



## **ATTACHMENTS TO REPORTS**

### **ORDINARY COUNCIL MEETING**

Wednesday 25 November 2020

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## Attachments to Reports

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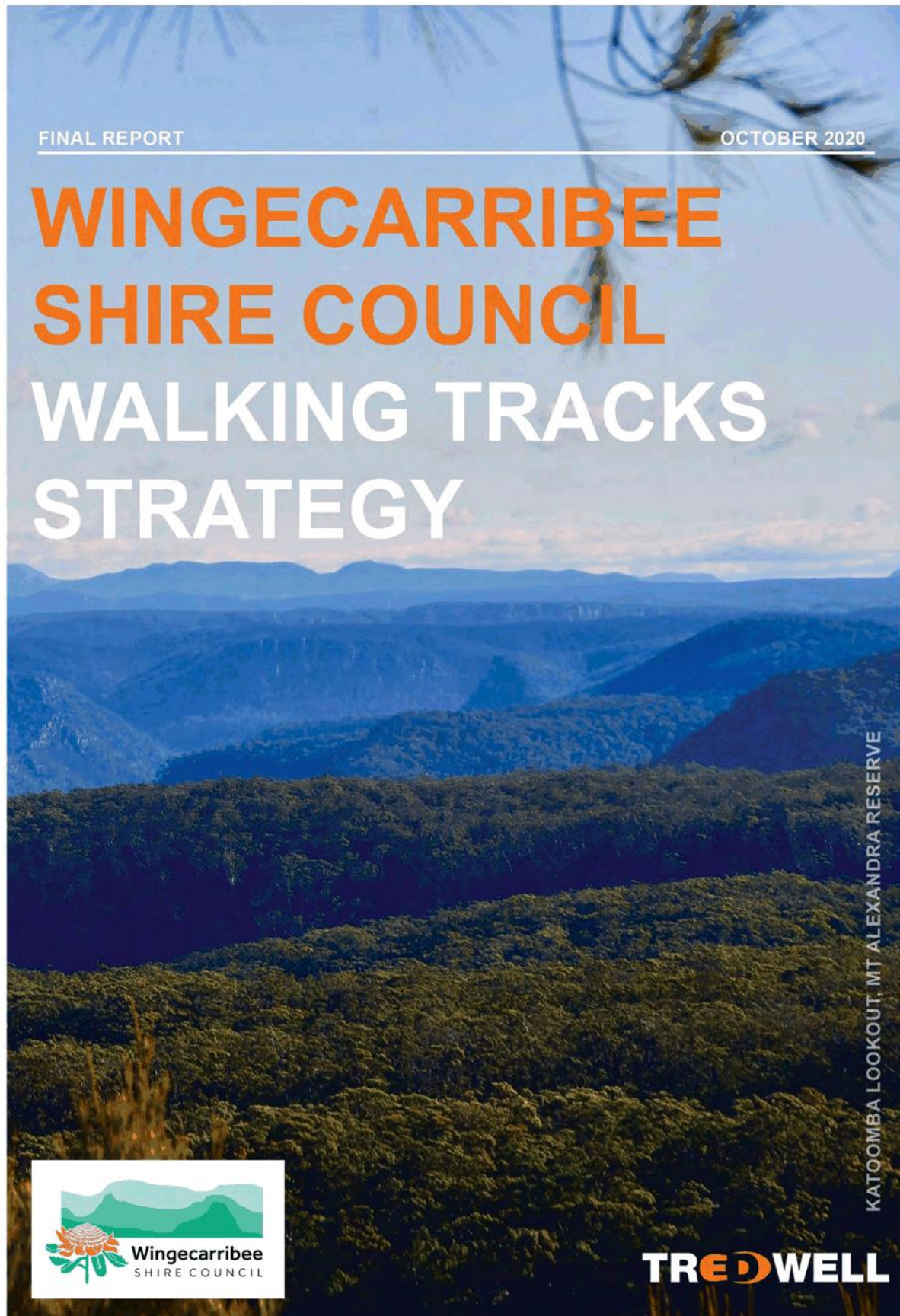
## **ATTACHMENTS TO REPORT**

### **Item 11.1**

#### **Walking Tracks Strategy**

#### **Attachment 2**

Draft Walking Tracks Strategy







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Version No.	Date	Description	Editor
Final Report	26.10.2020	Revised following Public Exhibition	Tredwell

### Acknowledgement of Country

The Wingecarribee Shire and Tredwell acknowledge the Traditional Custodians of this land and we pay our respects to Elders both past and present. We would also like to acknowledge our young leaders who are the Elders of today, tomorrow and our future.

### Photographic Acknowledgement

Sandra Stewart has generously donated the photographs for use throughout this report.

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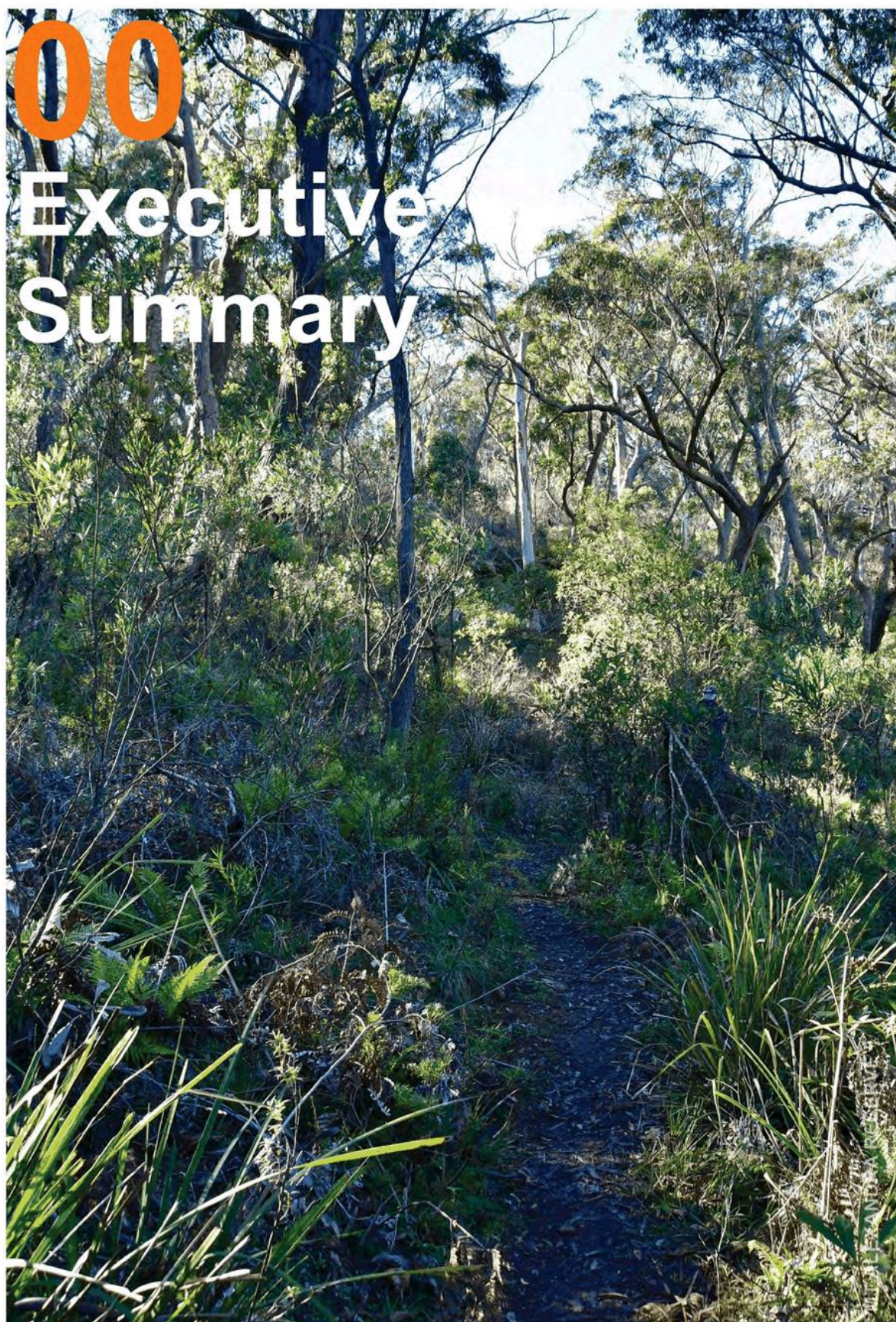


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## 00 Executive Summary

Wingecarribee Shire Council (WSC) engaged Tredwell Management to develop the Recreational Walking Tracks Strategy, with the aim to consolidate Council's understanding of the available network and to provide a framework surrounding the identification, maintenance and enhancement of authorised tracks and trail networks.

Key objectives of this project were to:

- Develop a Strategy for the management, enhancement, and on-going maintenance of recreational walking tracks on Council owned or managed land.
- Identify a cohesive track network that offers active and challenging recreational experiences encompassing the Shire's diverse and distinctive landscapes.

The project scope of the covers the following Council-managed reserves:

- |                           |   |
|---------------------------|---|
| • Mount Alexandra Reserve | • River Bend Reserve                      |
| • Welby Weir              | • Berrima Weir Reserve                    |
| • Lake Alexandra          | • Stone Quarry Walk                       |
| • Iron Mines Oval         | • Bong Bong Common (Link to Cecil Hoskins |
| • Mount Gibraltar Reserve | • Governors Road Boardwalk (Road Reserve) |
| • Gibbergunyah Reserve    | • Glow Worm Glen - William Street Reserve |
| • Mansfield Reserve       | • Garland Street Reserve                  |
| • Hammock Hill Reserve    |   |
| • Berrima River Reserve   |   |

The methodology consisted of background research, on-ground trail auditing and ground truthing, mapping, consultation, strategic planning and the development of a comprehensive strategy and action plan.

Demographic changes, as well as participation and broad societal trends will have implications on the requirements for walking tracks into the future. For example, the increasing popularity of nature-based tourism and individualised recreational pursuits and increasing community expectations.

The development of the Walking Tracks Strategy included a comprehensive review of background information to alignment with the wider objectives across the state, region, and local areas.

The following Australian Standards relate directly to walking tracks and are fundamental to this Strategy:

- AS 2156.1, Walking tracks, Part 1: Classification and signage, and
- AS 2156.2—2001: Walking Tracks Part 2: Infrastructure Design

These standards require walking tracks to be classified from Grade 1 to 6 according to their level of difficulty. This classification also determines the appropriate level and type of infrastructure as well as the risk management requirements for trail managers.

Signage templates have been provided to support the implementation of the Strategy; these are classified as:

- Trailhead Sign
- Waymarking Signs
- Directional Signs
- Interpretation Signs
- Management/Warning Signs

A hierarchy for walking tracks has been established to guide the level of infrastructure required to meet the needs of a trail's users. The hierarchy classified trails as regional, district or local.

Users of recreational trails are exposed to various risks, many of which can be identified and mitigated through a risk assessment. Council's risk matrix is provided, along with guidance for risk identification and mitigation measures.

The following Risk Assessment Matrix is used to determine the overall risk rating by the Wingecarribee Shire Council.

An on-ground audit has been undertaken to produce ground-truthed, geo-referenced data and photographs relating to the walking tracks and associated infrastructure.



## 00 Executive Summary

This process was also supported by an extensive desktop audit of existing walking tracks and consultation with stakeholders and community members to guide the focus of the field work toward established walking track alignments.

The data collection process aligned with Council's broader asset management system. This included use of the ESRI ArcGIS Online Collector mobile auditing application which integrates into Council's system hosted on ArcGIS Online.

The audit identified 28 walking tracks in the specified reserves.

While the recreational walking track experiences identified are generally suitable only for walking in their entirety, it is acknowledged that sections of these tracks may also be suitable for off-road cycling. This is particularly relevant to the sections of walking trails which utilise fire trails.

The Strategy has been informed by community consultation and stakeholder engagement. This involved an internal stakeholder meeting (with WSC staff), a meeting with targeted key external stakeholders, an online community workshop and a *YourSay Wingecarribee* webpage which includes an online community survey, mapping tool and forum.

Overall, the top three issues relating to walking tracks in the Shire's reserves were the lack of signage and track maintenance, and inadequate trail information and promotional materials.

The following vision has been developed, based on the findings of research, on-ground audits, and consultation, to reflect the goal for walking tracks in the Wingecarribee Shire.

The vision for walking tracks on Council owned or managed land is:

*A cohesive network of walking tracks that offers locals and visitors the opportunity to confidently explore the Southern Highlands, immersing themselves in the region's rich biodiversity, proud heritage, and rugged landscapes.*

To deliver the vision, the following series of strategic outcomes have been developed to provide a framework for the Strategy and Action Plan.

- A. Integrated Planning & Management
- B. Clearly Defined, Safe, Sustainable & Accessible Walking Tracks
- C. Information, Promotion and Marketing
- D. Management and Maintenance
- E. Community, Tourism & Economic Development

The Strategy and Action Plan is underpinned by the following principles which have been developed to guide the planning and management of walking tracks in the Wingecarribee Shire.

1. Sustainable  
Walking tracks that are planned, managed, and maintained to be socially, economically, and environmentally sustainable.
2. Diverse  
Walking tracks that offer opportunities accessible to a diverse range of people and showcase the region's diverse range of landscapes, environments, and historic features.
3. Safe  
Walking tracks that are safe and manage risk while maintaining the opportunity for walkers to undertake challenging experiences in the natural environment.
4. Collaborative  
Effectively and efficiently manage walking tracks through collaborative partnerships with stakeholders.

The Strategy and Action Plan provides outlines the prioritisation of strategies and indicates the costs and timeframes for specific actions. An Order of Probable Costs for the capital works components of the strategy has been prepared by Rider Levett Bucknall Quantity Surveyors to inform Council's budgetary processes (included as Appendix 2).









# 01 Introduction

## Project Overview

### Background

Wingecarribee Shire Council (WSC) manages an extensive network of recreational walking tracks. The existing network has evolved from historical use and, in some cases, unplanned walking tracks. This network of both authorised and unauthorised tracks comprising multiple ownership tenures is a challenge for Council. In addition, lack of track identification including distances and difficulty rating, leaves the community and Council at risk.

WSC engaged Tredwell Management to develop the Recreational Walking Tracks Strategy, with the aim to consolidate Council's understanding of the available network and to provide a framework surrounding the identification, maintenance and enhancement of authorised tracks and trail networks.

Key objectives of this project were to:

- Develop a Strategy for the management, enhancement, and on-going maintenance of recreational walking tracks on Council owned or managed land.
- Identify a cohesive track network that offers active and challenging recreational experiences encompassing the Shire's diverse and distinctive landscapes.

### Key Definition

For the purpose of this Strategy, a recreational walking track is considered to be:

*"A corridor, route or pathway within the 16 Council reserves (outlined above in the scope) that provides for recreational walking, which passes through or has a strong connection with the natural environment, open space and cultural heritage"*

The terms 'track' and 'trail' are used interchangeably and reflect this definition.

