Zones (TSMZ)**
  - TSMZ. Tree Safety Management Zones
- Dam Zones (DZ)**
  - DZ 1. Dam Zone 1
  - DZ 2. Dam Zone 2
  - DZ 3. Dam Zone 3
  - DZ 4. Dam Zone 4
  - DZ 5. Dam Zone 5
- Depot



**Disclaimer**  
 Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.



## Potential Monitoring Plot Locations Hanging Rock Reserve



**Disclaimer**  
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## 9. GOVERNANCE

Hangin g Rock Reserve is currently managed by Macedon Ranges Shire Council. The Council is the Committee of Management for the Crown allotment and the freehold land owner of the East Paddock.

Within Council, management of the site is overseen by the Recreation and Sports Department. Input on environmental management issues is provided by the Strategic Planning and Environment Department as required.

The Hangin g Rock Development Advisory Committee provides advice on large scale infrastructure projects which may affect existing user groups. The Committee is chaired by a Macedon Ranges Shire Council Councillor and is composed of representatives from the reserve's various sport and recreation clubs as well as representatives from the Victorian State Government, the local tourism association and the Friends of Hangin g Rock. Representatives from relevant Council departments also attend the Advisory Committee meetings.

At the time of preparing this EMP, a review of the site's governance arrangements was being undertaken by the Victorian State Government.

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## PERSONAL COMMUNICATIONS

Guido Bigolin: Macedon Ranges Shire Council – Head Ranger Hanging Rock Reserve

Gidja Walker: Practical Ecology Pty Ltd (weed prioritisation categories)

Penny Roberts: Newham and District Landcare Group

Anne Walsh: Macedon Ranges Shire Council– Coordinator Hanging Rock

William Terry: Macedon Ranges Shire Council– Environmental Programs and Education Officer

Lindy Lumsden: Department of Environment, Land Water and Planning– Arthur Rylah Institute.  
Senior Zoologist.

Austin O'Malley: Practical Ecology Pty Ltd (Senior Zoologist)

## Appendix 1. Hanging Rock Flora Species List (Entire Site)

The flora list below is a compilation of the known flora species lists for the site. The references and data used to compile the flora species list is outlined below:

- 1) Practical Ecology Pty Ltd (surveys undertaken spring 2014)
- 2) Paul Foreman (2013). Preliminary Assessment of "Grassland" Area within hanging Rock racecourse- Hanging Rock Community Recreation Reserve
- 3) Barry Kemp and Tony Davis (1985). Available on Visit Macedon ranges website (courtesy of the 1993 Hanging Rock Recreation Reserve Management Plan (accessed October 2014). <http://www.visitmacedonranges.com/natural-attractions/hanging-rock/downloads-and-documents/Hanging%20Rock%20Flora%20Fauna.pdf>
- 4) David Francis (2010). Flora list provided by Newham and District Landcare Group (NDLG)
- 5) NDLG- observations (especially exotic flora) provided by Penny Roberts (Newham and District Landcare Group)
- 6) Additions to Hanging Rock Reserve Flora List; compiled 6/09/1986 by Ian Lunt and Barry Kemp

The flora species table below indicate the species observed during the flora survey periods. This list is not exhaustive. If a species is not listed, this does not mean it does not occur within the reserve, or that it no longer grows within the reserve if it was recorded in a previous survey, but not in the more recent surveys.

### Key to Species List

- \* Introduced plants
- P? Species which have potentially been planted or are from an unknown source
- # Species which is native to Victoria but is naturalised outside of natural range. Species may be an Environmental Weed.
- s.l. Sensu latu : in the broad sense
- s.s. Sensu stricta: in the strict sense

The key to threatened species status is provided below:

**Conservation status under EPBC Act 1999:** EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant

**Conservation status under FFG Act 1988:**

L: Listed, N: Nominated, I: Invalid or ineligible, R: Rejected and D: Delisted

**Conservation status of Threatened Flora in Victoria (DSE 2005)**

x: Presumed extinct, e: Endangered, v: Vulnerable, r: rare and k: poorly known

Definitions of Conservation Status Codes can be found on the DSE website under Advisory List of Rare or Threatened Plants

	PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey	Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC		
<i>Acacia dealbata</i>	Silver Wattle		X			X	
<i>Acacia mearnsii</i>	Black Wattle						
<i>Acacia melanoxylon</i>	Blackwood		X			X	
<i>Acacia nano-dealbata</i>	Dwarf Silver Wattle			r	X		
<i>Acacia pravissima</i>	Ovens Wattle	#					X

			PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey			Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC				
<i>Acacia verticillata</i>	Prickly Moses		X				X		
<i>Acaena agnipila</i>	Hairy Sheep's Burr		X						
<i>Acaena echinata</i>	Sheep's Burr	*				X			
<i>Acaena novae-zelandiae</i>	Bidgee-widgee		X			X		X	
<i>Acaena spp.</i>	Sheep's Burr	*	X			X			
<i>Acetosella vulgaris</i>	Sheep Sorrel	*	X			X		X	
<i>Acrotriche prostrata</i>	Trailing Ground-berry		X			X		X	
<i>Acrotriche serrulata</i>	Honey-pots		X						
<i>Adiantum aethiopicum</i>	Maidenhair Fern					X			
<i>Admixta revoluta s.l.</i>	Black-anther Flax-lily		X			X			
<i>Agrostis capillaris</i>	Brown-top Bent	*	X			X		X	
<i>Aira cupaniana</i>	Quicksilver Grass	*				X			
<i>Aira elegantissima</i>	Delicate Hair-Grass	*				X			
<i>Aira spp.</i>	Hair Grass	*	X			X			
<i>Alisma plantago-aquatica</i>	Water Plantain		X						
<i>Allium triquetrum</i>	Angled Onion	*	X						
<i>Allocasuarina verticillata</i>	Drooping Sheoak	P?	X						
<i>Alstroemeria aurea</i>	Yellow Alstroemeria	*	X				X		
<i>Amyema pendula</i>	Drooping Mistletoe		X			X		X	
<i>Anthosacne scabra s.l.</i>	Common Wheat grass	*				X		X	
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	*	X			X		X	
<i>Arctotheca calendula</i>	Cape Weed	*	X						
<i>Arthropodium milleflorum</i>	Pale Vanilla Lily					X		X	
<i>Arthropodium strictum s.l.</i>	Chocolate Lily		X			X		X	
<i>Asperula conferta</i>	Common Woodruff		X			X			
<i>Asperula scoparia subsp. scoparia</i>	Prickly Woodruff		X			X		X	
<i>Asplenium flabellifolium</i>	Necklace Fern					X		X	
<i>Austrostipa densiflora</i>	Dense Spear-grass		X						
<i>Austrostipa spp.</i>	Spear Grass		X			X		X	
<i>Banksia marginata</i>	Silver Banksia		X			X		X	
<i>Bellis perennis</i>	English Daisy	*	X						
<i>Bossiaea prostrata</i>	Creeping Bossiaea		X			X		X	
<i>Briza maxima</i>	Large Quaking-grass	*	X			X			

					PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey					Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC						
<i>Briza minor</i>	Lesser Quaking-grass	*				X					
<i>Bromus diandrus</i>	Great Brome	*				X	X				
<i>Bromus hordeaceus subsp. hordeaceus</i>	Soft Brome	*					X				
<i>Bulbine bulbosa</i>	Bulbine Lily					X	X	X			
<i>Burchardia umbellata</i>	Milkmaids					X		X		X	
<i>Bursaria spinosa</i>	Sweet Bursaria						X	X			
<i>Calandrinia calypttrata</i>	Pink Purslane					X					
<i>Callistemon sieberi</i>	River Bottlebrush					X					
<i>Calystegia spp.</i>	Bindweed					X					
<i>Cardamine hirsuta s.l.</i>	Common Bitter-cress	*				X					
<i>Carduus tenuiflorus</i>	Winged Slender-thistle	*				X					
<i>Carex appressa</i>	Tall Sedge					X					
<i>Carex gaudichaudiana</i>	Fen Sedge					X					
<i>Carex inversa</i>	Knob Sedge						X				
<i>Carex iynx</i>	Tussock Sedge						X				
<i>Carex polyantha</i>	River Sedge						X				
<i>Carex spp.</i>	Sedge					X	X				
<i>Cassinia longifolia</i>	Shiny Cassinia					X		X			
<i>Centaureum erythraea</i>	Common Centaury	*				X		X			
<i>Centipeda cunninghamii</i>	Common Sneezeweed					X					
<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	*				X					
<i>Cheilanthes austrotenuifolia</i>	Green Rock-fern					X		X		X	
<i>Cirsium vulgare</i>	Spear Thistle	*				X	X		X		
<i>Clematis aristata</i>	Mountain Clematis					X		X		X	
<i>Conium maculatum</i>	Hemlock	*				X					
<i>Convolvulus spp.</i>	Native Convolvulus							X	X		
<i>Crassula sieberiana s.l.</i>	Sieber Crassula					X					
<i>Crassula spp.</i>	Crassula							X			
<i>Crataegus monogyna</i>	Hawthorn	*					X		X		
<i>Cyathea australis</i>	Rough Tree-fern							X	X		
<i>Cymbonotus preissianus</i>	Austral Bear's Ear							X	X	X	
<i>Cyperus eragrostis</i>	Drain Flat-sedge	*				X					
<i>Cyperus tenellus</i>	Tiny Flat-sedge							X	X		

					PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey					Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC						
<i>Cytisus proliferus</i>	Tree Lucerne	*					X				
<i>Cytisus scoparius</i>	English Broom	*				X					
<i>Dactylis glomerata</i>	Cocksfoot	*				X					
<i>Daucus glochidiatus</i>	Australian Carrot						X				
<i>Daviesia virgata</i>	Narrow-leaf Bitter Pea						X	X		X	
<i>Dianella admixta</i>	Black-Anther Flax-Lily									X	
<i>Dianella tasmanica</i>	Tasman Flax-lily						X	X		X	
<i>Dichondra repens</i>	Kidney-weed					X					
<i>Dillwynia cinerascens s.l.</i>	Grey Parrot-pea						X	X		X	
<i>Diuris pardina</i>	Leopard Orchid						X	X			
<i>Drosera peltata s.l.</i>	Pale Sundew					X	X	X			
<i>Drosera peltata subsp. auriculata</i>	Tall Sundew						X	X			
<i>Eleocharis acuta</i>	Common Spike-sedge					X	X	X		X	
<i>Eryngium vesiculosum</i>	Prickfoot					X	X	X			
<i>Eucalyptus aggregata</i>	Black Gum (origin unknown)		e								
<i>Eucalyptus camaldulensis</i>	River Red Gum					X	X				
<i>Eucalyptus globulus</i>	Southern Blue-gum	#				X					
<i>Eucalyptus obliqua</i>	Messmate						X	X			
<i>Eucalyptus ovata</i>	Swamp Gum					X	X	X			
<i>Eucalyptus pauciflora subsp. pauciflora</i>	White Sallee					X	X	X		X	
<i>Eucalyptus radiata s.l.</i>	Narrow-leaf Peppermint					X	X	X			
<i>Eucalyptus rubida</i>	Candlebark					X	X	X		X	
<i>Eucalyptus viminalis</i>	Manna Gum					X	X	X		X	
<i>Euchiton sphaericus</i>	Annual Cudweed						X				
<i>Euphorbia peplus</i>	Petty Spurge	*				X					
<i>Exocarpos cupressiformis</i>	Cherry Ballart					X	X	X			
<i>Festuca arundinaceae</i>	Tall Fescue	*					X				
<i>Fumaria capreolata</i>	White Fumitory	*				X					
<i>Fumaria spp.</i>	Fumitory	*					X			X	
<i>Galium aparine</i>	Cleavers	*				X				X	
<i>Galium gaudichaudii</i>	Rough Bedstraw					X	X				
<i>Galium species</i>	Bedstraw									X	
<i>Genista monspessulana</i>	Montpellier Broom	*					X			X	

					PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey					Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC						
<i>Geranium solanderi s.l.</i>	Austral Crane's-bill					X	X	X		X	
<i>Geranium sp.2</i>	Variable Crane's Bill					X					
<i>Geranium spp.</i>	Crane's Bill					X	X				
<i>Glycine clandestina</i>	Twining Glycine					X	X	X		X	
<i>Gonocarpus humilis</i>	Shade Raspwort					X					
<i>Gonocarpus tetragynus</i>	Common Raspwort					X	X	X		X	
<i>Hakea decurrens</i>	Bushy Needlewood										
<i>Halogaris heterophylla</i>	Varied Raspwort					X	X	X			
<i>Hardenbergia violacea</i>	Purple Coral-pea						X	X			
<i>Hedera helix</i>	English Ivy	*				X			X		
<i>Histiopteris heterophylla</i>	Bats-wing Fern						X	X			
<i>Holcus lanatus</i>	Yorkshire Fog	*				X	X		X	X	
<i>Hyacinthoides hispanica</i>	Spanish Bluebells	*							X		
<i>Hydrocotyle foveolata</i>	Yellow Pennywort						X				
<i>Hydrocotyle hirta</i>	Hairy Pennywort					X	X	X			
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort					X	X	X		X	
<i>Hydrocotyle sibthorpioides</i>	Shining Pennywort							X		X	
<i>Hydrocotyle spp.</i>	Pennywort					X	X				
<i>Hypericum gramineum</i>	Small St John's Wort					X	X	X			
<i>Hypochaeris glabra</i>	Smooth Cat's ear	*					X				
<i>Hypochaeris radicata</i>	Flatweed	*				X	X			X	
<i>Hypoxis glabella</i>	Yellow Star						X	X		X	
<i>Ilex aquifolium</i>	English Holly	*				X			X		
<i>Indigofera australis</i>	Austral Indigo									X	
<i>Iris spp.</i>	Bearded Iris	*							X		
<i>Isolepis cernua</i>	Nodding Club-sedge						X				
<i>Isolepis hookeriana</i>	Grassy Club-sedge						X				
<i>Juncus bufonius</i>	Toad Rush					X	X				
<i>Juncus capitatus</i>	Capitate Rush	*					X				
<i>Juncus holoschoenus</i>	Joint-leaf Rush					X	X	X		X	
<i>Juncus pallidus</i>	Pale Rush					X					
<i>Juncus procerus</i>	Tall Rush						X				
<i>Juncus spp.</i>	Rush					X	X			X	

		PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey		Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC			
<i>Juncus subsecundus</i>	Finger Rush					X		X
<i>Lachnagrostis filiformis s.l.</i>	Common Blown-grass		X					
<i>Lemna spp.</i>	Duckweed		X					
<i>Leontodon taraxacoides subsp. taraxacoides</i>	Hairy Hawkbit	*				X		
<i>Leptospermum continentale</i>	Prickly Tea-tree					X	X	X
<i>Leptospermum lanigerum</i>	Woolly Tea-tree		X					
<i>Lindsaea linearis</i>	Screw Fern		X					
<i>Lolium perenne</i>	Perennial Rye-grass	*	X					
<i>Lomandra filiformis</i>	Wattle Mat-rush		X	X	X	X		X
<i>Lomandra filiformis subsp. coriacea</i>	Wattle Mat-rush		X					
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		X					
<i>Lonicera spp.</i>	Honeysuckle	*					X	
<i>Luzula meridionalis</i>	Common Woodrush		X					
<i>Luzula meridionalis var. densiflora</i>	Common Woodrush			X				
<i>Luzula meridionalis var. flaccida</i>	Woodrush				X	X		X
<i>Lysimachia arvensis</i>	Pimpernel	*	X					
<i>Lythrum hyssopifolia</i>	Small Loosestrife		X	X				
<i>Medicago spp.</i>	Medic	*	X					
<i>Melicytus dentatus s.l.</i>	Tree Violet		X		X	X		
<i>Melissa officinalis</i>	Lemon Balm	P?	X					
<i>Microlaena stipoides var. stipoides</i>	Weeping Grass		X	X	X	X		X
<i>Microtis uniflora</i>	Onion Orchid				X	X		
<i>Moenchia erecta</i>	Erect Chickweed	*			X			
<i>Montia fontana</i>	Water Blinks				X	X		X
<i>Muellerina eucalyptoides</i>	Creeping Mistletoe				X	X		X
<i>Myosotis discolor</i>	Yellow-and-blue Forget-me-not	*			X			
<i>Myriophyllum propinquum</i>	Water Milfoil				X			X
<i>Myriophyllum simulans</i>	Water Milfoil					X		
<i>Myriophyllum spp.</i>	Water Milfoil		X					
<i>Narcissus pseudonarcissus</i>	Daffodil	*	X				X	
<i>Neopaxia australasica</i>	White Purslane				X	X		
<i>Olearia argophylla</i>	Musk Daisy-bush		X		X	X		X
<i>Olearia lirata</i>	Snowy Daisy-bush		X		X	X		X

					PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey					Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC						
<i>Opercularia ovata</i>	Broad-leaf Stinkweed						X	X			
<i>Ottelia ovalifolia subsp. ovalifolia</i>	Swamp Lily					X					
<i>Oxalis corniculata s.l.</i>	Yellow Wood-sorrel					X	X				
<i>Oxalis exilis</i>	Shady Wood-sorrel					X					
<i>Oxalis perennans</i>	Grassland Wood-sorrel					X					
<i>Oxalis species</i>	Wood-sorrel	*								X	
<i>Pennisetum clandestinum</i>	Kikuyu	*				X					
<i>Persicaria decipiens</i>	Slender Knotweed					X					
<i>Pimelea glauca</i>	Smooth Rice-flower					X					
<i>Pimelea humilis</i>	Common Rice-flower						X	X		X	
<i>Plantago lanceolata</i>	Ribwort	*				X					
<i>Plantago varia</i>	Variable Plantain						X	X			
<i>Plantago spp.</i>	Ribwort	*					X				
<i>Platylobium formosum</i>	Handsome Flat-Pea						X	X			
<i>Poa annua</i>	Annual Meadow-grass	*					X				
<i>Poa labillardierei</i>	Common Tussock-grass					X		X		X	
<i>Poa morrisii</i>	Soft Tussock-grass						X				
<i>Poa pratensis</i>	Kentucky Blue-grass	*					X				
<i>Poa sieberiana</i>	Grey Tussock-grass					X		X			
<i>Poa spp.</i>	Tussock Grass						X	X		X	
<i>Polystichum proliferum</i>	Mother Shield-fern					X		X			
<i>Pomaderris aspera</i>	Hazel Pomaderris						X				
<i>Poranthera microphylla s.l.</i>	Small Poranthera					X	X				
<i>Prunella vulgaris</i>	Self-heal	*				X					
<i>Prunus lusitanica</i>	Portuguese Laurel	*							X		
<i>Prunus spp.</i>	Prunus	*				X			X		
<i>Psilocybe. Spp.</i>	Magic Mushroom						X	X			
<i>Pterostylis melagramma</i>	Tall Greenhood							X			
<i>Pteridium esculentum</i>	Austral Bracken					X	X	X			
<i>Pterostylis spp.</i>	Greenhood						X				
<i>Pultenaea daphnoides</i>	Large-leaf Bush-pea					X	X	X			
<i>Quercus robur</i>	English Oak	*				X					
<i>Ranunculus lappaceus</i>	Australian Buttercup						X	X	X		

			PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey			Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC				
<i>Ranunculus spp.</i>	Buttercup	*				X			
<i>Romulea rosea</i>	Onion Grass	*	X						
<i>Rosa rubiginosa</i>	Sweet Briar	*	X	X			X		
<i>Rubus fruticosus spp. agg.</i>	Blackberry	*	X	X			X	X	
<i>Rubus parvifolius</i>	Small-leaf Bramble					X	X	X	
<i>Rumex spp.</i>	Dock	*	X						
<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass		X	X					
<i>Rytidosperma laeve</i>	Smooth Wallaby-grass			X					
<i>Rytidosperma pallidum</i>	Silvertop Wallaby-grass		X						
<i>Rytidosperma spp.</i>	Wallaby Grass		X			X	X		
<i>Salix spp.</i>	Willow	*	X						
<i>Sambucus gaudichaudiana</i>	White Elderberry		X			X	X	X	
<i>Sambucus nigra</i>	Common Elder	*	X				X		
<i>Schoenus apogon</i>	Common Bog-sedge		X	X		X	X		
<i>Schoenus maschalinus</i>	Leafy Bog-sedge			X					
<i>Senecio bathurstianus</i>	Dissected Fireweed		X						
<i>Senecio glomeratus</i>	Annual Fireweed		X						
<i>Senecio hispidulus s.l.</i>	Rough Fireweed		X						
<i>Senecio minimus</i>	Shrubby Fireweed		X						
<i>Senecio quadridentatus</i>	Cotton Fireweed		X			X	X	X	
<i>Senecio squarrosus A.Rich.</i>	Leafy Fireweed		X						
<i>Senecio spp.</i>	Groundsel			X				X	
<i>Solanum laciniatum</i>	Large Kangaroo Apple		X	X					
<i>Solenogyne gunnii</i>	Hairy Solenogyne		X	X					
<i>Sonchus asper s.l.</i>	Rough Sow-thistle	*	X	X					
<i>Sonchus oleraceus</i>	Common Sow-thistle	*	X						
<i>Spiraea spp.</i>	May Bush	*					X		
<i>Stellaria media</i>	Chickweed	*	X						
<i>Stellaria pungens</i>	Prickly Starwort		X			X	X	X	
<i>Stuartina muelleri</i>	Spoon Cudweed		X						
<i>Stylidium graminifolium s.l.</i>	Grass Triggerplant		X						
<i>Taraxacum officinale spp. agg.</i>	Garden Dandelion	*	X						
<i>Thelymitra spp.</i>	Sun Orchid			X					

		PE	Paul Foreman	Kemp & Davis	David Francis	NDLG	Lunt and Kemp	Future Flora Survey
Date of Survey		Spring 2014	10/11/2013	1985	2010	2010-2014	1986	?
Scientific Name	Common Name	Origin	DSE	FFG	EPBC			
<i>Themeda triandra</i>	Kangaroo Grass		X			X	X	
<i>Tragopogon porrifolius subsp. porrifolius</i>	Salsify	*	X					
<i>Trifolium dubium</i>	Suckling Clover	*				X		
<i>Trifolium repens var. repens</i>	White Clover	*	X			X		
<i>Trifolium subterraneum</i>	Subterranean Clover	*				X		
<i>Triglochin spp.</i>	Water Ribbons		X					
<i>Typha domingensis</i>	Narrow-leaf Cumbungi		X					
<i>Typha orientalis</i>	Cumbungi		X					
<i>Typha spp.</i>	Bulrush					X	X	X
<i>Ulex europaeus</i>	Gorse	*	X				X	
<i>Valeriana officinalis</i>	Valerian	*				X	X	
<i>Veronica gracilis</i>	Slender Speedwell		X			X	X	
<i>Vicia sativa</i>	Common Vetch	*	X			X		
<i>Vicia spp.</i>	Vetch	*	X			X		
<i>Vinca major</i>	Blue Periwinkle	*				X		
<i>Viola hederacea sensu Entwisle (1996)</i>	Ivy-leaf Violet	*	X			X	X	X
<i>Viola odorata</i>	Common Violet	*	X			X		
<i>Vulpia bromoides</i>	Squirrel-tail Fescue	*	X					
<i>Vulpia muralis</i>	Wall Fescue	*	X			X		
<i>Vulpia spp.</i>	Fescue	*	X			X		
<i>Wahlenbergia stricta subsp. stricta</i>	Tall Bluebell		X			X	X	X
<i>Zantedeschia aethiopica</i>	Italian Arum Lily	*	X			X	X	

## Appendix 2. Racecourse Grassland Flora Species List

The flora list below is a compilation of the known flora species lists for the racecourse grassland only. The references and data used to compile the flora species list are outlined below:

- 1) Practical Ecology Pty Ltd (surveys undertaken spring 2014)
- 2) Paul Foreman (2013). Preliminary Assessment of "Grassland" Area within Hanging Rock racecourse- Hanging Rock Community Recreation Reserve

The flora species table below indicate the species observed during the flora survey periods. This list is not exhaustive. If a species is not listed, this does not mean it does not occur within the reserve, or that it no longer grows within the reserve if it was recorded in a previous survey, but not in the more recent surveys.

### Key to Species List

- \* Introduced plants
- P? Species which have potentially been planted or are from an unknown source
- # Species which is native to Victoria but is naturalised outside of natural range. Species may be an Environmental Weed.
- s.l. Sensu latu : in the broad sense
- s.s. Sensu stricta: in the strict sense

The key to threatened species status is provided below:

<p><b>Conservation status under EPBC Act 1999:</b> EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant</p> <p><b>Conservation status under FFG Act 1988:</b></p> <p>L: Listed, N: Nominated, I: Invalid or ineligible, R: Rejected and D: Delisted</p>	<p><b>Conservation status of Threatened Flora in Victoria (DSE 2005)</b></p> <p>x: Presumed extinct, e: Endangered, v: Vulnerable, r: rare and k: poorly known</p> <p>Definitions of Conservation Status Codes can be found on the DSE website under Advisory List of Rare or Threatened Plants</p>
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Grassland	Date of Survey	Scientific Name	Common Name	Status				PE	Paul Foreman	Future Flora Survey
				Origin	DSE	FFG	EPBC	Spring 2014	10/11/2013	?
		<i>Acacia dealbata</i>	Silver Wattle					X	X	
		<i>Acacia melanoxylon</i>	Blackwood					X	X	
		<i>Acaena agnipila</i>	Hairy Sheep's Burr					X		
		<i>Acaena echinata</i>	Sheep's Burr						X	
		<i>Acaena novae-zelandiae</i>	Bidgee-widgee					X	X	
		<i>Acetosella vulgaris</i>	Sheep Sorrel	*				X	X	
		<i>Acrotriche serrulata</i>	Honey-pots					X		
		<i>Agrostis capillaris</i>	Brown-top Bent	*				X	X	
		<i>Aira cupaniana</i>	Quicksilver Grass	*					X	
		<i>Aira elegantissima</i>	Delicate Hair-grass	*					X	
		<i>Aira spp.</i>	Hair Grass	*				X		
		<i>Amyema pendula</i>	Drooping Mistletoe					X		
		<i>Anthosachne scabra s.l.</i>	Common Wheat-grass						X	
		<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	*				X	X	
		<i>Arctotheca calendula</i>	Cape Weed	*				X		
		<i>Arthropodium strictum s.l.</i>	Chocolate Lily					X	X	
		<i>Asperula conferta</i>	Common Woodruff					X		
		<i>Austrostipa spp.</i>	Spear Grass					X		
		<i>Bossiaea prostrata</i>	Creeping Bossiaea					X		
		<i>Briza maxima</i>	Large Quaking-grass	*				X		
		<i>Briza minor</i>	Lesser Quaking-grass	*				X		
		<i>Bromus diandrus</i>	Great Brome	*				X		
		<i>Bromus hordeaceus subsp. hordeaceus</i>	Soft Brome	*				X	X	
		<i>Bulbine bulbosa</i>	Bulbine Lily					X	X	
		<i>Burchardia umbellata</i>	Milkmaids					X		
		<i>Carex gaudichaudiana</i>	Fen Sedge					X		
		<i>Carex inversa</i>	Knob Sedge					X	X	