### Approach

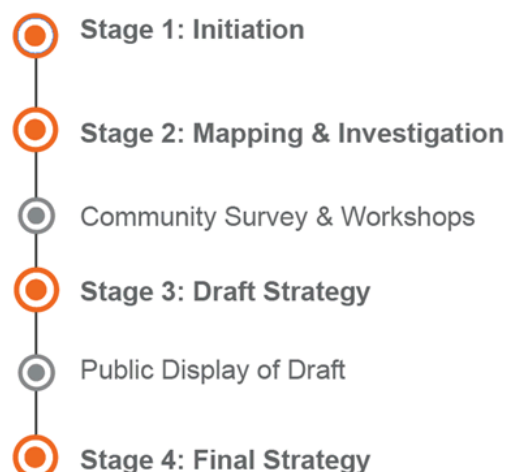


Figure 1: Project Approach

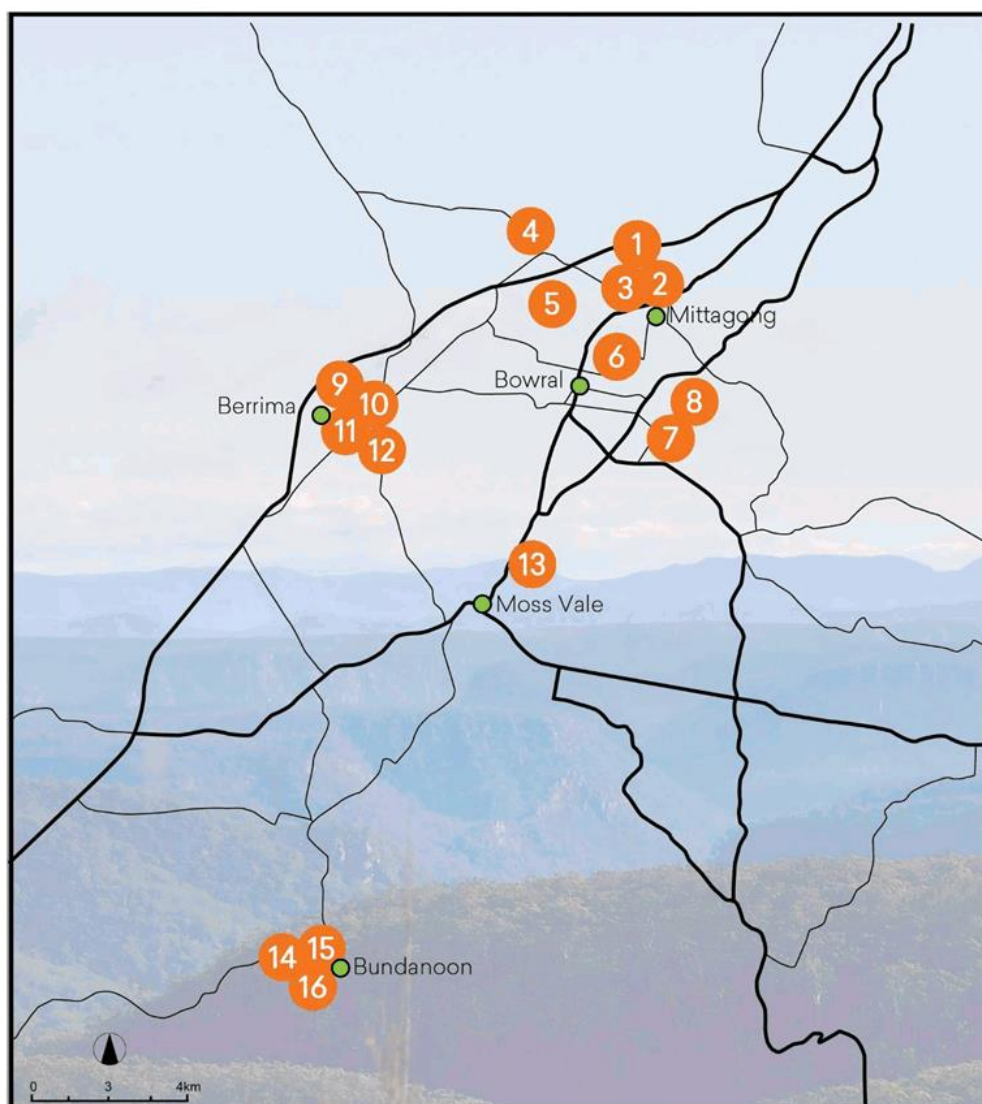
The methodology for this project consisted of background research, on-ground trail auditing and ground truthing, mapping, consultation, strategic planning and the development of a comprehensive strategy and action plan.

### Scope

The scope of the Recreational Walking Tracks Strategy covers 16 specific Council managed reserves which have been identified to have existing recreational walking tracks, or potential for the development of such facilities. The name and location of these reserves is illustrated in Figure 2.

It is acknowledged that additional opportunities for the enhancement of recreational walking tracks exist across the Shire, as well as opportunities for the enhancement of trails for mountain bike riding, water-based trail activities (e.g. canoeing), horse riding and rock climbing. These opportunities are recommended to be considered in future strategic trail planning projects.

## 01 Introduction



- |                           |                          |   |
|---------------------------|--------------------------|---|
| 1 Mount Alexandra Reserve | 7 Hammock Hill Reserve   | 13 Bong Bong Common (link to Cecil Hoskins) |
| 2 Lake Alexandra Reserve  | 8 Mansfield Reserve      | 14 Glow Worm Glen William Street Reserve    |
| 3 Iron Mines Oval Reserve | 9 River Bend Reserve     | 15 Garland St Reserve                       |
| 4 Welby Weir              | 10 Berrima River Reserve | 16 Governors Road Boardwalk (Road Reserve)  |
| 5 Gibbergunyah Reserve    | 11 Stone Quarry Walk     |   |
| 6 Mount Gibraltar Reserve | 12 Berrima Weir Reserve  |   |

Figure 2: Reserves within Project Scope

## 01 Introduction

### Strategic Context

#### Region Overview

The Wingecarribee Shire is located 75kms from the south western fringe of Sydney and 110kms from Sydney central business district. The Shire has a total area of around 2,700 square kilometres.

The Shire lies within the Sydney – Canberra – Melbourne transport corridor on the Southern rail line and Hume Highway. Wingecarribee is also referred to as the Southern Highlands due to its position on a spur of the Great Dividing Range.

The main towns are:

- Bowral
- Moss Vale
- Mittagong
- Bundanoon

There are smaller villages including Hill Top, Yerrinbool, Colo Vale, Robertson, Berrima, New Berrima, Exeter, Burrawang, Penrose, Willow Vale, Alpine, Balaclava, Renwick, Wingello, Sutton Forest, Avoca, Fitzroy Falls and Balmoral Village.

The Traditional Custodians of areas within the Shire are the Gundungurra and Tharawal people. There is a strong association to the Wingecarribee, Wollondilly and Nattai rivers. These rivers are connected to culture, dreaming and Songlines.

European settlement dates back to the early 1800s with first contact between Aboriginal people and Europeans occurring in 1798. Settlement followed in 1821 at Bong Bong.

The Shire is rich in biodiversity with large areas of high conservation values. Environmental features include cold climatic conditions, rugged topography and significant areas of state forest, national park and other protected lands that form part of the Sydney water catchment area.

(Source: Wingecarribee Shire Community Strategic Plan and [www.wsc.nsw.gov.au](http://www.wsc.nsw.gov.au))



Figure 3: Regional Context Map

The Southern Highlands sits atop the Great Dividing Range, providing a cool climate with four distinct seasons. This geography also provides a natural landscape of gorges, waterfalls and rolling hills, which the area is renowned for.

The 'Visit Southern Highlands' webpage promotes the area by highlighting the 'Five Best Walks of the Southern Highlands' as well as various destination and experiences incorporating nature, arts, heritage, wine, coffee and food trails.

(Source: <https://www.visitsouthernhighlands.com.au>)

## 01 Introduction

### Community Profile

In order to strategically plan for the network of recreational walking tracks, an understanding is required of the Southern Highlands' defining characteristics and the likely future directions for trail initiatives

Figure 4 outlines key statistics and headlines to provide an overview of the Wingecarribee Shire community profile.

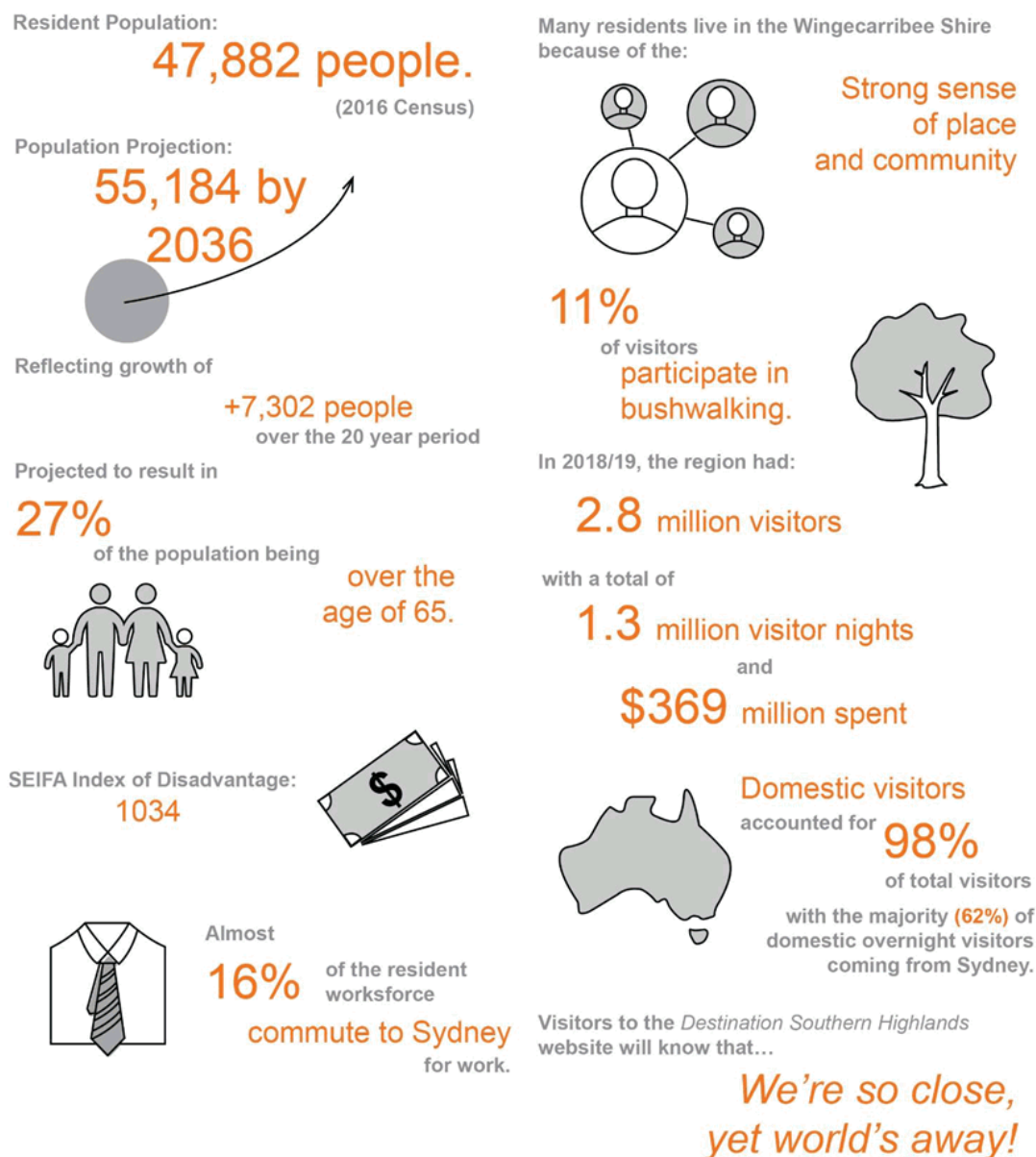


Figure 4: Community Overview

(Sources: www.profile.id.com.au, Bureau of Transport NSW Statistics (2011), Wingecarribee Shire Community Strategic Plan (2017), Tourism Research Australia National and International Visitor Surveys (2020) and Southern Highlands Tourism Snapshot, Tourism in the year ending June (2019).





## 01 Introduction

### Trends

Participation and broad societal trends will have implications on the requirements for and use of walking tracks into the future. The table below displays this data with corresponding implications for walk tracks.

**Table 1: Trends & Implications**

Trend	Implication for Recreational Walking Tracks
<b>Nature-based tourism</b> As societies around the globe become increasingly urbanised, people may suffer from a phenomenon known as terms as 'nature deficit'. Research from Tourism Australia into the Australian travel mindset found that getting away from crowds is more important than ever before, as holidays provide the opportunity for people to take the time to reconnect with the natural world. Nature based tourism where people can immerse themselves in the natural environment is a key tourism drawcard.	Establishment of well-defined recreational walking tracks enables residents and visitors to 'escape crowds' and reconnect with the natural environment. The Wingecarribee Shire's extensive and unique bushland areas provide great opportunity to embrace this visitation through developing trail networks which provide access to key landscape and historical features. It is important to consider the need to keep trail signage and infrastructure sympathetic to the natural environment in order to provide a true nature-based experience which is distinct from activities in urban areas.
<b>Popular physical activity</b> The top six physical activities for adults in NSW in 2019 were: <ol style="list-style-type: none"> <li>1. Walking (Recreational)</li> <li>2. Fitness/Gym</li> <li>3. Swimming</li> <li>4. Athletics, track and field</li> <li>5. Cycling</li> <li>6. Bushwalking</li> </ol> (Source: AusPlay Survey, Dec 2019)	The popularity of walking (recreational) and bushwalking indicate that there is very high demand for facilities to cater for this. While walking in general is the most popular physical activity, bushwalking is both a regular activity for people to lead healthy lifestyles, and is also a key tourism attractor, particularly in areas with exceptional natural beauty such as the Southern Highlands.
<b>Changing participation preferences</b> Increasingly busy, time fragmented lifestyles mean people are increasingly becoming involved in individualised recreational activities rather than traditional, structured sports. Trail activities can occur at any time, individually or in groups.	Individualised recreational pursuits, such as bushwalking, can expect to experience significant increases in participation levels over coming years. It is important for governments and planning agencies to acknowledge this shift in participation preferences to ensure that reserves, walking tracks & associated infrastructure can cater for demand.
<b>Ageing population</b> Populations across Australia are generally ageing and Wingecarribee Shire Council area by 2036 will have 27 percent of their population over the age of 65. Indicators are also showing that Australians between 60-64 years are a standout group for their elevated participation rates in regular bushwalking (Source: Australian Leisure Management).	Participation opportunities will need to be diversified and expanded to meet the needs of the growing cohort of older Australians. For example, bushwalking tracks that clearly identify their level of difficulty so that potential users can assess their suitability. As the 'baby boomer' population retire from the workforce there is potential to engage them in activities such as bushwalking, and also to embrace their skills and experience through volunteer roles associated with trails.
<b>High facility standards and community expectations</b> Today's society places high expectations on reserves, walking tracks and associated infrastructure including standards for public safety and risk mitigation.	There is increasing pressure to provide high quality walking tracks which meet community expectations and are compliant with Australian Standards, manage risk, and protects the natural environment. Due diligence is required relating to trail planning, maintenance, and management.