Grassland		PE	Paul Foreman	Future Flora Survey	
Date of Survey		Spring 2014	10/11/2013	?	
Scientific Name	Common Name	Status			
		Origin	DSE	FFG	EPBC
<i>Carex iynx</i>	Tussock Sedge				X
<i>Carex polyantha</i>	River Sedge				X
<i>Carex spp.</i>	Sedge				X
<i>Cenchrus clandestinus</i>	Kikuyu	*			X
<i>Centipeda cunninghamii</i>	Common Sneezeweed	*		X	
<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	*		X	
<i>Cirsium vulgare</i>	Spear Thistle	*		X	X
<i>Crataegus monogyna</i>	Hawthorn	*		X	X
<i>Cyperus lucidus</i>	Leafy Flat-sedge				X
<i>Cytisus scoparius</i>	English Broom	*		X	
<i>Dactylis glomerata</i>	Cocksfoot	*		X	
<i>Dillwynia cinerascens s.l.</i>	Grey Parrot-pea			X	X
<i>Drosera auriculata</i>	Tall Sundew				X
<i>Drosera peltata s.l.</i>	Pale Sundew			X	
<i>Eleocharis acuta</i>	Common Spike-sedge			X	
<i>Eryngium vesiculosum</i>	Prickfoot			X	
<i>Eucalyptus camaldulensis</i>	River Red-gum				
<i>Eucalyptus ovata</i>	Swamp Gum			X	
<i>Eucalyptus pauciflora</i>	Snow Gum				X
<i>Eucalyptus pauciflora subsp. pauciflora</i>	White Sallee			X	
<i>Eucalyptus radiata s.l.</i>	Narrow-leaf Peppermint			X	X
<i>Eucalyptus rubida</i>	Candlebark			X	X
<i>Eucalyptus viminalis</i>	Manna Gum			X	X
<i>Festuca arundinacea</i>	Tall Fescue	*			X
<i>Genista monspessulana</i>	Montpellier Broom	*		X	
<i>Geranium solanderi s.l.</i>	Austral Crane's-bill			X	
<i>Geranium sp. 2</i>	Variable Crane's-bill				X
<i>Geranium spp.</i>	Crane's Bill			X	X
<i>Gonocarpus humilis</i>	Shade Raspwort			X	X
<i>Gonocarpus tetragynus</i>	Common Raspwort			X	
<i>Haloragis heterophylla</i>	Varied Raspwort			X	X
<i>Holcus lanatus</i>	Yorkshire Fog	*		X	X
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort			X	
<i>Hypericum gramineum spp. agg.</i>	Small St John's Wort			X	X
<i>Hypochaeris glabra</i>	Smooth Cat's-ear	*			X
<i>Hypochaeris radicata</i>	Flatweed	*		X	X
<i>Isolepis cernua</i>	Nodding Club-sedge				X
<i>Isolepis hookeriana</i>	Grassy Club-sedge				X
<i>Juncus bufonius</i>	Toad Rush				X
<i>Juncus capitatus</i>	Capitate Rush				X
<i>Juncus holoschoenus</i>	Joint-leaf Rush			X	
<i>Juncus procerus</i>	Tall Rush			X	
<i>Juncus subsecundus</i>	Finger Rush			X	
<i>Lachnagrostis filiformis s.l.</i>	Common Blown-grass			X	
<i>Leontodon taraxacoides subsp. taraxacoides</i>	Hairy Hawkbit	*		X	
<i>Luzula meridionalis var. densiflora</i>	Common Woodrush				
<i>Lysimachia arvensis</i>	Pimpernel	*		X	
<i>Lythrum hyssopifolia</i>	Small Loosestrife			X	X
<i>Microlaena stipoides var. stipoides</i>	Weeping Grass				X
<i>Moenchia erecta</i>	Erect Chickweed	*			
<i>Myosotis discolor</i>	Yellow-and-blue Forget-me-	*		X	X

Grassland		PE	Paul Foreman	Future Flora Survey	
Date of Survey		Spring 2014	10/11/2013	?	
Scientific Name	Common Name	Status			
		Origin	DSE	FFG	EPBC
	not				
<i>Myriophyllum spp.</i>	Water Milfoil		X		
<i>Oxalis corniculata s.l.</i>	Yellow Wood-sorrel		X		
<i>Oxalis perennans</i>	Grassland Wood-sorrel			X	
<i>Pimelea glauca</i>	Smooth Rice-flower		X		
<i>Pimelea humilis</i>	Common Rice-flower			X	
<i>Plantago lanceolata</i>	Ribwort	*	X		
<i>Plantago varia</i>	Variable Plantain		X	X	
<i>Poa annua</i>	Annual Meadow-grass	*		X	
<i>Poa labillardierei</i>	Common Tussock-grass		X		
<i>Poa labillardierei var. labillardierei</i>	Common Tussock-grass			X	
<i>Poa morrisii</i>	Soft Tussock-grass			X	
<i>Poa pratensis</i>	Kentucky Blue-grass	*		X	
<i>Poa sieberiana</i>	Grey Tussock-grass		X		
<i>Poa sieberiana var. sieberiana</i>	Grey Tussock-grass			X	
<i>Poa spp.</i>	Tussock Grass		X		
<i>Poranthera microphylla s.l.</i>	Small Poranthera			X	
<i>Ranunculus lappaceus</i>	Australian Buttercup		X	X	
<i>Ranunculus spp.</i>	Buttercup			X	
<i>Romulea rosea</i>	Onion Grass	*	X		
<i>Rosa rubiginosa</i>	Sweet Briar	*	X	X	
<i>Rubus fruticosus spp. agg.</i>	Blackberry	*	X	X	
<i>Rumex spp. (naturalised)</i>	Dock (naturalised)	*		X	
<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass			X	
<i>Rytidosperma laeve</i>	Smooth Wallaby-grass			X	
<i>Rytidosperma spp.</i>	Wallaby Grass			X	
<i>Schoenus apogon</i>	Common Bog-sedge		X	X	
<i>Schoenus maschalinus</i>	Leafy Bog-sedge			X	
<i>Senecio glomeratus</i>	Annual Fireweed		X		
<i>Senecio quadridentatus</i>	Cotton Fireweed		X		
<i>Senecio squarrosus A.Rich.</i>	Leafy Fireweed		X		
<i>Senecio spp.</i>	Groundsel			X	
<i>Solanum laciniatum</i>	Large Kangaroo Apple			X	
<i>Solenogyne gunnii</i>	Hairy Solenogyne			X	
<i>Sonchus asper s.l.</i>	Rough Sow-thistle	*	X	X	
<i>Stylidium graminifolium s.l.</i>	Grass Triggerplant		X		
<i>Taraxacum officinale spp. agg.</i>	Garden Dandelion	*	X	X	
<i>Thelymitra spp.</i>	Sun Orchid			X	
<i>Themeda triandra</i>	Kangaroo Grass		X	X	
<i>Tragopogon porrifolius subsp. porrifolius</i>	Salsify	*	X		
<i>Trifolium dubium</i>	Suckling Clover	*		X	
<i>Trifolium repens var. repens</i>	White Clover	*	X	X	
<i>Trifolium subterraneum</i>	Subterranean Clover	*		X	
<i>Typha domingensis</i>	Narrow-leaf Cumbungi		X		
<i>Ulex europaeus</i>	Gorse	*	X		
<i>Veronica gracilis</i>	Slender Speedwell		X	X	
<i>Vicia sativa</i>	Common Vetch	*	X	X	
<i>Vulpia bromoides</i>	Squirrel-tail Fescue	*	X		
<i>Vulpia muralis</i>	Wall Fescue	*		X	