## 01 Introduction





Trend	Implication for Recreational Walking Tracks
<b>Inactivity and obesity</b> Physical inactivity increases the risk of a range of diseases, such as cardiovascular disease, type 2 diabetes, and some cancers. More than half of Australian adults are either not active at all or do not meet the recommended guidelines (Source: Impact of physical inactivity as a risk factor for chronic conditions, Institute of Health and Welfare 2017)	Provision of active recreation opportunities is a role of all levels of governments which is becoming increasingly acknowledged and valued in the community. It is important that investment in reserves, walking tracks and associated infrastructure is well planned to encourage maximum community participation and healthy/active lifestyles.
<b>Technology advancements – web-based systems &amp; apps</b> Recreation and physical activities are being transformed by technology. For example, social technologies have created online communities (e.g. Strava) and fitness tracking technologies (e.g. Fitbit).	Virtual platforms allow trail users to track and monitor their own performance and the times/skills of others, based on GPS enabled apps. The widespread availability of this technology is allowing enthusiastic trail users to 'virtually' walk anywhere in the world and discover new places to be active.
<b>Technology advancements – user-generated content</b> Online trail information is becoming increasingly accessible via user generated platforms (e.g. Maps.ME; Visit Southern Highlands).	While user-generated content can be an excellent initiative led by individuals to promote the use of tracks and trails, it is important that these online platforms are developed and maintained in collaboration and partnership with trail managers to ensure accuracy and consistency of information, and to ensure that use of unauthorised trails is not promoted.
<b>Climate change</b> It is widely researched and documented that the global climate is changing which is having an impact on weather patterns and the viability of existing lifestyles. Rising temperatures and extreme weather events (i.e. bushfires) which may be attributes to climate change impact directly on bushwalking procedures.	As active transport, such as walking, becomes increasingly encouraged to reduce carbon emissions, it is likely that participation in these activities will increase. It is important to ensure that the environmental impacts from walking tracks are mitigated. For example, by ensuring sustainable design which protects and conserves the natural environment.
<b>Biodiversity &amp; heritage loss</b> Around the world, valuable ecosystems and heritage sites (Aboriginal and non-Aboriginal) are under pressure from urban expansion, agricultural clearing, and the effects of climate change.	It is important that walking tracks are planned for suitable areas and that any threats to the loss of biodiversity and heritage are effectively mitigated and managed. Many reserves have strong historical and ecological significance (e.g. Mount Gibraltar Reserve is listed by the NSW Heritage Council on its Significant Heritage Register for its Endangered Ecological Communities and the Heritage Quarry Complex).
<b>Leveraging from sport and recreation</b> Governments (federal, state, local) and companies are increasingly utilising recreation to achieve their policy objectives (i.e. decrease chronic conditions) or market their products (i.e. Garmin).  Recreation is increasingly incorporated into various policies to tackle a range of issues from childhood obesity through to social inclusion.	Trail walking can be used as a tool to improve health outcomes, build a sense of belonging and reduce feelings of loneliness. According to the Heart Foundation, this can play a key role in preventing depression and reducing anxiety. Various trail walking programs exist which are aimed at social inclusion and building a sense of community while spending time in nature. For example, the 'First Hike Project' which is a volunteer-led organisation taking people who have recently arrived in Australia through spectacular experiences in the bush as a way of welcoming people for a wide range of cultures.

## 01 Introduction

### Benefits of Recreational Walking Tracks

Recreational walking tracks offer a diverse range of benefits to our environment, people, economy, and places. Table 2 highlights key benefits of a well-planned and managed recreational tracks network in line with the Wingecarribee Shire Community Strategic Plan.

Table 2: Benefits of recreational walking tracks

Benefit		Outcomes
<b>Environment</b> 	Protection and enhancement of distinct and diverse natural environment	<p>A network of well-planned, clearly defined, and authorised recreational tracks will:</p> <ul style="list-style-type: none"> <li>discourage people from deviating into natural areas which helps reduce human impacts on sensitive environments.</li> <li>allow reserve access for key groups for activities such as weed management, trail maintenance, fire protection (i.e. Bushcare, NSWRFs, FRNSW)</li> <li>encourage regulated access to natural and cultural areas which can increase passive surveillance and help mitigate unauthorised activities.</li> </ul>
<b>People</b> 	Happy and healthy lifestyle	<p>It is well researched and documented that physical activity and active outdoor recreation, such as walking, offer improved physical and mental wellbeing. Participation in trail-based activities can improve bone health, cardiovascular and muscular fitness, reduce the risk of obesity, and decrease rates of physical and mental illness.</p> <p>Recreational walking tracks can bring communities together through fostering community partnerships which are often required for trail planning, maintenance, or activation. For example, bushcare groups at Glow Worm Glen, Berrima, Hammock Hill, and Mansfield Reserves connect people with common interests.</p>
<b>Economy</b> 	Sustainable economy	<p>Investment in trail development is known to provide a positive return on investment through contributions to the economy. This is achieved through trail experiences becoming a key tourism driver which can increase visitation, extend lengths of stay, and enhance visitor expenditure. Southern Highlands has a unique brand identity and recreational walking tracks industry fits within the clean industry stance.</p> <p>Encouraging participation in trail-based activities can also ease the burden of health costs associated with increasingly inactive lifestyles.</p>
<b>Places</b> 	Integrated and efficient network	<p>Recreational tracks can provide safe off-road routes which link key destinations and enhance connectivity between towns and villages by utilising the network of cycleways and footpaths.</p> <p>The trail network also recognises, protects, and promotes places of significant cultural heritage (i.e. Indigenous heritage at Gibbergunyah Reserve, Mining legacy at Mt Alexandra &amp; World War 1 German internees at Berrima River Reserve).</p>



## 01 Introduction

### Background Review

An important component on the development of the Walking Tracks Strategy was the review of a wide range of background information to ensure that the strategy is developed in alignment with the wider objectives across the state, region, and local areas.

The following strategic documents have been reviewed for consideration in the development of the Wingecarribee Shire Recreational Walking Tracks Strategy:



#### STRATEGIC ALIGNMENT

It is important to ensure that the Walking Tracks Strategy is developed in alignment with the wider objectives across NSW, the South East & Tablelands and Wingecarribee Shire Council.

#### State-level Documents

- *State Plan – NSW 2021*
- *NSW Walking Strategy Literature Review (2011)*

#### Regional-level Documents

- *South East and Tablelands Regional Plan*
- *The Great Burragorang Valley Walk, Wollondilly Shire Council*

#### Wingecarribee Shire Council

- *Community Strategic Plan 2017 - 2031*
- *Parks Strategy (2016)*
- *Bicycle Strategy for Mittagong, Bowral and Moss Vale (Stage 1, 2008)*
- *Bicycle Strategy for Towns and Villages (Stage 2, 2016)*
- *Pedestrian Access and Mobility Plan for Small Towns and Villages (Bundanoon, Mittagong, Bowral and Moss Vale, Robertson) (2007)*
- *Delivery Program 2017-2021 Operational Plans 2019/20 and 2020/21*
- *Wingecarribee Local Planning Strategy 2015-2031*
- *Local Strategic Planning Statement (2020)*
- *Bushfire Risk Management Study of Reserves (2005)*
- *Community Engagement Strategy (2019)*
- *Disability Inclusion Action Plan 2017 - 2021*
- *Community Safety Plan 2015-2020*
- *Youth Strategy & Action Plan 2016-26*
- *Positive Ageing Action Plan 2016-26*
- *Arts and Culture Strategic Plan 2015-2031*
- *Local Emergency Management Plan (June 2016)*
- *Bong Bong Common Masterplan (2019)*
- *Plans of Management for Bushland Reserves (Various)*



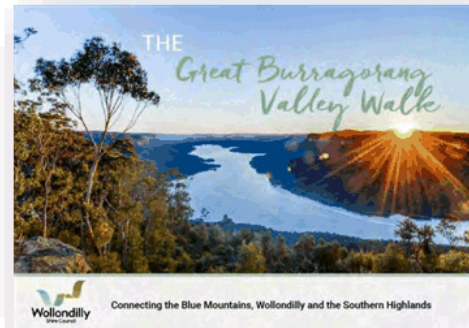
## 01 Introduction



*The South East and Tablelands Regional Plan* guides the NSW Government's land use planning priorities and decisions over the next 20 years.

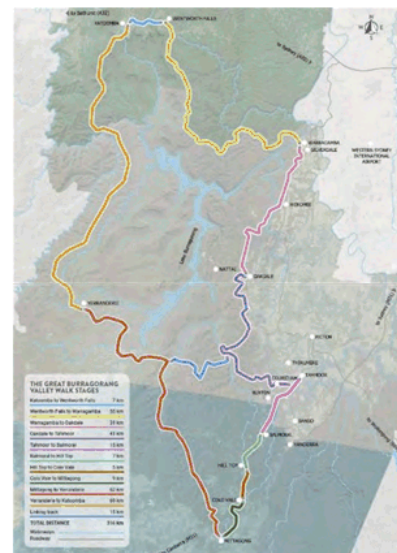
Priorities for Wingecarribee that connect with the walking track strategy include:

- Protect high environmental value lands including regionally significant biodiversity corridors
- Protect the Sydney Drinking Water Catchment
- Protect the Shire's valued heritage assets
- Capitalise on economic opportunities arising from the area's proximity to Sydney
- Promote the Shire as a destination and encourage visitors to Canberra to also visit Wingecarribee Shire
- Protect the unique character of the Shire's village and rural lifestyle



*The Great Burragorang Valley Walk, Connecting the Blue Mountains, Wollondilly and the Southern Highlands* through a partnership led by Wollondilly Shire Council is an initiative to connect communities, attract visitors and tourism, grow the local and regional economy and ensure our environment and heritage is valued and protected.

The concept Mittagong to Yerranderie walk section appears to use a portion of the Forty Foot Falls and Nattai Loop Track. While the section Colo Vale to Mittagong appears to use the Sixty Foot Falls track.



**Figure 5: Great Burragorang Valley Walk Concept Map**



## 01 Introduction



*The NSW Walking Strategy – Literature Review* refers to walking as a means of travel, a way of keeping healthy, a form of relaxation, and a sport.

Despite well documented benefits which show improved outcomes for health, environment, social inclusion and the economy, there is some evidence levels of walking has declined with only half of adult Australians sufficiently active to achieve health benefits.

Creating pleasurable walking environments can be highly effective and can significantly extend (perhaps double) the distance people are willing to walk. There is an established association between built environment and walking behaviour centred around three themes:

#### Connected suburbs

- Distance and connectivity
- Attractive walking destinations
- Different users have different needs
- Strategies for rural settings

#### Quality of the walking environment

- A route fit for purpose
- Wayfinding
- A pleasant environment
- Community involvement in decision making
- Different users have different needs

#### Safety

- Crime
- Conflict with other users of the transport system
- Trips and falls



The *Wingecarribee Shire Community Strategic Plan* adopted in June 2017 sets out the Community Vision. In 2031 we will be:

*“A healthy and productive community, learning and living in harmony, proud of our heritage and nurturing our environment”*

Several of the key goals and strategies designed to meet the aspirations of the community that are associated with the Walking Tracks Strategy are:

1.1.2 – Effective financial and asset management ensure Council's long-term sustainability.

1.3.2 – Empower our community to advance agreed priorities and address emerging issues in a collaborative manner to explore new ideas to improve the Shire.

2.1.3 – Increase promotion of healthy lifestyle choices

2.2.1 – Actively foster a spirit of participation and volunteering by addressing key barriers

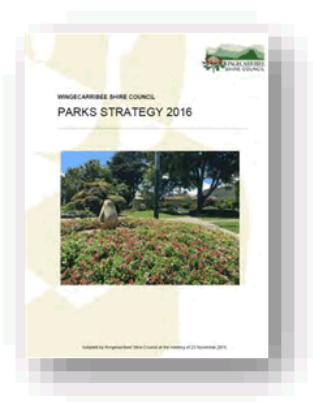
2.3.2 – Acknowledge and respect our Aboriginal cultural heritage and people

3.2.3 – Identify, protect, and promote places of cultural heritage

4.1.1 – Protect and improve biodiversity

5.14 – Provide diversity in tourist attractions and experiences

## 01 Introduction



The *Wingecarribee Shire Council, Parks Strategy* (2016) identifies existing land resources and sets service levels for most of the reserves considered in the Recreational Walking Tracks Strategy.

The primary purpose of a bushland reserve is to provide opportunities for people to experience, or protect, the natural environment and to provide habitat for flora and fauna. They may include walking tracks, low impact recreational activities, picnic areas and facilities to support and services these activities.

A community park is designed for passive recreation, should be easily accessible and provide an open grass area and may contain small scale informal sports facilities.

Linear Parks are typically long and narrow, often associated with watercourses, and almost always incorporating a walking or cycling path.

There are three levels of service for bushland reserves & community parks that denote the level of development within each. A linear path has only a level of service 2 associated with it.

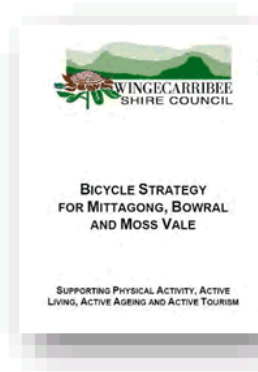
Table 3 outlines the service level assigned to each reserve within the scope of the Recreational Walking Tracks Strategy.

Table 3: Parks Hierarchy - Service Levels

Facility	Level of Service
Bushland Reserves	
Mt Gibraltar Reserve	1
Berrima Weir Reserve	2
Hammock Hill Reserve	2
Mansfield Reserve	2
Mt Alexandra Reserve	2
River Bend Reserve	2
Stone Quarry Walk Berrima	2
Garland St Reserve (Glow Worm Glen)	3
Gibbergunyah Reserve	3
Ironmines Oval	3
Welby Weir	3
Community Parks	
Lake Alexandra	1
Berrima River Reserve (Camping Grounds)	2
Linear Parks	
Bong Bong Common	2

Note: Governors Rd Boardwalk (Road Reserve) and Glow Worm Glen (William Street Reserve) are not included within the Park Strategy as they are road reserves.

## 01 Introduction



The *Bicycle Strategy for Mittagong, Bowral and Moss Vale* is a comprehensive plan for supporting physical activity, active living, active ageing and active tourism.

The bicycle strategy provides a proactive policy to develop and increase the role of the bicycle as an important sustainable transport mode to benefit the health and economic wellbeing of the community.

The stage 2 Bicycle Strategy focuses on delivering maximum effectiveness for increasing cycling across the LGA and to attract community wide benefits for cyclists.

The Wingecarribee Shire Council layer provided via ArcGIS Online captures the proposed, on road and off-road cycleways. In respect to this project the off-road cycleways exist in only two of the reserves:

- Hammock Hill (Kiameron PI to Harley St)
- Mount Gibraltar (Gib West Fire Trail)

The bicycle strategy does not identify that off-road cycling occurs at the Welby Mountain Bike Park, which is part of the Mt Alexandra Reserve and on various fire tracks and informal trails throughout the Shire reserves.

The *Southern Highlands Destination Plan 2020-2030* (Draft, July 2020) charts a new course towards a future the community can be proud of - a future that protects the special place.

This Plan is built on the foundation of four pillars:

- People,
- Place,
- Prosperity and
- Partnerships.

Key opportunities are to:

- Increase attractiveness as a visitor destination to both domestic and international tourism markets. The region currently receives less than 2% of total visitation from international visitors and very few local tourism businesses are prepared for international markets and wholesalers.
- Increase mid-week visitation
- Ensure that the Southern Highlands is an attractive destination to live, work, learn, play, invest and visit. Ensuring that the region's natural environment (with nature-based facilities and activities) is not just attractive to visitors but is also desirable for people looking to move to rural areas; and therefore also to employers trying to attract workers to an area.
- Enhance nature-based experiences, including eco accommodation, hiking, mountain biking, adventure tourism etc., are considered a key opportunity for the region's tourism industry.

## 01 Introduction



*Wingecarribee Local Planning Strategy 2015-2031* purpose is to identify a long term direction for the future development of the Shire upon which any proposed amendments to the Local Environmental Plan (LEP), or to the Development Controls Plans (DCPs) which support it, can be based.

It notes five key themes of Leadership, People, Places, Environment and Economy, along with local planning strategy recommendations.

2.2.4 – Provide structure in the Shire to encourage physical activities and enable access.

3.1.5 – Encourage cycling and walking

3.1.6 – Encourage development that will increase the viability of public transport, cycling and walking infrastructure.

3.2.2 – Retain and make more distinctive the special qualities that make each town or village unique.

3.5.2 – Ensure that the unique heritage qualities of towns, villages and special areas are protected.

3.5.1 – Identify and promote buildings, places, trees, gardens, landscapes and other areas of significant culture heritage value.



The *Wingecarribee Local Strategic Planning Statement* (LSPS) sets out the 20-year land use vision for the Shire and provides a long-term planning framework to meet the economic, housing, social and environmental needs of the community.

The LSPS takes into account the State and Regional planning framework, and builds on the communities' priorities outlined in the *Community Strategic Plan* and *Local Planning Strategy* to outline how the Shire will continue to evolve in a way that protects local character, natural areas and rural landscapes in accordance with the communities' expectations. It identifies the special characteristics that contribute to the region's local identity and recognises the shared community values to be maintained and enhanced.

The LSPS outlines the following six key land use themes including:

- our environment and sustainability,
- our rural lands,
- our economy,
- our housing,
- our infrastructure and
- our place.

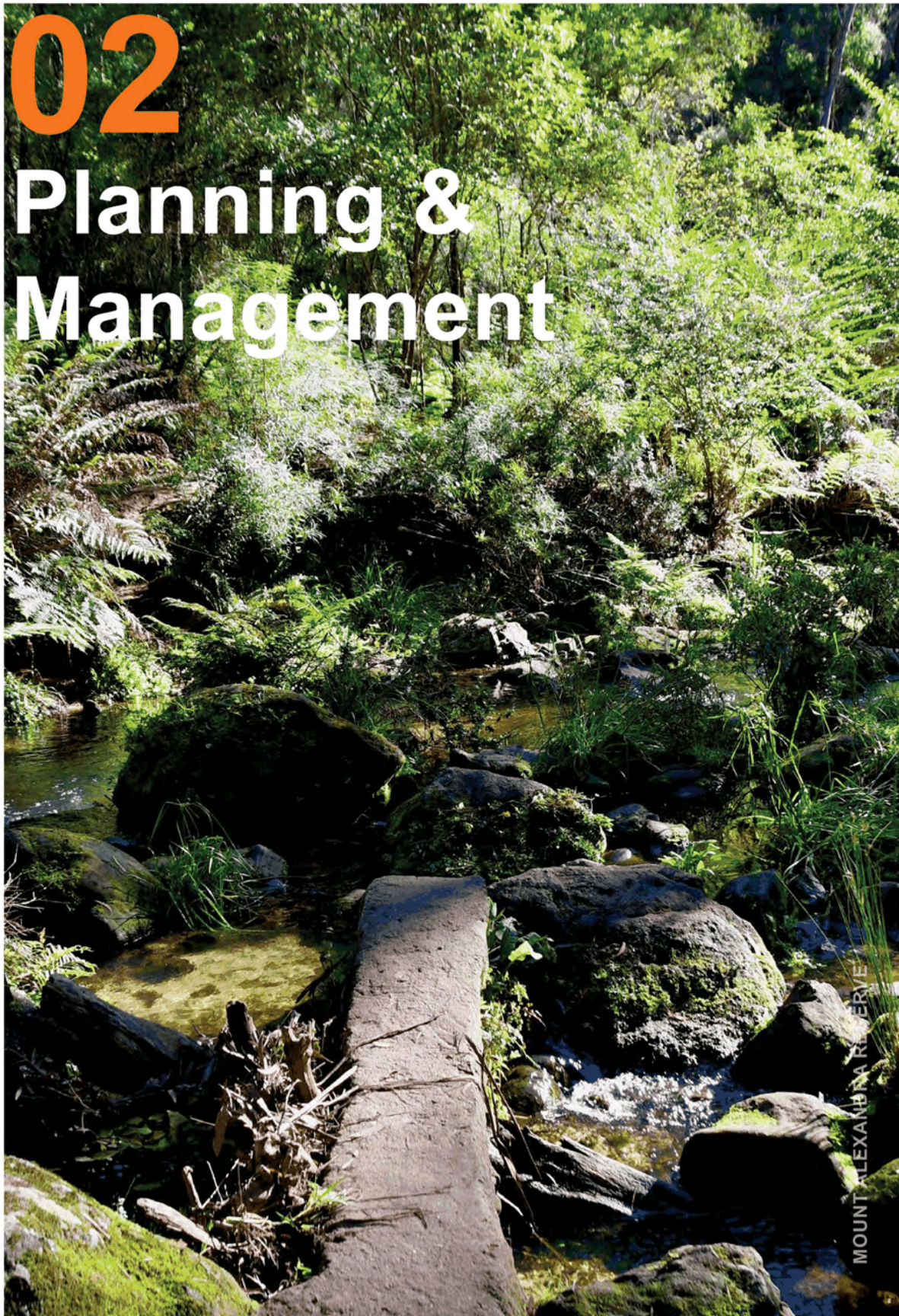
Each land use theme includes a set of planning priorities and actions to achieve the communities' vision for the Wingecarribee.

The LSPS identifies opportunities to improve walking trails at Berrima and will inform future strategic planning, infrastructure planning and investment decisions by Council, State Government agencies and service providers.



# 02

## Planning & Management





## 02 Planning & Management

### Australian Standards for Walking Tracks

The Standards Australia Committee has prepared the following Australian Standards which relate directly to walking tracks to assist trail planners, designers, and managers:

- AS 2156.1, Walking tracks, Part 1: Classification and signage, and
- AS 2156.2—2001: Walking Tracks Part 2: Infrastructure Design

The Standards were first published in 2001, and like all Australian Standards, are living documents which reflect progress in science, technology, and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published.

#### AS 2156.1 – 2001: Walking Tracks Part 1- Classification and Signage

This Standard provides a classification system for walking tracks, guidance for the design, fabrication and use of track markers, and information signs to be used for walking tracks. The Standard also sets out guidelines for the erection of these markers and signs to ensure that while they will be readily visible, clear, and easy to read, they will not detract from the landscape. This Standard applies to outdoor areas where the environment is the focus of recreational activity.


The objective of this Standard is to provide managing authorities with guidance for walking track classification and signage in order to provide consistency of information to users of walking tracks. This is intended to minimise risk, preserve natural features, and enhance recreation opportunities associated with the use of walking tracks.

#### Classification of Walking Tracks





Walking tracks are graded from 1 to 6, with specific images used to illustrate each. These are outlined in Table 4. A track is to be classified according to the least developed element. In some cases (e.g. long-distance tracks) select portions of the track may be classified separately, however the overall classification will be according to the least developed/most challenging element.

Table 4 outlines key relevant information from *AS 2156.1 – 2001: Walking Tracks Part 1- Classification and Signage* for each classification/grade of trail.

**Table 4: AS2156.1 Walking Tracks Classification and Signage – Guidance for Classification & Management**

Classification	Description	Track Conditions	Experience Level	Risk Management Recommendation
Class 1 	No bushwalking experience required. Flat even surface with no steps or steep sections. Suitable for wheelchair users who have someone to assist them. Walks no greater than 5km.	Generally, a broad, hardened surfaced track suitable for wheelchair use. Width: 1200mm or more. Well maintained with minimal intrusions. Grades in line with AS1428 series. Steps allowed only with alternate ramp access.	Users need no previous experience and are expected to exercise normal care regarding their personal safety.	Tracks and adjacent natural and built elements to be inspected and maintained regularly. Inspection interval: 30 days or less.

## 02 Planning & Management

Classification		Description	Track Conditions	Experience Level	Risk Management Recommendation
Class 2		No bushwalking experience required. The track is a hardened or compacted surface, may have gentle hill section or sections and occasional steps. Walks no greater than 10km.	Generally, a modified or hardened surface. Width: 900mm or more. Well maintained with minimal intrusions. Generally, no steeper than 1:10. Minimal use of steps.	Users need no previous experience and are expected to exercise normal care regarding their personal safety.	Tracks and adjacent natural and built elements to be inspected and maintained regularly. Inspection interval: 90 days or less.
Class 3		Suitable for most ages and fitness levels. Some bushwalking experience recommended. Tracks may have short steep hill sections a rough surface and many steps. Walks up to 20km.	Generally, a modified surface, sections may be hardened. Width: Variable and generally less than 1200mm. Kept mostly clear of intrusions/obstacles. Gradient may exceed 1:10 but generally no steeper than 1:10. Steps may be common.	Users need no bushwalking experience and a minimal level of specialised skills. May encounter natural hazards such as steep slopes unstable surfaces and minor water crossings. Users responsible for their own safety.	Built elements to be inspected and maintained regularly. Any built facilities to be managed for public risk. Inspection interval: 6 months or less.
Class 4		Bushwalking experience recommended. Tracks may be long, rough, and very steep. Directional signage may be limited.	Generally distinct without major modification to the ground. Encounters with fallen debris and other obstacles are likely.	Users require a moderate level of specialised skills such as navigation skills. May require maps & navigation equipment. Users need to be self-reliant, particularly for first aid/weather hazards.	Tracks to be inspected on a regular basis and after major natural events such as fires. Any built facilities to be managed for public risk. Inspection interval: 6 to 12 months.
Class 5		Very experienced bushwalkers with specialised skills, including navigation and emergency first aid. Tracks are likely to be very rough, very steep and unmarked. Walks may be more than 20km.	Limited modification to natural surfaces and track alignment may be indistinct in places. Minimal cleaning. Debris along the track.	Users require a high degree of specialised skills, may require maps and navigation equipment. Users need to be self-reliant, particularly for first aid/weather hazards.	Tracks to be inspected on a regular basis and after major natural events such as fires. Any built facilities to be managed for public risk. Inspection interval: 6 to 18 months.
Class 6		Very experienced bushwalkers with specialised skills, including navigation and emergency first aid. No defined track.	No modification of the natural environment.	Experience in the outdoors and a high level of specialised skills/equipment required. Need to be self-reliant, particularly for first aid/weather hazards.	Tracks will not be managed for public risk. Users will be responsible for personal safety and need to exercise appropriate care.

## 02 Planning & Management

### AS 2156.2—2001: Walking Tracks Part 2: Infrastructure Design

This Standard is intended for application to the design of new structures; however, existing structures may be assessed using the given criteria. The standard acknowledges that a considerable number of existing structures may not comply with the standard.

The design criteria are varied depending on the track class in which the structure is to be constructed and the configuration of the structure, based upon the track classifications (classes 1 to 6) outlined in AS 2156.1.

Walking track structures covered within this standard are simple structures, including boardwalks, pedestrian bridges, viewing platforms and other similar open, non-habitable structures, provided for the use of a wide range of visitors.

Management considerations for choice of the type of structure to be used and decisions made during its general specification and design will cover the dual objectives of:

- a) control of the impact of visitors, tracks, and track infrastructure on the environment.
- b) provision of access for visitors to the quality of experience they seek, while recognising the visitors' capabilities for safely accessing the points of interest.

When laying out or planning new work on a track, the choice of track class and the actual structures to be installed should consider the expected number, class of visitors and the recreational opportunities to be provided (see AS 2156.1). In deciding what structures to use it should be remembered that once a structure is in place, it may be difficult to remove without damage to the environment (e.g. a cultural site). The design of elements, choice of materials and colours of structures should cause minimal adverse visual impact on natural areas or culturally significant sites.



Figure 6: Trail Infrastructure (Heritage Staircase) at Heritage Quarries Circuit (, Mt Gibraltar Reserve



## 02 Planning & Management

### Trail Signage

#### Signage Requirements

For the purpose of this project, recreational trail signs have been classified according to the following descriptions.

#### Trailhead Sign

A trailhead sign is the primary sign at the location where a user can access a trail and/or a network of trails. A trailhead is an important point of reference and is the appropriate location for associated trail infrastructure such as amenities, car parking and picnic facilities.

It is important that trailhead signs are professionally displayed, simple to comprehend & may include:

- Trail network name & map
- Trail grade/classification
- Trail distance & estimated time
- Trail type (i.e. loop, each way, return)
- Permitted trail user/s (e.g. walk, bike, horse)
- Key trail features (e.g. heritage sites)
- Key amenities (e.g. public toilets).
- Safety information (e.g. code of conduct, emergency contact information, recommended equipment, warning)
- Trail manager contact details
- Website and/or QR code with further information.

Trailhead signs can be used to enhance the trail experience through providing information about features that can be found along the trail, as well as to promote other trails in the region. Many trail users take photographs of the trailhead sign to refer to whilst using the trail, or (where cellular coverage allows) scan a QR code which provides the trail map on a personal phone/device.

A trailhead sign does not replace the requirement for signage at reserve entries noting management and safety information.

Waymarking Signs- provide trail users with reassurance that they are following the correct alignment. The amount of waymarking necessary is dependent on the grade of trail and the target user group; difficult trails designed for experienced users often require less waymarking signage although these users tend to rely more on detailed signage at the trailhead. Waymarking signs are required at the beginning of a trail and at regular intervals along the route as well as at trail intersections. Where one section of alignment is used for multiple trails, all trails should be waymarked on the same signpost with corresponding colours or symbols.

Directional Signs - directing users to or from the trailhead and other features, such as a nearby town, road or car park. These signs are particularly relevant at intersections where users are required to choose between a number of routes. It is usually appropriate to indicate the distance to/from the identified feature/s. Directional signage from a trail to a town can have positive economic impacts as users are more likely to impulsively visit if they are aware of the town's proximity.

Interpretation Signs - conveys educational material about the natural and/or cultural heritage features along a trail. This signage is designed to attract more users to the trail, engage trail users and provide for a well-rounded trail experience. Interpretive information can be provided at a trailhead and at points of interest along a trail.

Management/Warning Signs - used to advise trail users of dangers, risks or management policies. The sign should include a statement of danger, statement of consequence, statement of precautionary actions and use an appropriate pictogram. These signs play an important role for both users and trail managers in the risk and safety management of a recreational trail.



## 02 Planning & Management

### Signage Design and Placement

Relevant guidance from these Standards relating to signage is summarised below.

Shape:

- Shape of a directional arrow or an isosceles triangle (square background, minimum size 90mm x 90mm)

Materials:

- Made of aluminium, galvanised low carbon steel or non-toxic recycled plastic. Other materials may be suitable given that they are durable and resistant to both corrosion and fire.