## Appendix 3. Fauna Species List for Hanging Rock

The flora list below is a compilation of the known fauna species lists for Hanging Rock. The references and data used to compile the fauna species list are outlined below:

- 1) Bird census data and incidental observations; Practical Ecology Pty Ltd (17/11/2014)
- 2) The current nestbox and camera trap monitoring being undertaken by the MRSC
- 3) Previous fauna survey data from the 1993 Management Plan (Loder and Bayly)
- 4) Information available on the Hanging Rock website (Visit Macedon Ranges; <http://www.visitmacedonranges.com/natural-attractions/hanging-rock/downloads-and-documents/Hanging%20Rock%20Flora%20Fauna.pdf>)
- 5) Two bat surveys undertaken for the NDLG in 2008 and 2010
- 6) Bird data from the Woodend Bird Observers Club
- 7) Data from the annual koala counts
- 8) Bird data from Albert Golden, and
- 9) Observations from the long-term Reserve Ranger (G Bigolin pers. comm.).
- 10) Data from the January 2015 Spotlight undertaken by Macedon Ranges Shire Council

The fauna species table below indicate the species observed during a variety of fauna surveys. This list is not exhaustive. If a species is not listed, this does not mean it does not occur within the reserve, or that it no longer occurs within the reserve if it was recorded in a previous survey, but not in the more recent surveys.

### Key to Species List

\* Introduced animals

The key to the threatened species **status** is provided at the bottom of the fauna results table.

		Bat Survey	Bat Survey	Albert Golden	Woodend Bird Observers	MP	Website	Guido Bigolin	Incidental	MRSC Remote Cameras	MRSC Spotlight	PE	Comments
Date		2008	2010	1985–2013	21/09/13	1982	1993	Since 1982		2014	Jan 2015	Nov 2014	
Common Name	Scientific Name	Status											
		DELWP	FFG	EPBC									
<b>BIRDS</b>													
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>			X			X						X
Striated Thornbill	<i>Acanthiza lineata</i>			X	X		X						
Brown Thornbill	<i>Acanthiza pusilla</i>			X			X						X
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>			X									
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>			X			X						
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>			X									
Brown Goshawk	<i>Accipiter fasciatus</i>			X	X			X				1	
Grey Goshawk	<i>Accipiter novaehollandiae</i>											vu	L

		Bat Survey	Bat Survey	Albert Golden	Woodend Bird Observers	MP	Website	Guido Bigolin	Incidental	MRSC Remote Cameras	MRSC Spotlight	PE	Comments
Date		2008	2010	1985-2013	21/09/13	1982	1993	Since 1982		2014	Jan 2015	Nov 2014	
Common Name	Scientific Name	Status											
		DELWP	FFG	EPBC									
	<i>novaehollandiae</i>												
Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>			X									
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>			X									
Chestnut Teal	<i>Anas castanea</i>			X									
Grey Teal	<i>Anas gracilis</i>			X								X	
Australasian Shoveler	<i>Anas rhynchotis</i>	vu		X									
Pacific Black Duck	<i>Anas superciliosa</i>			X			X					X	
Darter	<i>Anhinga novaehollandiae</i>			X									
Red Wattlebird	<i>Anthochaera carunculata</i>			X								X	
Australasian Pipit	<i>Anthus novaeseelandiae</i>			X			X						
Fork-tailed Swift	<i>Apus pacificus</i>			X									
Wedge-tailed Eagle	<i>Aquila audax</i>			X			X						
Eastern Great Egret	<i>Ardea modesta</i>	vu	L	X									
White-necked Heron	<i>Ardea pacifica</i>			X	X								
Dusky Woodswallow	<i>Artamus cyanopterus</i>			X	X		X					X	
Hardhead	<i>Aythya australis</i>	vu		X									
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>			X	X		X	X				X	
Little Corella	<i>Cacatua sanguinea</i>			X				X					
Long-billed Corella	<i>Cacatua tenuirostris</i>			X				X					
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>			X								X	Heard (WT), N of rock
Brush Cuckoo	<i>Cacomantis variolosus</i>						X						
Gang Gang Cockatoo	<i>Callocephalon fimbriatum</i>							X					
Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>			X				X					
European Goldfinch	<i>Carduelis carduelis</i>			X									
Australian Wood Duck	<i>Chenonetta jubata</i>			X	X							X	
Horsfield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>			X									
Shining Bronze-Cuckoo	<i>Chrysococcyx lucidus</i>			X									
Swamp Harrier	<i>Circus approximans</i>			X									
Red-browed Treecreeper	<i>Climacteris erythrops</i>			X		X			X				William Terry observation
Brown Treecreeper (south-	<i>Climacteris picumnus victoriae</i>	nt		X					X				W T observation

		Bat Survey	Bat Survey	Albert Golden	Woodend Bird Observers	MP	Website	Guido Bigolin	Incidental	MRSC Remote Cameras	MRSC Spotlight	PE	Comments
Date		2008	2010	1985-2013	21/09/13	1982	1993	Since 1982		2014	Jan 2015	Nov 2014	
Common Name	Scientific Name	Status											
		DELWP	FFG	EPBC									
eastern ssp.)													
Grey Shrike-thrush	<i>Colluricincla harmonica</i>			X	X					X			X
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>			X	X		X						X
White-winged Chough	<i>Corcorax melanorhampos</i>						X						X
White-throated Treecreeper	<i>Cormobates leucophaeus</i>			X	X		X			X			X
Australian Raven	<i>Corvus coronoides</i>			X									X
Little Raven	<i>Corvus mellori</i>			X	X		X						
Stubble Quail	<i>Coturnix pectoralis</i>			X									
Pallid Cuckoo	<i>Cuculus pallidus</i>			X			X						
Black Swan	<i>Cygnus atratus</i>			X				X					Don't stay due to fluctuating dam levels (Guido)
Laughing Kookaburra	<i>Dacelo novaeguineae</i>			X	X		X						X
Varied Sittella	<i>Daphoenositta chrysoptera</i>			X			X						
Mistletoebird	<i>Dicaeum hirundinaceum</i>			X									
White-faced Heron	<i>Egretta novaehollandiae</i>			X			X						X
Black-shouldered Kite	<i>Elanus axillaris</i>			X									
Black-fronted Dotterel	<i>Elseyornis melanops</i>			X			X						
Galah	<i>Eolophus roseicapilla</i>			X			X	X					X
Eastern Yellow Robin	<i>Eopsaltria australis</i>			X	X			X					X
White-fronted Chat	<i>Epthianura albifrons</i>			X									
Brown Falcon	<i>Falco berigora</i>			X									
Nankeen Kestrel	<i>Falco cenchroides</i>			X									
Peregrine Falcon	<i>Falco peregrinus</i>			X	X								X
Crested Shrike-tit	<i>Falcunculus frontatus</i>			X									
Eurasian Coot	<i>Fulica atra</i>			X				X					X
Latham's Snipe	<i>Gallinago hardwickii</i>			nt		M							
Dusky Moorhen	<i>Gallinula tenebrosa</i>			X									
Musk Lorikeet	<i>Glossopsitta concinna</i>			X									
Magpie-lark	<i>Grallina cyanoleuca</i>			X			X						X
Australian Magpie	<i>Gymnorhina tibicen</i>			X	X		X						X
Whistling Kite	<i>Haliastur sphenurus</i>			X									

		Bat Survey	Bat Survey	Albert Golden	Woodend Bird Observers	MP	Website	Guido Bigolin	Incidental	MRSC Remote Cameras	MRSC Spotlight	PE	Comments
Date		2008	2010	1985-2013	21/09/13	1982	1993	Since 1982		2014	Jan 2015	Nov 2014	
Common Name	Scientific Name	Status											
		DELWP	FFG	EPBC									
Little Eagle	<i>Hieraaetus morphnoides</i>			X									
White-throated Needletail	<i>Hirundapus caudacutus</i>	vu		X									
Welcome Swallow	<i>Hirundo neoxina</i>							X				X	
White-winged Triller	<i>Lalage sueurii</i>			X	X								
Swift Parrot	<i>Lathamus discolor</i>	en	L	EN									
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>			X	X		X					X	
White-eared Honeyeater	<i>Lichenostomus leucotis</i>			X	X							X	
Yellow-tufted Honeyeater	<i>Lichenostomus melanops</i>			X									
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>			X	X							X	
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>							X					
Superb Fairy-wren	<i>Malurus cyaneus</i>			X	X		X					X	
Noisy Miner	<i>Manorina melanocephala</i>			X									
Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>			X									
White-naped Honeyeater	<i>Melithreptus lunatus</i>			X	X		X					X	
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>			X									
Jacky Winter	<i>Microeca fascinans</i>			X			X						
Restless Flycatcher	<i>Myiagra inquieta</i>			X									
Leaden Flycatcher	<i>Myiagra rubecula</i>			X									
Red-browed Finch	<i>Neochmia temporalis</i>			X	X							X	
Barking Owl	<i>Ninox connivens connivens</i>	en	L	X							1		
Southern Boobook	<i>Ninox novaeseelandiae</i>			X				X					
Powerful Owl	<i>Ninox strenua</i>	vu	L	X	X			X					
Crested Pigeon	<i>Ocyphaps lophotes</i>			X								X	
Olive-backed Oriole	<i>Oriolus sagittatus</i>			X									
Golden Whistler	<i>Pachycephala pectoralis</i>			X	X		X					X	
Rufous Whistler	<i>Pachycephala rufiventris</i>			X	X		X					X	
Spotted Pardalote	<i>Pardalotus punctatus</i>			X			X						
Striated Pardalote	<i>Pardalotus striatus</i>			X	X		X					X	Heard (WT)
*House Sparrow	<i>Passer domesticus</i>			X									
Welcome Swallow	<i>Petrochelidon neoxena</i>			X									
Tree Martin	<i>Petrochelidon nigricans</i>			X									
Scarlet Robin	<i>Petroica boodang</i>			X				X					