Colour:

- Track markers may be any colour (recommended colours Blue B21, Ultramarine; Yellow Y14, Golden Yellow X15, Orange; Red R13, Signal Red)
- Clearly visible and be distinguishable from colours used for intersecting trails.

Finish:

- The triangle should be mounted with the apex pointing toward the direction to be followed & attached to structural elements.

Height:

- The placement of track markers is 0 – 2 metres above the ground, depending upon local conditions (e.g. terrain) and seasonal variations (e.g. vegetation).

Fabrication:

- Sympathetic with the landscape, and ensure sign will be durable, readily seen and easy to read.
- The overuse of signs, and the use of very large signs, should be avoided.

Placement:

- Minimal adverse visual impact on natural areas or culturally significant sites.

### Trail Naming

Trail names play an important role in facilitating:

- Visitors to identify and understand the nature of the trail
- Management to promote and maintain the trail
- Emergency services to access the trail and identify specific locations

Trail names are to be determined by the land manager with respect to the following considerations:

Consistency

- Trail naming should be consistently approached throughout the network. A trail's name needs to be clearly determined to prevent confusion for management and users.

Relevancy:

- A trail's name should reflect the distinct natural and/ or cultural features of the trail. Interpretive signage may be used to reinforce the relevance of the trail's name whilst educating users.

Representation

- Trail names can be used to represent basic information about the trail such as location, key features and characteristics. Non-representative trail names can be misleading.

Indigenous naming of walking tracks and trail features is strongly encouraged where appropriate and supported.

## 02 Planning & Management

### Signage Templates

A suite of trail signage templates has been developed for use in the implementation of this Strategy. An overview is provided on the following page with detailed copies included in Appendix 1.

#### Trailhead Sign

There are two trailhead sign templates. The first is designed to cater for Mt Alexandra which has an extensive network of trails needing two panels to exhibit the required level of information. The second is designed to be tailored to suit the other walking track networks.



Figure 7: Lake Alexandra Trailhead Sign Template – Panels 1 and 2



Figure 8: General Trailhead Sign Template

#### Interpretive Sign

Interpretive signs come in varying shapes, sizes and style. The template provides a proposed style which is consistent with other signage templates, however, this may be further tailored to suit the distinct location and enhance the 'sense of place'.



Figure 9: Interpretation Sign Template

#### Management/Warning Sign



Figure 10: Management Warning Sign Template

#### Waymarking/Directional Signage

The waymarking template broadly aligns with the style recently installed in Mt Alexandra Reserve and Mt Gibraltar Reserve. These can be tailored with colour-coded systems.

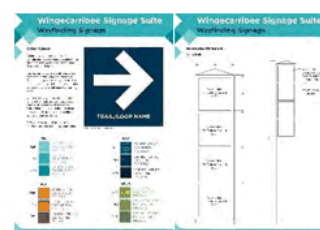


Figure 11: Waymarking Sign Template



## 02 Planning & Management

### Trail Hierarchy

Establishing a hierarchy for walking tracks provides a guide for the level of infrastructure required to meet the needs of a trail's users and to ensure that an appropriate standard of facilities is provided.

The following hierarchy has been used to classify the walking track experiences in this project.

#### Regional:

A recreational walking track that offers a distinct experience and draws users from across a region beyond the Wingecarribee Shire Council area.

Regional-level trails can generate significant economic benefits to the region as important regional recreational and tourism asset.

#### District:

A recreational walking track that draws users from outside of the localised area/township.

#### Local:

A recreational walking track that caters for residents in the local area.

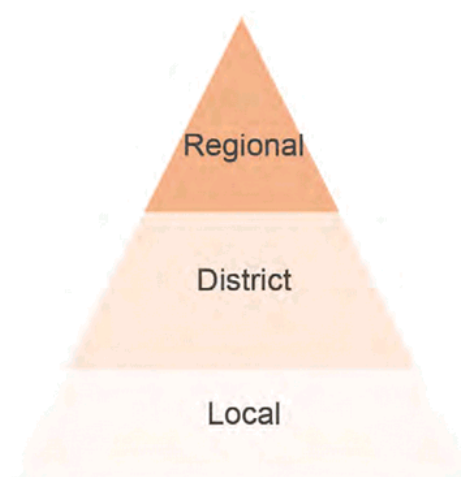


Figure 12: Trail Hierarchy

### Management Models

Management and maintenance of walking tracks is often a collaborative effort between various parties. It is important to identify partners involved and to clearly define roles and responsibilities for the trail and/or trail network. These responsibilities can be clearly defined and agreed upon through the development of a Trail Management Plan and/or Management Agreement. Formalising these agreements can help address liability, which is a common constraint for trails which cross varied land tenures and for volunteer community groups taking on responsibility.

The Management Plan of each trail needs to identify partners in management and/or maintenance and clearly define roles and responsibilities. This could be agreed upon through a Memorandum of Understanding, a formal (non-legally binding) partnership agreement or a Trail Licensing Agreement through Council which can assist external landowners (e.g. private landowners or other public authorities) to manage risk and liability.

An effective management model may include the establishment of a Trail Management Committee working with local government or other public authorities under a Memorandum of Understanding for management of the trail.

The roles and responsibilities of such a Committee could include:

- Strategic management of the trail and its ongoing development.
- Development and implementation of relevant planning and policy governing the trails operation.
- Ensuring standardisation of the trail.
- Advocacy and submission to Council and other external organisations for budgeting and external funding for future development, operation, and marketing of the trail.
- Operating within and being accountable for approved budgets.
- Ensuring the quality of the trail and its facilities are maintained to the agreed service level.

## 02 Planning & Management

### Accessible Trails

To increase rates of physical activity and the use of walking trails across the region, it is imperative that a walking trails are provided which meet a variety of accessibility levels. If trails are designed inclusively, the benefits of these recreational assets will have greater positive impact within the local community. The Australian Walking Tracks Grading System identifies that Grade 1 trails are those which are accessible to people in a wheelchair with assistance, whereas Grade 2 trails are may have gentle hill section or sections and occasional steps, but are accessible to trail walkers with no previous experience.

It is important that universal design practices are integrated where-ever practical, acknowledging that people of varying levels of fitness and ability are likely to want to challenge themselves on the trail network.

There are innovative ways of providing trail access to people of varying abilities. For example, The NSW National Parks and Wildlife Service (NPWS) has a program which provides an all-terrain wheelchair, known as a TrailRider, for visitors at national parks (NP). This program is currently operational at Kamay Botany Bay National Park, Dorrigo National Park and Kosciuszko National Park. This offers people with mobility restrictions the opportunity to experience national parks beyond Grade 1 and 2 trails.

Trails, signage and infrastructure can also be designed to cater for people who are blind, deaf or have hearing loss. For example, the Grade 1 accessible trail at Lake Alexandra Reserve provides Braille on trail signage, as well as other universal access features along the trail.



Figure 13: Use of a TrailRider in Dorrigo NP

Image source: [www.nationalparks.nsw.gov.au](http://www.nationalparks.nsw.gov.au)



Figure 14: Lake Alexandra Circuit - Grade 1

## 02 Planning & Management

### Risk Management

Risk Management is a four-step process involving:

- Step 1: Identify hazards
- Step 2: Assess risks
- Step 3: Control and manage risks
- Step 4: Review.

Users of recreational trails are exposed to various risks, many of which can be identified and mitigated through a risk assessment.

The following Risk Assessment Matrix is used to determine the overall risk rating by the Wingecarribee Shire Council.

			CONSEQUENCES					
			Health & Safety	Fatality or permanent disability or cost of injury more than \$100,000	Serious Injury or illness resulting in more than 31 calendar days absence from work or cost of injury between \$10,000 and \$100,000	Significant injury or illness > 7 days to < 31 calendar days absence from work or cost of injury between \$1,000 and \$10,000	Moderate injury or illness < 7 calendar days absence from work or cost of injury between \$100 and \$1,000	Minor injury or illness first aid needed not time lost or cost of injury less than \$100.
			Corporate Financial Loss	\$10 million to \$100 million	\$1 million to \$10 million	\$100,000 to \$1 million	\$12,000 to \$100,000	Up to \$12,000
			Natural Environment	Catastrophic & irreversible environmental damage. Full clean up not possible.	Major but reversible environmental damage. Full clean up extremely difficult and expensive	Significant local impact on or off work site requiring longer term clean up	Moderate environmental impact. Issue affects more than just the worksite. Quick clean up possible	Minor environmental damage. Contained on worksite. Quick clean up possible.
			Social/ Cultural/ Heritage		Ongoing serious social issues. Significant damage to structures/sections of cultural significance		Ongoing social issues. Permanent damage to sections of cultural significance	Minor medium term social impacts on local population. Mostly repairable
			Community/ Government/ Reputation/ Media		Serious public or media outcry (international coverage)	Significant adverse national/media/ public/Local Government attention	Attention from media and/or heightened concern by Local community. Criticism by Local Government	Minor adverse local public or media attention or complaints
			Legal	V. Serious breach. Prosecution including class actions and/or potential culpability/ manslaughter implications. Loss of Licence to operate	Major breach of regulation. Major investigation by authority with litigation and/or potential criminal charges or major compensation implications	Significant breach of regulation with investigation or report to authority with possible prosecution and/or significant fine	Minor legal issues, non compliance and breaches of regulation	
						A	B	C
			Catastrophic /Fatality	Major/Serious	Significant	Moderate	Minor	
LIKELIHOOD	A	Almost Certain (at any time)	EXTREME	EXTREME	HIGH	MEDIUM	LOW	
	B	Very Likely (in most circumstances)	EXTREME	HIGH	HIGH	MEDIUM	LOW	
	C	Likely (may happen at some time)	HIGH	HIGH	MEDIUM	LOW	LOW	
	D	Unlikely (could happen)	HIGH	MEDIUM	MEDIUM	LOW	INSIGNIFICANT	
	E	Very Unlikely (probably wont happen)	MEDIUM	MEDIUM	LOW	INSIGNIFICANT	INSIGNIFICANT	

Figure 15: Wingecarribee Shire Council Risk Matrix





## 02 Planning & Management

### Risk Identification

Some of the identified risks associated with the audited walking tracks include:

- Bushfire
- Flooding
- Falling objects
- Unpotable water
- Bites/stings (e.g. snakes and spiders)
- Trips, slips and falls
- Unstable land formations (e.g. erosion)
- Trail user conflict
- Traffic (e.g. trails traversing on roads)
- Impacts on sensitive environments
- Unsafe built elements
- Getting lost in remote environments
- Unpredictable creek/river crossings

Trail construction & maintenance staff are also exposed to the following risks:

- Remote work
- Communication black spots
- Temperature extremes (hot/cold)
- Manual handling
- Plant and machinery
- Working at heights
- Failure to meet Work, Health and Safety requirements

The audit identified hazards on walking tracks. These are documented in Council's ArcGIS Online system, and hazards requiring action are addressed in the Implementation Plan.

Hazards have been categorised into the following types:

- Physical hazard
- Biological hazard
- Environmental hazard
- Chemical hazard
- Other hazard

The following priority rating system has been applied:

- High – urgent repairs/action required
- Medium – add repairs/works to maintenance program
- Low – monitor for changes, add to maintenance program if condition deteriorates.

### Risk Mitigation

By understanding the potential risks and finding ways to minimise their impacts, Council can confidently respond should an incident occur. Key components of risk management on walking tracks are ensuring:

- users of walking tracks are aware of the risks involved in the trail they choose,
- the level of risk is kept consistent with that outlined in the trail information, and
- Council is in a position to adequately and rapidly respond to hazards such as bushfire and flooding.

Ongoing trail and infrastructure maintenance require ongoing allocations of financial and human resources. The costs associated with maintenance will vary depending on trail characteristics such as slope, weather, soil types, construction standards and usage patterns.

Trails can also be subject to natural events such as flooding and bushfires which can destroy trail infrastructure. Future maintenance costs can be alleviated through effective design and construction of trails, and proactive management involving a regular maintenance schedule.

Maintenance of trails can generally be divided into the following two categories:

- Regular inspections and simple repairs (e.g. vegetation management). This type of maintenance can be supported by well-trained and regular volunteer programs.
- Works programs to address hazards identified (e.g. erosion control or repairing built features). This will often require larger amounts of capital and human resources, which will often be undertaken by Council staff or contractors and can also be supported by volunteers under skilled supervision.

Inspections should be undertaken at a frequency in line with the inspection interval for the trail's classification level (AS 2156.1). For example, Grade 1 Accessible trails require high duty of care and so inspection intervals of 30 days or less are recommended.



## 02 Planning & Management

Hazard inspections should include assessments of:

- the condition of the trail surface noting erosion of or damage to the track, slippery rock or clay sections and obstructions/trip hazards on the track
- the condition of built elements
- adequacy of signage
- consideration of overhanging limbs or overgrown vegetation

The majority of trail maintenance is likely to be related to regrowth vegetation, damage to signage and accumulation of leaf litter and debris. Providing these issues are attended to early they are largely labour intensive rather than capital expensive. Resourcing such an ongoing program is crucial, and funds (or volunteers) will be required on an ongoing basis to enable maintenance work to take place. This matter requires address in Council's budget and recurrent funding opportunities. Annual maintenance costs can be kept at a minimum by ensuring that inspection and works programs stay on schedule.

An example and guidance for inspection intervals specific to the recreational walking tracks addressed in this Strategy is included in Appendix 2: Inspection Intervals.

There may be opportunity to work in partnership with the bushwalking community to identify hazards along a walking track. For example, through an online application for bushwalkers and community groups to report hazards, such as 'snap, send, solve' systems which also support asset management and hazard identification for other assets.

### Bushfire and Flood Events

With high likelihood of increased frequency and severity of bushfires and floods, it is important that the associated risks are clearly identified to trail users and that mitigation measures are put in place. Associated risks include:

- Inability to escape fire or flash flooding,
- Injury during or after bushfire or flooding events, such as debris and unstable vegetation,
- Health effects from exposure to bushfire smoke or flood waters,

### Mitigation of Key Risks

The following mitigation measures have been identified to enhance the safety of bushwalking in Council's bushland reserves:

- Coordinated approach to management of walking tracks, including risk management, through a dedicated role within Council.
- Regular and coordinated inspection and maintenance programs, with specific integration of post-bushfire and flood inspections.
- Closure of reserves on days of "high" risk (e.g. days at risk of bushfire or flood events).
- Clear and consistent communication of designated walking tracks and public access points.
- Regularly reviewed and updated Plans of Management Council's bushland reserves integrating trail management and maintenance requirements and management of risk to reserve users.

These measures have been integrated as actions within section 06 Implementation Plan of the Walking Tracks Strategy.

## 02 Planning & Management

### Emergency Location Systems

Location information challenges are particularly difficult for 'open space' locations with no set addresses such as bushland reserves. Mt Alexandra Reserve is a large reserve with extensive networks of walking tracks and fire trails. Emergency location systems can help mitigate this risk, and it is noted that aged Emergency Location Markers currently exist in Mt Alexandra Reserve, as shown in Figure 16.