		Bat Survey	Bat Survey	Albert Golden	Woodend Bird Observers	MP	Website	Guido Bigolin	Incidental	MRSC Remote Cameras	MRSC Spotlight	PE	Comments
Date		2008	2010	1985–2013	21/09/13	1982	1993	Since 1982		2014	Jan 2015	Nov 2014	
Common Name	Scientific Name	Status											
		DELWP	FFG	EPBC									
Red-capped Robin	<i>Petroica goodenovii</i>			X									
Flame Robin	<i>Petroica phoenicea</i>			X									
Pink Robin	<i>Petroica rodinogaster</i>			X									
Great Cormorant	<i>Phalacrocorax carbo</i>			X				X?					Catch fish stock in racecourse dam when released by DEPI (Guido)
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>			X	X								
Pied Cormorant	<i>Phalacrocorax varius</i>			X									
Common Bronzewing	<i>Phaps chalcoptera</i>			X									
Brush Bronzewing	<i>Phaps elegans</i>			X									
Crescent Honeyeater	<i>Phylidonyris pyrrhoptera</i>			X									
Yellow-billed Spoonbill	<i>Platalea flavipes</i>			X									
Crimson Rosella	<i>Platycercus elegans</i>			X	X		X	X		X			
Eastern Rosella	<i>Platycercus eximius</i>			X	X		X	X					
Tawny Frogmouth	<i>Podargus strigoides</i>			X				X					
Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>			X								X	
Purple Swamphen	<i>Porphyrio porphyrio</i>			X				X					
Red-rumped Parrot	<i>Psephotus haematonotus</i>			X									
Grey Fantail	<i>Rhipidura albiscarpa</i>			X	X		X					X	
Willie Wagtail	<i>Rhipidura leucophrys</i>			X			X					X	
White-browed Scrubwren	<i>Sericornis frontalis</i>			X	X		X					X	
Weebill	<i>Smicrornis brevirostris</i>			X									
Pied Currawong	<i>Strepera graculina</i>			X	X		X						
Grey Currawong	<i>Strepera versicolor</i>			X			X					X	
*Common Starling	<i>Sturnus vulgaris</i>			X	X							X	Heard (WT)
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>			X									
Australian Shelduck	<i>Tadorna tadornoides</i>			X									
Australian White Ibis	<i>Threskiornis molucca</i>			X									
Straw-necked Ibis	<i>Threskiornis spinicollis</i>			X									
Sacred Kingfisher	<i>Todiramphus sanctus</i>			X				X				X	Used to be 10–12 not as many now (Guido)

		Bat Survey	Bat Survey	Albert Golden	Woodend Bird Observers	MP	Website	Guido Bigolin	Incidental	MRSC Remote Cameras	MRSC Spotlight	PE	Comments
Date		2008	2010	1985-2013	21/09/13	1982	1993	Since 1982		2014	Jan 2015	Nov 2014	
Common Name	Scientific Name	Status											
		DELWP	FFG	EPBC									
*Common Blackbird	<i>Turdus merula</i>			X						X			PE: Scattered observations throughout site (AE)
Pacific Barn Owl	<i>Tyto javanica</i>			X	X			X					
Masked Lapwing	<i>Vanellus miles</i>			X								X	
*Silvereye	<i>Zosterops lateralis</i>			X			X						
<b>MAMMALS</b>													
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>					X							
Chocolate Wattled Bat	<i>Chalinolobus morio</i>					X							
Eastern Falsistrelle	<i>Falsistrellus tasmaniensis</i>				X	X							
*Feral Cat	<i>Felis catus</i>							X					
Eastern Grey Kangaroo	<i>Macropus giganteus</i>							X		X		X	
Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>				X	X			X				W T obs in nest box
Gould's Long-eared Bat	<i>Nyctophilus gouldi</i>				X	X							
*European Rabbit	<i>Oryctolagus cuniculus</i>									X		X	
Greater Glider	<i>Petauroides volans</i>							X					
Sugar Glider	<i>Petaurus breviceps</i>									X			
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>												
Koala	<i>Phascolarctos cinereus</i>							X		X	9		
Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>									X	5	X	Dreys (AE)
*Black Rat	<i>Rattus rattus</i>									X		X	
Short-beaked Echidna	<i>Tachyglossus aculeatus</i>							X		X		X	
White-striped Freetail Bat	<i>Tadarida australis</i>				X	X							
Brushtail Possum	<i>Trichosurus vulpecula</i>							X		X	14		
Large Forest bat	<i>Vespadelus darlingtoni</i>				X	X							
Southern Forest Bat	<i>Vespadelus regulus</i>				X	X							
Little Forest Bat	<i>Vespadelus vulturnus</i>				X								
Common Wombat	<i>Vombatus ursinus</i>							X		X		X	Burrows, scats (AE)
*Red Fox	<i>Vulpes vulpes</i>							X		X	2		

			Bat Survey	Bat Survey	Albert Golden	Woodend Bird Observers	MP	Website	Guido Bigolin	Incidental	MRSC Remote Cameras	MRSC Spotlight	PE	Comments
Date			2008	2010	1985-2013	21/09/13	1982	1993	Since 1982		2014	Jan 2015	Nov 2014	
Common Name	Scientific Name	Status												
		DELWP	FFG	EPBC										
Swamp Wallaby	<i>Wallabia bicolor</i>							X			X		X	
*Domestic Dog	<i>Canis familiaris</i>										X			
*Fallow Deer	<i>Dama dama</i>										X			

REPTILES

Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>							X						
Eastern Brown Snake	<i>Pseudonaja textilis</i>							X						
Lace Monitor/Goanna	<i>Varanus varius</i>							X						

AMPHIBIANS

Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>								X					
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INVERTEBRATES

Common Grass Blue	<i>Zizinia labradus</i>												X	
Cabbage White	<i>Pieris rapae</i>												X	
Common Brown	<i>Heteronympha merope</i>												X	

Conservation status of Threatened Fauna in Victoria (DELWP, ref. DEPI 2013)

EX: Extinct, RX: Regionally Extinct, WX: Extinct in the Wild, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, DD: Data Deficient

Definitions of Conservation Status Codes can be found on the DELWP website under Advisory List of Rare or Threatened Fauna

Conservation status under EPBC Act 1999:

EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant M: Migratory Species listed under the Act

Conservation status under FFG Act 1988: L: Listed, N: Nominated, I: Invalid or ineligible and D: Delisted