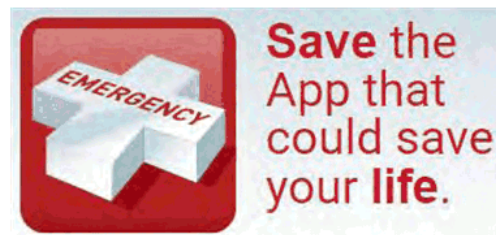


**Figure 16: Emergency Location Marker in Mt Alexandra Reserve**

The existing emergency location system provides GPS coordinates in 'Degrees Minutes Seconds' rather than Decimal Degrees which is the preferred format for most GPS receivers. The location referred to in Figure 16 would translate to -34.42886 / 150.44014.

### Emergency+ App

The Emergency+ app is considered the best-practice emergency location system across Australia and is endorsed by the NSW Government (Resilience NSW) and NSW emergency services agencies.



To increase the safety of reserve users, it is recommended that trailhead signage advises users to download the (free) Emergency+ mobile app. The app guides users as to when they should call Triple Zero (000) and who to call in different non-emergency situations. It also helps dial the number and shows the phone's GPS coordinates for the caller to read out to the operator.

This approach does not require on-ground emergency location infrastructure and will also increase the safety of people once they have downloaded the app and have left the reserve.

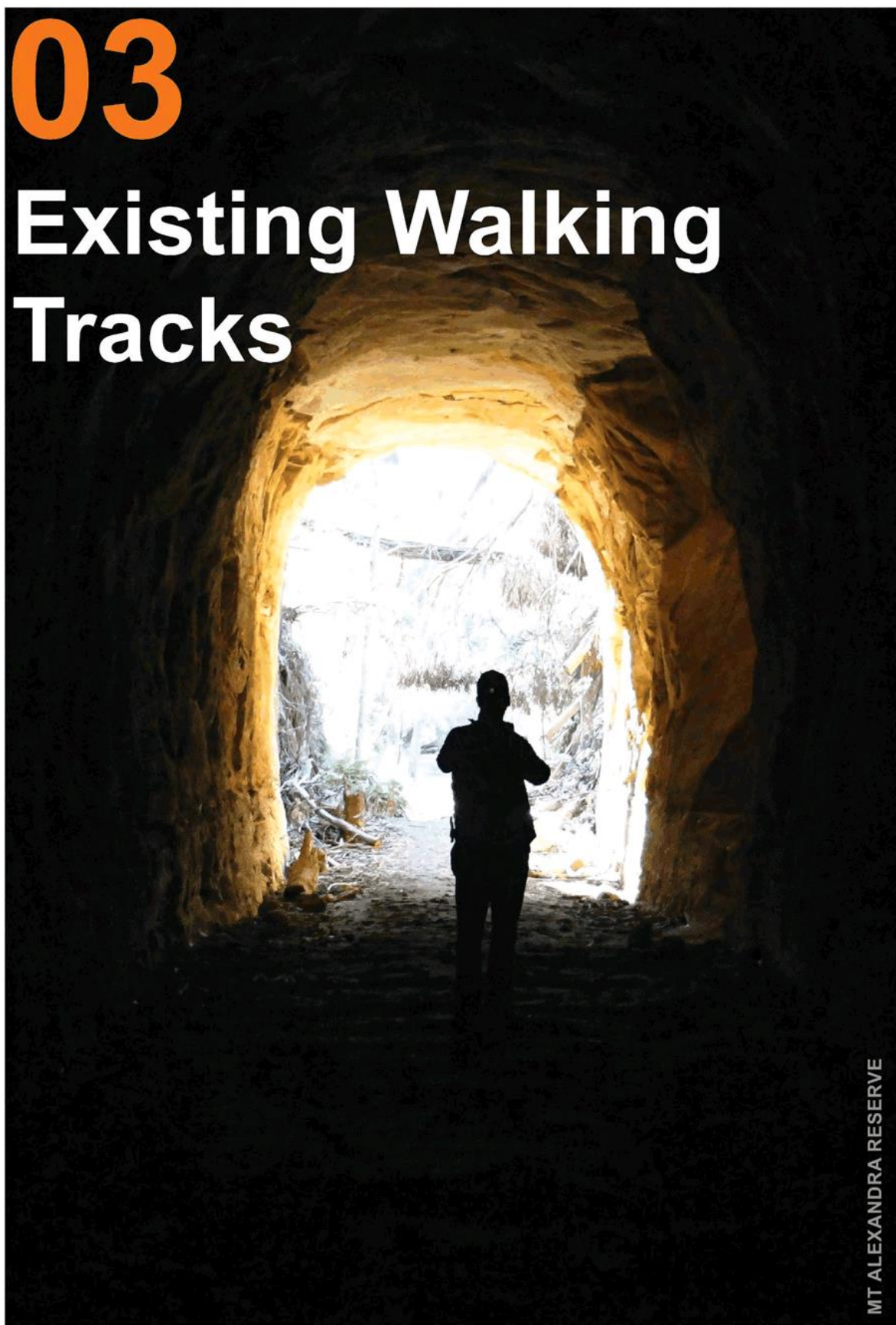
### Interactive Trail Maps

Provision of trail maps and information via mobile apps allows for users to keep track of their location along the trail using GPS receivers on their mobile device. This enhances user safety. A wide range of software exist which accommodate this function such as Maps.ME, AvenzaMaps and Gaia GPS.



# 03

## Existing Walking Tracks



MT ALEXANDRA RESERVE



## 03 Existing Walking Tracks

### Audit Process

An on-ground audit was undertaken during May 2020 to produce ground-truthed, geo-referenced data and photographs relating to the walking tracks and associated infrastructure in the specified reserves.

This process was also supported by an extensive desktop audit of existing walking tracks and consultation with community members to guide the focus of the field work to established walking track alignments.

The data collection process aligned with Council's broader asset management system. This included use the ESRI ArcGIS Online Collector mobile auditing application which integrates into Council's system hosted on ArcGIS Online.

An example of the data interface on ArcGIS Online is shown in **Error! Reference source not found.**

Point features were collected for:

- Signs
- Support infrastructure (e.g. seats, picnic facilities)
- Built features (e.g. stairs, bridge, lookout structure)
- Points of interest (e.g. viewpoints)
- Hazards (e.g. damaged infrastructure)

Associated attributes included:

- Type
- Condition
- Material
- Comments
- Priority (for Hazards only)

Line features were collected for the alignment of the walking tracks. Associated attributes included:

- Track name (if known)
- Primary use of track
- Grade/Difficulty (in line with AS2156.1)
- Condition.

The condition assessment ratings are in line with the system outlined in the Institute of Public Works Engineering Australasia's (IPWEA) *Condition Assessment and Asset Performance Guidelines*, from 1: Very Good Condition to 5: Asset Unserviceable.

## 03 Existing Walking Tracks

### Identified Walking Tracks

Table 5 outlines the 28 walking tracks identified and audited in the specified reserves with their grade, length, estimated time for completion, level of hierarchy and appropriate use.

While the recreational walking track experiences identified are generally suitable only for walking in their entirety, it is acknowledged that sections of these tracks may also be suitable for off-road cycling. This is particularly relevant to the sections of walking trails which utilise fire trails.

**Table 5: Identified Walking Tracks – Categorised by Reserve**

Trail Name	Grade	Length	Estimated Time	Hierarchy	Appropriate Use
Mt Alexandra Reserve (primary access from Box Vale Trailhead)					
Box Vale Track	3	9km return	3 hours return	Regional	Walk
Forty Foot Falls Track (Box Vale Trailhead to Falls)	4	7km return	2.5 hours return	Regional	Walk
Nattai Loop Track	5	12km loop	5 hour loop	Regional	Walk
Mt Alexandra Reserve (primary access from Lake Alexandra Trailhead)*					
Boulder Valley Track	4	3km return	1.5 hours return	Regional	Walk
Forty Foot Falls Track (Lake Alexandra to Falls)	4	7km return	2.5 hours return	Regional	Walk
Mountain Circuit	5	10km loop	5 hour loop	Regional	Walk
Katoomba Lookout Trail	3	1.5km return	1 hour return	Regional	Walk
Sixty Foot Falls Track	4	3km return	1.5 hours return	Regional	Walk
Big Rock Link Trail	4	2km each way	30 mins each way	Regional	Walk
Lake Alexandra Reserve					
Lake Alexandra Circuit	1	600m loop	15min loop	Regional	Walk
Mount Gibraltar Reserve					
Bowral Lookout Trail	1	250m return	10 min return	Regional	Walk
Heritage Quarries Track	3	1.5km loop	20min loop	Regional	Walk
Rim Track	3	2.5km loop	45min loop	Regional	Walk
Reservoir Ravine Track	4	3km loop	1.5hours loop	Regional	Walk
Gibbergunyah Reserve					
Geebung Track	3	4km return	1.5 hours return	District	Walk
Gibbergunyah Walk	4	6.2km return	2.5 hours return	District	Walk
The Glen Track	4	1.1km each way	30 mins each way	District	Walk
Glow Worm Glen (Bundanoon Access)					
Glow Worm Glen - William St Access**	3	600m each way	N/A - access to nature reserve trail	Regional	Walk
Governors Road Walking Trail	2	600m each way	15 mins each way	Local	Walk



## 03 Existing Walking Tracks

Trail Name	Grade	Length	Estimated Time	Hierarchy	Appropriate Use
Stone Quarry Walk Reserve (Berrima)					
Stone Quarry Walk	3	650m loop	30 min loop	District	Walk
River Bend Reserve and Berrima River Reserve (Berrima)					
Berrima River Walk	2	3.6km return	1 hour return	District	Walk
Lambies Well Walk	2	900m each way	15min each way	District	Walk
Berrima Weir Reserve					
Berrima Weir Trail	2	2.8km return	45 min return	District	Walk/Bike
Hammock Hill Reserve					
Unnamed Trail 1	2	1.8km return	30 mins return	Local	Walk
Unnamed Trail 2	3	2.5km return	40 mins return	Local	Walk
Mansfield Reserve					
Wallaby Track	2	2km loop	30 min loop	Local	Walk
Wombat Track	2	1.5km loop	20 min loop	Local	Walk
Bong Bong Common (Link to Cecil Hoskins Nature Reserve)					
Cecil Hoskins Link Track	2	170m each way	N/A - access to nature reserve	District	Walk

\*Incorporates a local access point from Iron Mines Oval

\*\*Trail not ground-truthed due to access restrictions after bushfire damage

Table 6 outlines the potential walking tracks which are proposed for formalisation in the specified reserves with their grade, length, estimated time for completion and level of hierarchy.

**Table 6: Proposed/Potential Walking Tracks - Categorised by Reserve**

Trail Name	Grade	Length	Estimated Time	Hierarchy
Glow Worm Glen (Bundanoon Access)				
Governors Street Walking Trail (Potential Extension)^	N/A^	1km each way	15mins each way	District
River Bend Reserve and Berrima River Reserve (Berrima)				
Berrima River Walk (via Proposed Loop)^	N/A^	3.6km return	1 hour return	District
Berrima Weir Reserve				
Berrima Weir (Proposed Extension)^	N/A^	2.2km each way	30 mins each way	District
Welby Weir Reserve				
Welby Weir Track^	N/A^	1km return	10mins return	Local
Hammock Hill Reserve				
Unnamed Trail 3	1^	550m return	10mins return	Local

## 03 Existing Walking Tracks

Figure 17 provides a photo montage of a selection of the trailhead, directional, waymarker, management/warning and interpretation signs, as well as picnic infrastructure and seating. A complete record of trail alignment and infrastructure is contained within the ArcGIS Online System, with further photographs of each category provided in Appendix 4.

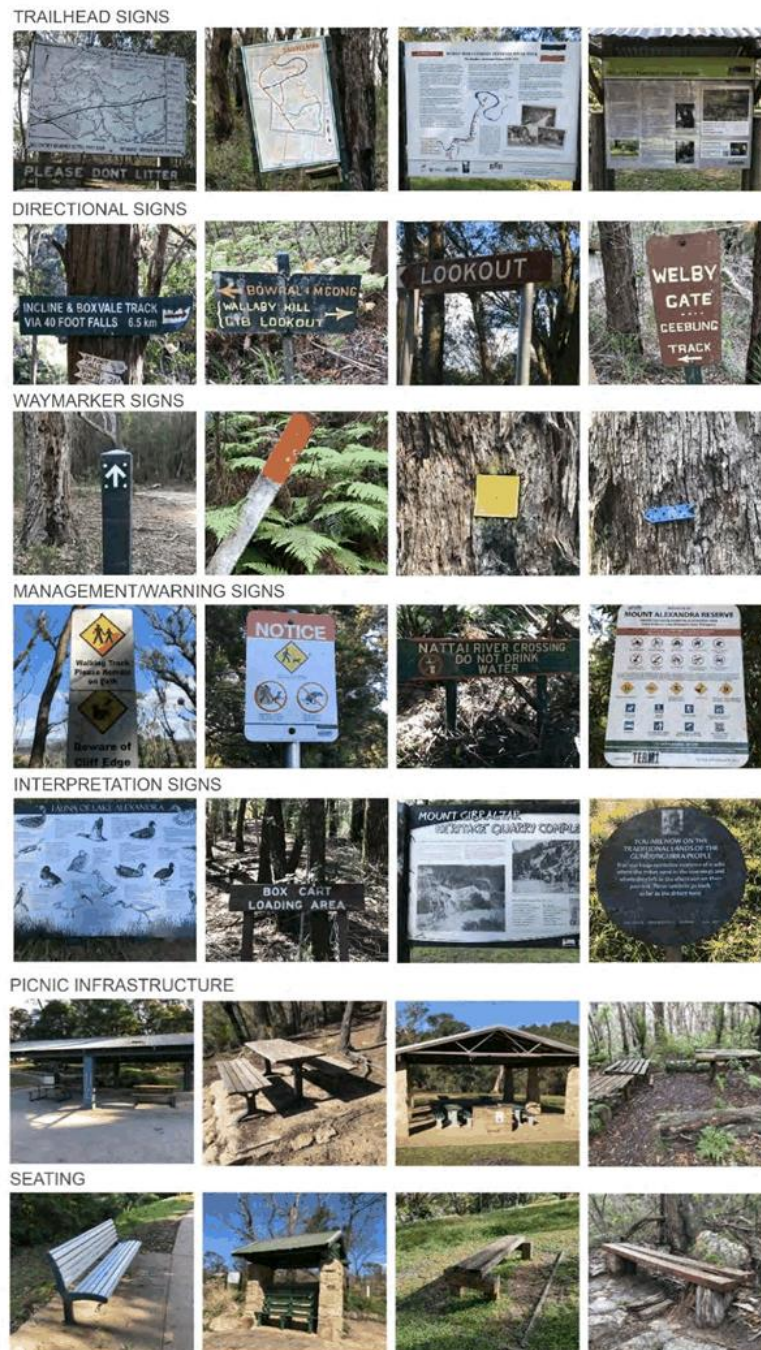


Figure 17: Examples of Signage and Infrastructure







## 04 Consultation

### Process

The development of the Wingecarribee Shire Council Walking Tracks Strategy was informed by community consultation and stakeholder engagement. This involved an internal stakeholder meeting (with WSC staff), a meeting with targeted key external stakeholders, an online community workshop and a YourSay Wingecarribee webpage which includes an online community survey, mapping tool and forum.

Information was provided to stakeholders and the wider community through the distribution of an information flyer (Figure 18), weekly circular, Council's website and social media.. A *Your Say Wingecarribee* webpage was established as the project's community engagement hub.