## Appendix 4. Bird Census Data Hanging Rock Reserve

Survey Details		Year (and 2-hectare, 20-minute bird census site #)				Comments
		2014				
		Site 1	Site 2	Site 3	Incidental	
Date		17/11/2014				Alice Ewing (Practical Ecologist – Zoologist)
Time (start/finish)		1035–1055	1400–1420	1147–1207	0930–1730	
Observer(s)		AE, WT	AE, WT	AE, WT	AE, WT	William Terry (Macedon Ranges Shire Council – Environmental Officer)
Temperature	°C	12.5	14.5	13.5	12–17	
Cloud Cover	%	>90	~80	>90	>90 – 80	Constantly windy (cool) in morning which dropped off around midday to scattered light gusts in late afternoon, along with increasing temperature and lower cloud cover. Light showers in morning only.
Wind Velocity	knots	19	22	19	10–25	
Wind Direction		SSW	SW	SW	S–W	
Precipitation	(description)	scattered showers	nil	nil	scattered showers (AM)	
Relative Humidity	%	79	62	73	85–45	
Common Name	Scientific Name	Status				Comments (all records are observations, unless otherwise described below)
		Origin	DEPI	FFG	EPBC	
BIRDS						
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>					X
Brown Thornbill	<i>Acanthiza pusilla</i>					X
Grey Teal	<i>Anas gracilis</i>					X
Pacific Black Duck	<i>Anas superciliosa</i>				x	X
Red Wattlebird	<i>Anthochaera carunculata</i>					X
Dusky Woodswallow	<i>Artamus cyanopterus</i>	x		x		X
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>				x	X
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>					X
Australian Wood Duck	<i>Chenonetta jubata</i>				x	X
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	x			x	X
Black-faced Cuckoo Shrike	<i>Coracina novaehollandiae</i>	x				X
White-winged Chough	<i>Corcorax melanorhamphos</i>					X
White-throated Treecreeper	<i>Cormobates leucophaea</i>	x				X
Raven sp. (probable Little)	<i>Corvus sp.</i>				x	X
Australian Magpie	<i>Cracticus tibicen</i>				x	x
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	x		x	x	X
White-faced Heron	<i>Egretta novaehollandiae</i>				x	X
Galah	<i>Eolophus roseicapilla</i>					X
Eastern Yellow Robin	<i>Eopsaltria australis</i>					X
Peregrine Falcon	<i>Falco peregrinus</i>				x	X
Eurasian Coot	<i>Fulica atra</i>				x	X
Magpie Lark	<i>Grallina cyanoleuca</i>				x	X
Welcome Swallow	<i>Hirundo neoxena</i>				x	X
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>					x
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>					X
Superb Fairy-wren	<i>Malurus cyaneus</i>	x	x	x		X
White-naped Honeyeater	<i>Melithreptus lunatus</i>	x			x	X

Survey Details			Year (and 2-hectare, 20-minute bird census site #)				
			2014				
			Site 1	Site 2	Site 3	Incidental	Comments
Red-browed Finch	<i>Neochmia temporalis</i>			x		X	
Crested Pigeon	<i>Ocyphaps lophotes</i>					X	
Rufous Whistler	<i>Pachycephala pectoralis</i>		x			X	
Golden Whistler	<i>Pachycephala rufiventris</i>				x		
Striated Pardalote	<i>Pardalotus striatus</i>		x		x	X	Heard (WT)
Crimson Rosella	<i>Platycercus eximius</i>		x		x	X	
Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>			x		X	
Grey Fantail	<i>Rhipidura albiscapa</i>		x		x	X	
Willie Wagtail	<i>Rhipidura leucophrys</i>					X	
White-browed Scrubwren	<i>Sericornis frontalis</i>					X	
Grey Currawong	<i>Strepera versicolor</i>					X	
Sacred Kingfisher	<i>Todirhamphus sanctus</i>					X	
Masked Lapwing	<i>Vanellus miles</i>			x		X	
Common Starling	<i>Sturnus vulgaris</i>	*				X	Near Racecourse Facility
European Blackbird	<i>Turdus merula</i>	*			x	X	Scattered observations throughout site
<b>MAMMALS</b>							
Eastern Grey Kangaroo	<i>Macropus giganteus</i>					X	scats, tracks, observed (many, three groups)
Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>					X	dreys
Short-beaked Echidna	<i>Tachyglossus aculeatus</i>					X	diggings, observed (2)
Common Wombat	<i>Vombatus ursinus</i>					X	burrows, scats
Swamp Wallaby	<i>Wallabia bicolor</i>					X	scats, observed (1)
European Rabbit	<i>Oryctolagus cuniculus</i>	*				X	scats, burrows, scratchings, observed
<b>INVERTEBRATES</b>							
Common Grass Blue	<i>Zizinia labradus</i>					X	
Cabbage White	<i>Pieris rapae</i>					X	
Common Brown	<i>Heteronympha merope</i>					X	

## Appendix 5. Defendable Space Management Standards

Vegetation within defendable space is modified and managed to ensure the defendable space mitigates the bushfire risk as it approaches a structure.

Defendable space management standards presented in Planning Practice Note 65 (DTPLI 2014) require that:

- Within 10 metres of a building, flammable objects such as plants, mulches and fences must not be located close to vulnerable parts of the building such as windows, decks and eaves.
- Trees must not overhang the roofline of the building, touch walls or other elements of a building.
- Grass should be kept short. Five centimetres or less is considered short. All leaves and vegetation debris are to be removed at regular intervals.
- Shrubs should not be planted under trees.
- Plants greater than 10 centimetres in height at maturity must not be placed directly in front of a window or other glass feature.
- Tree canopy separation of five metres and the overall canopy cover of no more than 15 per cent at maturity.

Additional recommendations to guide the management of fuel within defendable space include:

- Groups of shrubs should be separated by at least 1.5 times their mature height
- Tree branches below 2 metres from ground level should be removed
- Shrubs and/or trees should not form a continuous canopy with unmanaged fuels.
- \*Close is considered to be 1.5 to 2 time's mature height of the fuel.

## Appendix 6. Defendable Space Calculations

As outlined in Sections 7 and 8.3, defendable space calculations from Clause 52.47 Planning for Bushfire have been utilised to determine the extent of the fuel management that may be required in the future around the public buildings within of the Reserve.

Defendable space calculations are based on the slope and vegetation type in each direction around a building, and then either the extent of area available, or the required BAL level for certain building types is then used to determine the extent of defendable space from Tables 1, 2 or 3 in Clause 52.47.

A brief explanation and the defendable space calculations for public buildings are provided below.

### Public Buildings

Clause 52.47–2 Bushfire Protection Objectives applies to buildings located in a reserve.

All building used as ‘a place of assembly’ must be constructed to a bushfire attack level of BAL 12.5, and defendable space must be in accordance with Table 3 to Clause 52.47–3.

#### Defendable space assessment (5: Hanging Rock Café and Visitors Centre)

Direction	West	South	North	East
Vegetation type	Woodland	Woodland	Forest	Low Threat Vegetation
Slope	Downslope 5–10°	Downslope 5–10°	Upslope	Downslope 5–10°
BAL 12.5 defendable space	62m	62m	60m	N/a
Extent of defendable space = 62m radius around café/visitor centre				

#### Defendable space assessment (7: Cricket Clubrooms)

Direction	West	South	North	East
Vegetation type	Low Threat Vegetation	Low Threat Vegetation	Low Threat Vegetation	Low Threat Vegetation
Slope	upslope	Flat	Upslope	Flat
BAL 12.5 defendable space	N/a	N/a	N/a	N/a
Extent of defendable space = N/a				

#### Defendable space assessment (8: Tennis Clubhouse)

Direction	West	South	North	East
Vegetation type	Woodland	Woodland	Woodland	Woodland
Slope	Flat	Flat	Flat	Flat
BAL 12.5 defendable space	40m	40m	40m	40m
Extent of defendable space = 40m radius around tennis clubhouse				

**Defendable space assessment (9: Racecourse Clubrooms)**

Direction	West	South	North	East
Vegetation type	Forest	Low Threat Vegetation	Woodland	Low Threat Vegetation
Slope	Upslope	Downslope 0-5°	Flat	Downslope 0-5°
BAL 12.5 defendable space	60m	N/a	40m	N/a
<b>Extent of defendable space = 60m radius around racecourse clubrooms</b>				

**Defendable space assessment (10: Workshop)**

Direction	West	South	North	East
Vegetation type	Forest	Low Threat Vegetation	Woodland	Grassland
Slope	Upslope	Flat	Flat	Downslope 0-5°
BAL 12.5 defendable space	60m	N/a	40m	40m
<b>Extent of defendable space = 60m radius around workshop</b>				



Gould's Wattled Bat  
Photo: Lindy Lamaden

Other examples of roost trees used by Gould's Wattled Bats in Melbourne



Loose bark on eucalypt trunk provided a roost site for an individual male bat.



A colony of females roosted in one of the crevices in the trunk.



A colony of bats used the spout on this tree underneath these noisy bells!  
Photo: Caroline Wilson

Australian Bat Society

# Before you prune, consider roosting bats!



A freetail bat leaving a tree hollow used as a roost.  
Photo: A Natural History of Australian Bats - Working the Night Shift

Dead trees and branches in our gardens, parks and bushlands can pose a risk to human safety – but they are also important roosts for bats.

Here's some advice on how we can protect people and property from falling limbs and still provide vital habitat for bats.

## What do I do if I find a bat while pruning?

1. If you notice microbats while pruning a tree – stop work immediately!
2. Avoid handling bats if possible, as they may carry the Australian Bat Lyssavirus, but if unavoidable use gloves to avoid being bitten. Put bats into a cloth bag or other secure container until help can be obtained.
3. If you find bats within a section of lopped branch or trunk, lower the section to the ground or lean it against another tree, and leave it for at least 24 hours, to give any uninjured bats the chance to escape.
4. Do not leave bats out in the open or exposed on the ground, as they are vulnerable to predators such as birds and cats.
5. If there are any bats that appear injured or do not fly away, contact a wildlife shelter for assistance (call "Help for Wildlife" – 0417 380 687 or "Wildlife Victoria" – 1300 094 535). The bats can be collected and assessed for injuries and then released that night.