Figure 18: Project Information Flyer

### Findings

The *Internal Stakeholder Meeting* was attended by 14 Wingecarribee Shire Council staff and discussed site specific information relating to each of the reserves. The discussion focused on the existing trails and usage, access, heritage/biodiversity, and key opportunities/constraints. Key themes of the meeting included:

- Lack of adequate trail signage/promotional materials
- Improving connections/linkages
- Existing infrastructure
- Considering the sensitive environment
- Tourism opportunities
- Extensive heritage (Aboriginal & non-Aboriginal) associated with the trails

The *Key Stakeholder Meeting* was held with representatives from the fields of education, bushwalking, birdwatching, national parks, parkrun, and cycling. Key themes of this meeting included:

- Varying track maintenance levels
- Improved connections/linkages
- Lack of adequate trail signage/promotional materials
- Three peaks trail opportunity (Mt Alexandra, Mt Gibraltar & Gibbergunyah)

The Community Workshop meeting was attended by approximately 25 community members. The key themes of discussion included:

- Variance in trail maintenance levels
- Lack of adequate trail signage/promotional materials
- Enhancing trail linkages
- Opportunity to create new extensions to existing trails to improve experience
- Ensuring developers join up areas
- Vision – chance to develop an integrated trails network throughout the Shire.

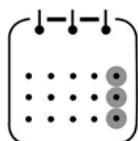
Overall, the top three issues relating to walking tracks in the Shire's reserves were the lack of signage and track maintenance, and inadequate trail information and promotional materials.

## 04 Consultation

### Community Online Survey

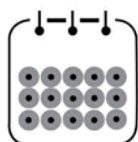


**137**  
RESPONSES



**75%**

USE WALKING  
TRACKS AT  
LEAST ONCE  
WEEKLY



**31%**

USE WALKING  
TRACKS DAILY

### TOP MOTIVATIONS TO USE WALKING TRACKS:



**1.** EXERCISE / PHYSICAL  
HEALTH



**2.** BEING IN NATURE



**3.** MENTAL WELLBEING



**4.** SOCIALISING / SHARING  
EXPERIENCES



**5.** WALKING A DOG

### RATING OF WALKING TRACK EXPERIENCES AS 'EXCELLENT' OR 'GOOD'

★	41%	MT ALEXANDRA RESERVE
★	72%	LAKE ALEXANDRA
★	47%	MT GIBRALTAR RESERVE
★	34%	GIBBERGUNYAH RESERVE
★	73%	BERRIMA RIVER RESERVE
★	42%	BERRIMA WEIR RESERVE
★	57%	STONE QUARRY WALK
★	55%	HAMMOCK HILL RESERVE
★	47%	MANSFIELD RESERVE

### LEVEL OF AGREEMENT

👍	69%	Definitely agree The Shire's provision of recreational walking tracks are highly valued by the community
👍	46%	Somewhat agree Recreational walking tracks managed by the Shire are generally in good condition
👎	60%	Definitely disagree or Somewhat disagree Recreational walking tracks across the Shire are generally well connected
👎	70%	Definitely disagree or somewhat disagree Signage is sufficient to meet the needs of recreational walkers
👎	72%	Definitely disagree or somewhat disagree Recreational walking tracks within the Shire are well promoted
👍	42%	Somewhat agree Recreational walking tracks within the Shire are safe
👍	32%	Somewhat agree or definitely agree Recreational walking tracks within the Shire are accessible and welcoming to visitors, and people who are new to bushwalking.

## 04 Consultation

### POSITIVE FEEDBACK

+ "Wonderful walking tracks great scenery around the Box Vale Trail".

"It is great to have such a variety of tracks close to home". +

+ "Our shire has amazingly beautiful mountains, valleys, and rivers. There are some excellent trails that can take you to spectacularly beautiful places!".

"Lots of potential for some of these reserves for both local exercise and for visitor destinations". +

+ "Berrima campgrounds is a particular standout with the plaques explaining the history of the areas".

"We have so many fantastic trails in the shire. Maintenance and expansion will only make it even better". +

+ "Wonderful locations, not crowded, great for supporting your mental wellbeing".

"There are so many possibilities for great walking that the highlands could become a destination for hikers". +

### ISSUES

"Lack of signage and maps is a huge issue, especially if you are unfamiliar with the area". -

- "Sometimes it is hard to find the way. Often signs are broken or unclear. More signage is needed and the signs need to be maintained regularly".

- "The main issue is signage, and the need to improve it. For example, Mount Alexandra has some great walks but there is limited and/or faded signage so if you don't have a map it can be difficult to know where you should be going".

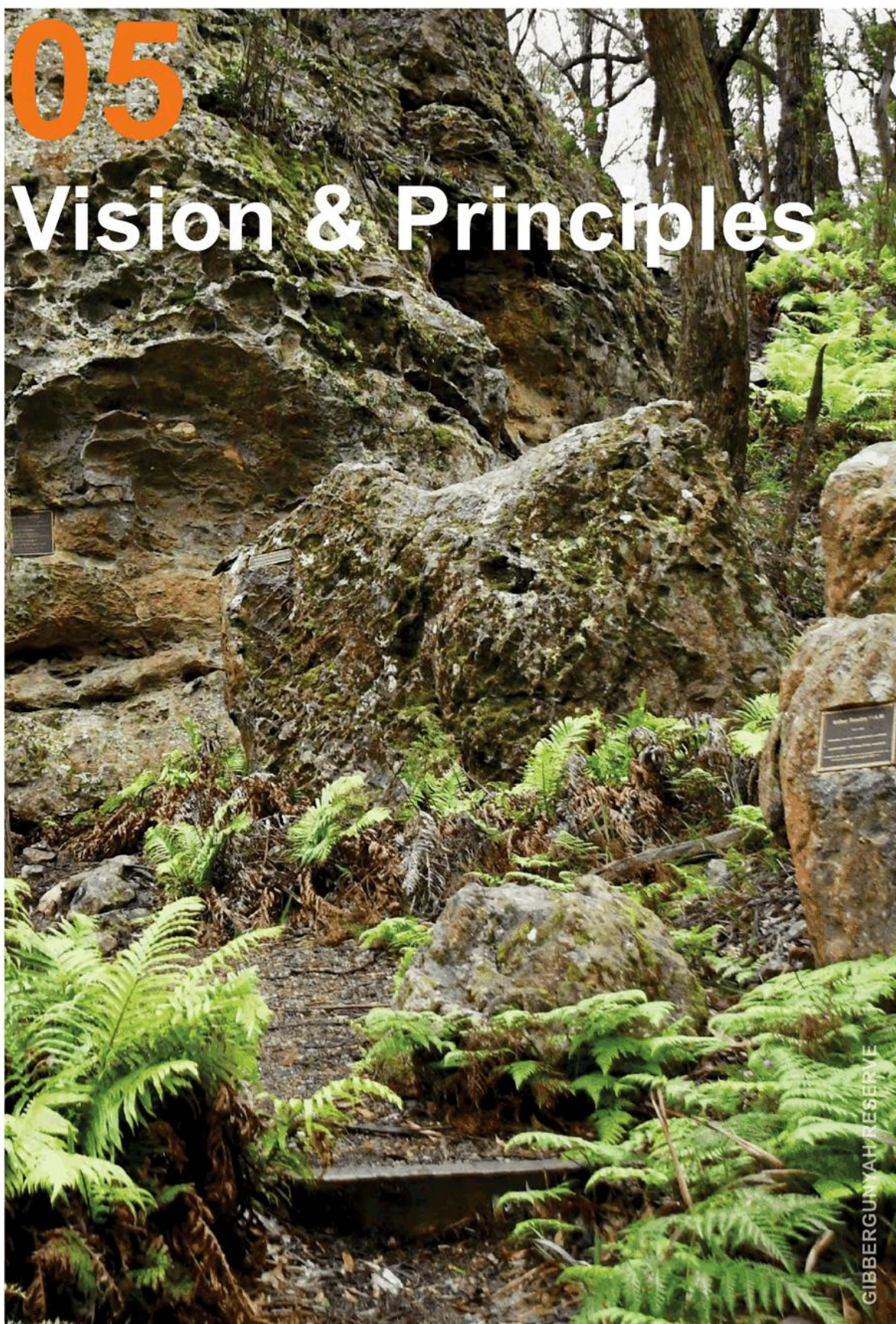
- "There appears to be no maintenance of walking tracks, many steps are missing and some signage is missing or incorrect".

- "Poor walking track maintenance (vast number of trails). Poor signage, having found visitors to the area being in the completely wrong area in which they thought they had been heading".

- "I suspect many residents have no knowledge of the various walking tracks available - perhaps a brochure/map would be helpful".

- "The walking tracks and riding tracks in the Southern Highlands are so beautiful, and are such an attraction to the area. I would just like to see more maintenance of some of the tracks".







## 05 Vision and Principles

### Planning Pyramid

The establishment of a common vision for walking tracks across the Shire provides a goal for Council, other organisations and the wider community to coordinate initiatives towards.

As illustrated below, the vision facilitates the development of associated strategic outcomes, which in turn provide the framework for the development of Strategies (specific approaches to achieve the strategic outcomes and fulfill the vision).

Individual actions are then identified to deliver on each of the strategies and address the relevant issues and opportunities identified through the research, on-ground audits and consultation.

Utilising this approach produces a clear and actionable implementation plan to deliver the overall vision.



Figure 19: Strategic Planning Pyramid

### Vision

The following vision has been developed, based on the findings of research, on-ground audits, and consultation, to reflect the ultimate goal for walking tracks in the Wingecarribee Shire.

The vision for walking tracks on Council owned or managed land is:



*A cohesive network of walking tracks that offers locals and visitors the opportunity to confidently explore the Southern Highlands, immersing themselves in the region's rich biodiversity, proud heritage, and rugged landscapes.*



## 05 Vision and Principles

### Strategic Outcomes

To deliver the vision, the following series of strategic outcomes have been developed.

#### **A: Integrated Planning & Management**

Underpinning a sustainable, integrated, and accessible network of walking tracks is a strategic framework and coordinated approach through collaboration with key stakeholders, prioritised investment and appropriate levels of resources.

#### **B: Clearly Defined, Safe, Sustainable & Accessible Walking Tracks**

Initial focus on enhancing existing walking tracks to provide clearly defined, safe, sustainable, and accessible opportunities for recreational walking in natural environments.

#### **C: Information, Promotion and Marketing**

Provision up-to-date, consistent, and reliable information relating to walking tracks to enable walkers to confidently explore the Southern Highlands, and for use in marketing and promotion of the experiences offered across the region.

#### **D: Management and Maintenance**

The ongoing success and sustainability of recreational walking tracks is dependent on effective management and regular maintenance coordinated by Council.

#### **E: Community, Tourism & Economic Development**

Significant community, tourism, and economic development opportunities are available through having a clearly defined and well managed network of walking tracks across the Shire.

### Principles

The following principles are broadly based on the best-practice guidelines and have been tailored to guide the planning and management of walking tracks in the Wingecarribee Shire.

These principles underpin the concepts for each reserve and strategies and actions which are detailed in Section 06 Implementation Plan.

#### **Sustainable**

Walking tracks that are planned, managed and maintained to be socially, economically, and environmentally sustainable.

#### **Diverse**

Walking tracks that offer opportunities accessible to a diverse range of people and showcase the region's diverse range of landscapes, environments, and historic features.

#### **Safe**

Walking tracks that are safe and manage risk while maintaining the opportunity for walkers to undertake challenging experiences in the natural environment.

#### **Collaborative**

Effectively and efficiently manage walking tracks through collaborative partnerships with stakeholders.



# 06 Implementation Plan



MANSFIELD RESERVE



## 06 Implementation Plan

### Prioritisation

A prioritised implementation plan has been prepared to enable a staged approach to the enhancement of walking tracks across the Shire.

Strategies have been prioritised as 'High', 'Medium', or 'Low', based on:

- Benefit: Overall benefit to the region and community (social, environmental, economic).
- Need/Demand: field observation, requirement to mitigate existing levels of risk, consultation findings, contribution to broader Council objectives.
- Feasibility: project size, resource requirements/cost, social, economic or environmental constraints, likelihood of successful implementation.
- Location: Proximity to residential populations, proximity to existing trails networks, identified gaps in current provision, connectivity, proximity to significant visitor/tourist attractions.

It is anticipated that implementation of many actions the Recreational Walking Tracks Strategy will include further consultation with stakeholders and the wider community. Levels of community interest in a project should further inform prioritisation. A potential project that generates a high level of public interest and is considered to be relatively easy to implement at reasonable cost should be prioritised above a project which requires substantial funding, has significant constraints and/or limited public interest.

### Indicative Timeframes

Actions have been identified with indicative timeframes acknowledging that it is not feasible to deliver all of the identified actions at the same time. Timeframes are indicated as follows:

- Immediate: 2020/21
- Short: 2021/22 - 2023/24
- Medium: 2024/25 - 2026/27
- Long: 2027/28 - 2029/30

These timeframes should be reviewed periodically acknowledging that the schedule of implementation will be influenced by funding priorities. The Recreational Walking Tracks Strategy should be comprehensively reviewed and updated in 2030.

Key projects requiring initial feasibility studies, design development and/or cross-agency collaboration will likely take multiple years. Some actions will be reliant on the successful completion of other actions.

### Cost Estimates

An estimate of the resources required to implement each action has been identified to inform Council with its budget processes. These are broad estimates and should be reviewed prior to implementation or as part of annual business and budget planning. The following indicative cost estimates have been used in the Strategy & Action Plan:

- Low: <\$50,000
- Medium: \$50,000 - \$100,000
- High: \$100,000 - \$500,000

An Order of Probable Costs for the capital works components has been prepared by Rider Levett Bucknall Quantity Surveyors to inform Council's budgetary processes. This is included as Appendix 2.

Note: Costs indicated with an asterisk (\*) are improvements to the overall reserve and not specific to the trail network (e.g. road entrances).

### Concept Plans

Strategies for specific reserves include an accompanying concept plan which illustrates the proposed trail network. Each track is colour-coded, with identification of trail name, users, grade/difficulty, estimated time, length and hierarchy. The concept plans also indicate the registered fire trails.

Note: Some sections of walking tracks share an alignment with registered fire trails. It is acknowledged that fire trails are used by authorised vehicles and for off-road cycling.

### Partners

Partnerships will be required for the implementation of this Strategy and ongoing trail management and maintenance. These will be especially crucial where complexities surround the planning and development of recreational walking tracks.

Key partners are likely to include: NSW National Parks and Wildlife Service (NPWS); Bushcare, Landcare and Rivercare Groups; Crown Lands; Traditional Owners; Sydney Water; Neighbouring Local Governments; Community Groups; Southern Highlands Welcome Centre; Destination NSW; Private Land Owners; Developers.

### Funding

A range of external funding sources to support the development of recreational facilities, such as walking tracks, are potentially available for the implementation of the Strategy. Further details are provided in Appendix 3.

## 06 Implementation Plan

### Overview

The strategic outcomes and strategies are summarised below, and detailed over the following pages.