### Fun Fact!

How did biologists find out where bats roost in Melbourne? They attached tiny radio-transmitters to the bats and tracked them all over the city!

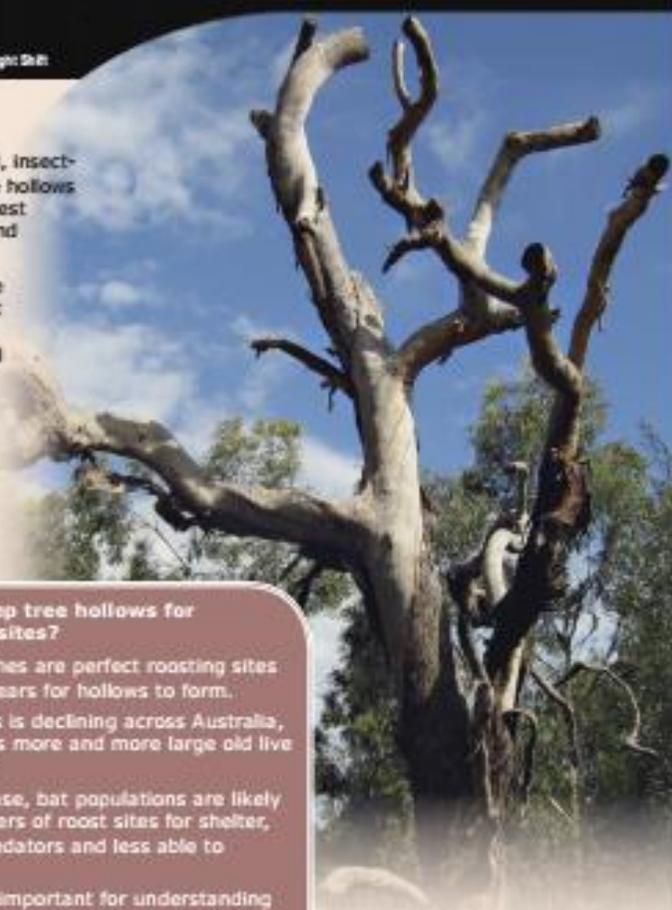


## Why do bats need a roost?

- In Australia, most "microbats" (small, insect-eating bats) rely on shelters like tree hollows as a place to roost, where they can rest and find protection from predators and extreme daytime temperatures.
- Bats use roosts for shelter during the day, and also at night when they rest between feeding excursions. During the breeding season, female bats will group together in maternity roosts to raise their young.
- Many bats like to use a number of roost sites, moving between them on a regular basis, so it's important to have many suitable roost trees for bats to use.

## Why is it important to keep tree hollows for bat roosting sites?

- Hollows in dead trees and/or branches are perfect roosting sites for bats, but it can take over 100 years for hollows to form.
- The number of hollow-bearing trees is declining across Australia, in forests, bushland and in cities, as more and more large old live and dead trees are being removed.
- As the number of roost sites decrease, bat populations are likely to decline. Without adequate numbers of roost sites for shelter, bats may be more vulnerable to predators and less able to successfully rear their young.
- Information on where bats roost is important for understanding the impact of disturbance on bat populations and to provide a focus to conservation efforts for bat species.
- Hollow-bearing trees are an important part of our ecosystem. They are also used by other animals such as possums, gliders, birds and insects.



When this tree was pruned the branches were lopped on an angle to avoid filling with water. Photo: Caroline Wilson.



Publisher: Australian Bat Society Inc.  
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Looking for more information about bats? Please see our fact sheets on a range of issues, available for download from: [www.ausbats.org.au](http://www.ausbats.org.au)



## Did you know there are bats all over Melbourne, even in the city centre!

Bats are widespread across the city and suburbs. Good places for them include city parks and bushland reserves.

### City parks

Bats are common in European-style parklands close to the city centre (e.g. Melbourne's Royal Botanic Gardens, Fitzroy Gardens and Fawkner Park). In the city parks, bats (particularly groups of breeding females) mainly roost in the dead fronds of cabbage tree palms and within crevices of Californian cypress pines. Palms and pines are most likely used by bats because native gum trees are no longer common in the city's parklands.

In Melbourne, Gould's Wattle Bats (*Chalinolobus pookii*) often roost under the dead fronds on cabbage tree palms. The arrow indicates the roost entrance point.  
Photo: Caroline Wilson



### Bushland reserves

Bats are also common in bushland reserves in the south-eastern suburbs of Melbourne (e.g. Blackburn Lake). In these reserves, bats prefer to roost in hollows, mostly in dead trees. Groups of breeding females are often found within the trunks and branches of these trees, while males find shelter under the shedding bark. Even small dead trees (as little as 15 cm in diameter) can be used by our urban bats!

Typical bat roost in a dead tree in Melbourne. The arrow indicates the entrance to the roost.  
Photo: Caroline Wilson



### Guidelines for pruning trees

- Where dead branches or trees pose a risk to human safety, they may need to be pruned or completely removed. However, there are alternatives to removing branches or trees, and ways to prune potential roost trees effectively so that they still provide some habitat for microbats and other animals.
- If a dead tree is not close to a building, walking track, or a place where people frequent, pruning may be unnecessary and consideration should be given to protect the tree. Signage could be used to provide information about the significance of these trees and their importance to microbats and other native animals.
- Where appropriate, fence off dead trees to keep people from venturing under their branches. If there are a number of dead trees along a path, limit access to the area by re-directing the path.
- If a dead tree is on a path edge where it might pose a public safety risk, only prune the side of the tree facing the path. This will remove hazardous branches that may fall onto walking tracks, and the weight of the remaining branches will encourage the tree, if it collapses, to fall away from the path.
- Avoid pruning trees when female bats may be using the hollow as a maternity roost (November – January), because large groups of females and their dependent young (potentially hundreds of bats) may be killed when the branch or tree is felled.
- The fronds of cabbage tree palms (common bat roosts in our city parks) are often pruned so that trees appear tidier and dead fronds are not shed onto walking paths. When pruning palms, remove just the outer dead fronds from cabbage tree palms, or only remove fronds that are overhanging pedestrian walkways. As an alternative to removing dead fronds, signage could be used to inform the public about falling dead fronds and resultant debris on walking tracks.

### Tips for pruning branches!

1. DO leave as much of the branch as feasible while still considering public safety, and only remove branches that are considered unstable or prone to failure.
2. DO check for any hollows on the branch, and cut the branch well above any hollow you find.
3. DON'T remove the entire branch at its base, because leaving a stump may provide a hollow that bats and other species can use.
4. DO cut branches on an angle so that any remaining hollows don't fill with water when it rains.
5. DO try coronet cuts instead of traditional chainsaw cuts which result in an unnatural flat-plane surface. Coronet cuts are designed to mimic natural branch breakage, and provide more opportunities for micro-organisms to colonise and aid hollow development. Branches can be partially cut and then left to fall naturally, or where tree limbs are removed, a chainsaw can be used to carve a range of shapes which imitate natural fractures.

For more information on this technique, see the Arboricultural Information Exchange (<http://www.aie.org.uk/vault/nfp.htm>).

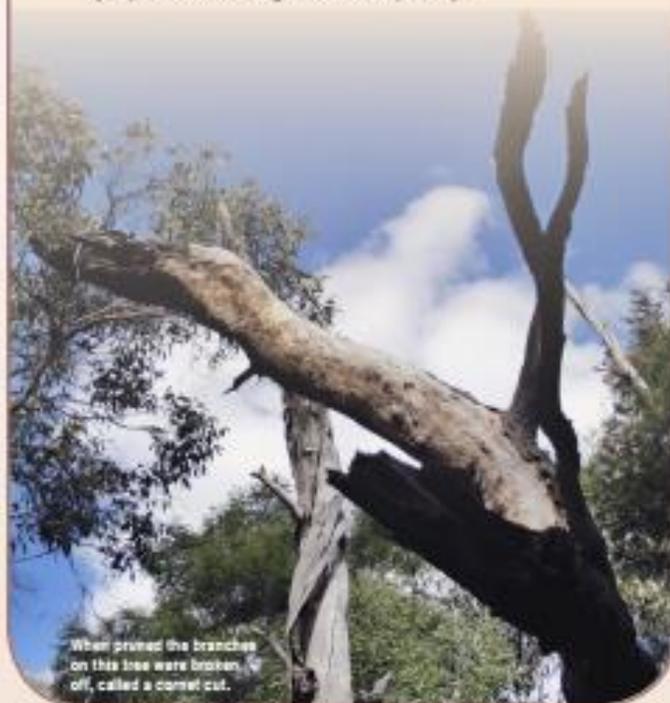


Photo: Caroline Wilson