STRATEGY		PRIORITY
<b>STRATEGIC OUTCOME A: Integrated Planning &amp; Management</b>		
A1	Implement an integrated framework for planning and management of recreational walking tracks in the Wingecarribee Shire Council area.	High
<b>STRATEGIC OUTCOME B: Clearly Defined, Safe, Sustainable &amp; Accessible Walking Tracks</b>		
B1	Focus on the enhancement of existing and potential regional level walking tracks that contribute to the Southern Highlands' position as a renowned destination for outdoor and nature-based recreation.	High
B2	Enhance the network of existing recreational walking tracks within Mt Alexandra Reserve accessible from the Box Vale Trailhead to provide well defined and safe, yet challenging, opportunities for bushwalking as well as conservation of the environment.	High
B3	Enhance the network of existing recreational walking tracks within Mt Alexandra Reserve accessible from the Lake Alexandra Trailhead to provide well defined and safe, yet challenging, opportunities for bushwalking as well as conservation of the environment.	High
B4	Enhance Lake Alexandra Reserve to provide a high quality regional-level trailhead precinct and to continue to provide an accessible Grade 1 Walking Trail.	High
B5	Enhance the network of existing recreational walking tracks within Mt Gibraltar Heritage Reserve to provide for recreational use, on loop trails where possible, while prioritising conservation of the environment and heritage.	Medium
B6	Formalise and enhance walking tracks within Gibbergunyah Reserve recreational use as well as conservation of the environment.	Medium
B7	Reinstate access to Glow Worm Glen from various local access points in Bundanoon with walking tracks offering opportunities for recreational use as well as conservation of the environment.	High
B8	Progressively enhance Stone Quarry Walk to provide a well defined walking track offering opportunities for recreational use as well as conservation of the environment.	Medium
B9	Progressively enhance the Berrima River Walk and Lambies Well Walk to provide well defined walking tracks offering opportunities for recreational use, showcase of historical significance and conservation of the environment.	Medium
B10	Establish a well defined recreational walking track in Berrima Weir Reserve to provide opportunities for recreational use as well as conservation of the environment	Low
B11	Progressively enhance Hammock Hill Reserve to provide formalised walking tracks offering opportunities for recreational use as well as conservation of the environment	Low
B12	Progressively enhance Mansfield Reserve to provide formalised walking tracks offering opportunities for recreational use as well as conservation of the environment.	Low
B13	Develop Welby Weir Reserve for provision of a formalised walking track along Nattai Creek offering opportunities for recreational use as well as conservation of the environment.	Low
B14	Enhance connectivity for walkers between Bong Bong Common and Cecil Hoskins Nature Reserve.	Low
<b>STRATEGIC OUTCOME C: Information, Promotion &amp; Marketing</b>		
C1	Provide consistent & reliable signage, maps & supporting information for walking tracks.	High
<b>STRATEGIC OUTCOME D: Management &amp; Maintenance</b>		
D1	Clearly define management structures and maintenance schedules for walking tracks.	High
<b>STRATEGIC OUTCOME E: Community, Tourism &amp; Economic Development</b>		
E1	Use trail development and provision as a tool for economic and community development.	High



## 06 Implementation Plan

### STRATEGIC OUTCOME A: INTEGRATED PLANNING & MANAGEMENT

#### STRATEGY

**A1** Implement an integrated framework for the planning and management of recreational walking tracks in the Wingecarribee Shire Council area.

#### PRIORITY

High

#### RATIONALE

This Recreational Walking Tracks Strategy provides a framework for the ongoing the identification, maintenance and enhancement of authorised walking tracks and trails.

It is important that an integrated approach to allow for coordinated efforts between various government agencies (e.g. NSW National Parks and Wildlife Service), community groups (e.g. bushwalking clubs, bushcare groups) and individual trail users. Integrated recreational trail networks offer synergies to achieve positive outcomes across various sectors such as health, recreation, transport and conservation. Trail management and maintenance, including risk management, need to be adequately resourced to ensure effectiveness.

Risk management is an important component of trail management, and it is important that this is integrated into Council's trail management and maintenance systems.

It is acknowledged that the scope of this Recreational Walking Tracks Strategy covers specific reserves and that additional opportunities for the enhancement of recreational walking tracks exist across the Shire. The community would also benefit from broader strategic planning for recreational trails, including those for mountain bike riding, water-based trail activities (e.g. canoeing), horse riding, rock climbing and walking tracks which have not been included in the scope of this project. There are various opportunities which require further investigation for these recreational trail users, such as the re-purposing of the Welby Tip into a mountain bike park (subject to Environmental Protection Authority approval).

ACTION		TIMEFRAME	COST
A1.1	Establish a Recreational Trails Working Group to manage the implementation of the Recreational Walking Tracks Strategy with representation from relevant departments within Council and engagement of relevant stakeholders (e.g. state government departments i.e. NPWS, Indigenous representatives, bushcare groups, user groups). Project managers are to be included as projects are added to the capital works program. Refer also Action D1.1.	Short	Low
A1.2	Establish a Trail Stewardship Program which builds capacity and encourages volunteers to meaningfully and continually contribute to trail management and maintenance activities, while managing risks of such activities.	Short	Low
A1.3	Continue to strategically plan for recreational tracks and trails across the region with the preparation of a Recreational Trails Strategy (including audit) incorporating volumes for mountain bike riding, water-based trail activities (e.g. canoeing), horse riding, rock climbing and walking tracks which have not been included in the scope of this project.	Short	Medium
A1.4	Develop a Trail Corridor Protection Policy for Council which ensures that requests for the closure of Council-controlled land (i.e. road reserves) are considered in the context of the existing and potential future trail network, preventing loss of public land which provides strategic connections for recreational trails.	Short	Low
A1.5	Encourage, advocate and seek funding to support the implementation of the Recreational Walking Tracks Strategy.	Ongoing	Low
A1.6	Ensure that all of Council's recreational walking track signage, infrastructure, maintenance and communication adhere to AS2156.1 <i>Walking Tracks Classification and Signage</i> and AS2156.2 <i>Walking Tracks Infrastructure Design</i> .	Ongoing	Low
A1.7	Integrate trail audits and assessments into Council's regular ongoing program of works and inspections, in line with the inspection intervals for each grade outlined in AS2156.1. Undertake trail inspections using the ArcCollector process created and used for the development of the Recreational Walking Tracks Strategy which aligns with Council's asset management system.	Ongoing	Low
A1.8	Incorporate initiatives for the enhancement of walking tracks into broader community planning (e.g. strategic plans, development plans, open space plans, transport plans) and Council's budgeting processes.	Ongoing	Low
A1.9	Incorporate Indigenous, cultural, educational and heritage interests into trail development initiatives (i.e. Acknowledgment of Traditional Custodians, integration of Dreaming and Songlines).	Ongoing	Low

## 06 Implementation Plan

### STRATEGIC OUTCOME B: CLEARLY DEFINED, SAFE, SUSTAINABLE & ACCESSIBLE WALKING TRACKS

#### STRATEGY

**B1** Focus on the enhancement of existing and potential regional level walking tracks that contribute to the The Southern Highlands' position as a renowned destination for outdoor and nature-based recreation.

#### PRIORITY

High

#### RATIONALE

Outdoor and nature-based recreational experiences are the top tourism driver for the Southern Highlands and offer the opportunity to further market the region for activities such as bushwalking, which provide a distinct 'customer experience'. The Southern Highlands Welcome Centre in Mittagong reports frequent queries from visitors about bushwalking opportunities, particularly those related to the renowned Box Vale Track. Mt Alexandra provides for a range of trail-based activities, with multiple regional-level trail experiences offered, and has the potential for further development as a regional trails hub.

Other regional walking trail experiences exist at Berrima, Mt Gibraltar and at Glow Worm Glen in Bundanoon. It is important that Council focuses on enhancing these trails to a standard which enables them to be key attractions for the region.

The Southern Highlands has the valuable opportunity to further capitalise on its close proximity to the Sydney tourism market, as a sought-after destination for bushwalking with experiences on offer to suit a variety of interests, challenges and abilities. In order to confidently promote the impressive range of walking experiences on offer, there is a need for Council to define and communicate the experience on offer, provide effective trail signage, enhance infrastructure along the tracks and manage risks associated with the walking tracks.

A concept for a packaged trail experience incorporating the walking trails of Mount Alexandra, Mount Gibraltar and Gibbergunyah Reserve is known colloquially as the 'Three Peaks of the Southern Highlands'. It is proposed that this experience incorporates key iconic lookouts across these reserves, along Katoomba Lookout Trail (Mt Alexandra Reserve), The Rim Track (Mt Gibraltar Reserve) and Geebung Track (Gibbergunyah Reserve). There is potential to formalise this experience for promotion once trail upgrades have occurred.

Wollondilly Council has proposed an iconic new 316km walk known as the Great Burratorang Valley Walk which incorporates trails within Mt Alexandra Reserve as a key link between destinations such as Mittagong and Katoomba. This concept is likely to utilise trails within Mt Alexandra Reserve.

Once walking tracks are enhanced to a level appropriate for promotion, the development of marketing and informational materials such as maps and brochures (printed and online) will enable the region to confidently capitalise on this opportunity while managing the risks associated with some of the challenging experiences on offer.

	ACTION	TIMEFRAME	COST
B1.1	Define a multi-disciplinary regional trails hub (i.e. bushwalking, mountain biking, rock climbing, orienteering, bird watching, nature appreciation, heritage features) in Mount Alexandra Reserve, catering for a variety of interests, challenges and abilities [Refer B2, B3 and B4].	Short	-
B1.2	Develop the existing walking track network at Mt Gibraltar Reserve showcasing the region's distinct ecological and heritage values. [Refer B5].	Short	-
B1.3	Develop the existing walking track network at Berrima showcasing the town's distinct heritage values. [Refer B8, B9].	Short	-
B1.4	Maximise connectivity between William Street and Governors Road Reserves and the wider trail network in Morton National Park. [Refer B7].	Short	-
B1.5	Support the proposed concept of the Great Burratorang Valley Walk (linking the Blue Mountains to the Southern Highlands) incorporating walking trails within Mt Alexandra Reserve with a key trailhead at Lake Alexandra.	Medium	Low
B1.6	Develop a concept for the Three Peaks Trail with connectivity, off-road where possible, between key iconic lookouts surrounding Mittagong via Katoomba Lookout Trail (Mt Alexandra Reserve), The Rim Track (Mt Gibraltar Reserve) and Geebung Track (Gibbergunyah Reserve).	Medium	Low



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## 06 Implementation Plan

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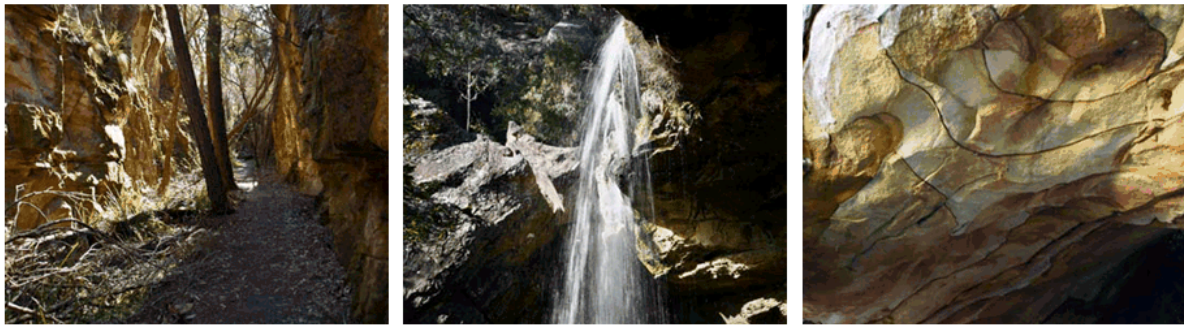
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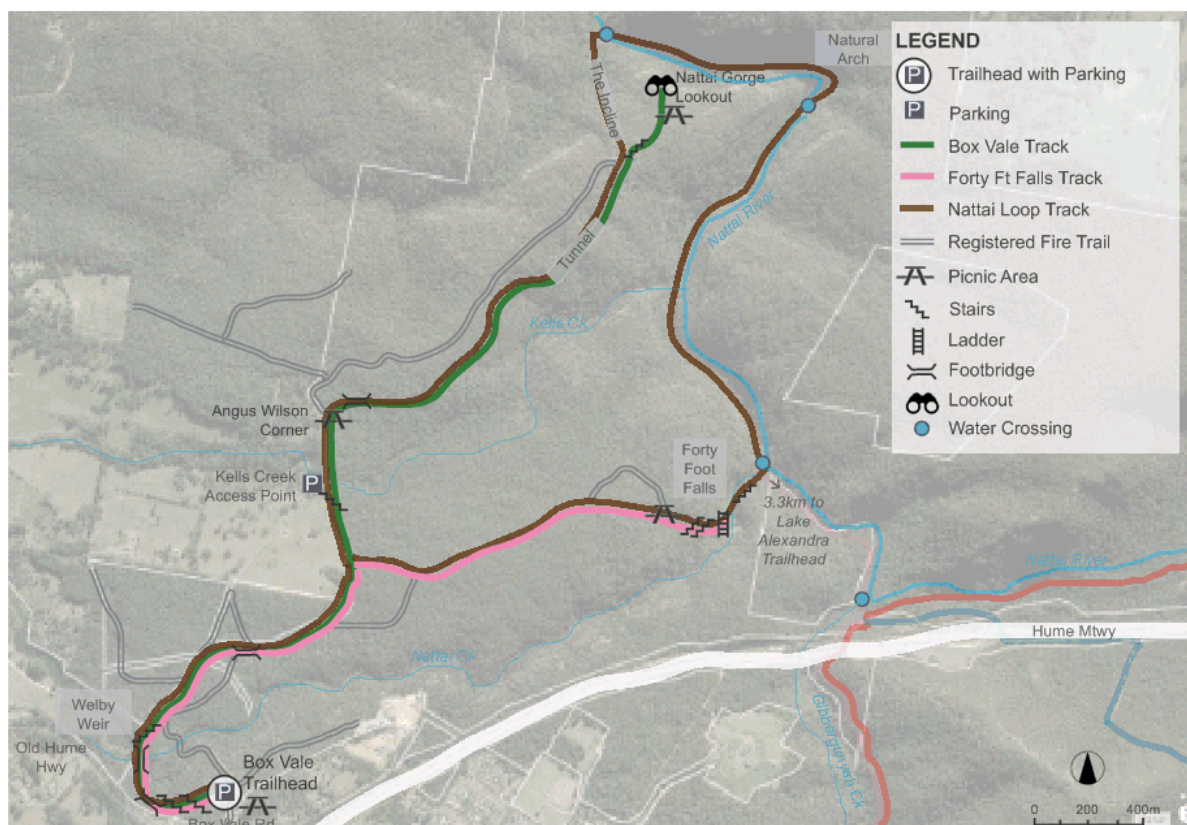
## 06 Implementation Plan




### MT ALEXANDRA RESERVE (BOX VALE TRAILHEAD)

Mt Alexandra Reserve is a very large bushland reserve covering an area of approximate 11,000ha located between Welby, Mittagong and Colo Vale. The raised Hume Motorway runs through the reserve, however trails and ecology remain connected underneath. The reserve is a popular destination for bushwalking and has an interesting history, particularly known for its features relating to its historical use for coal mining.



### CONCEPT PLAN



PROPOSED TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Box Vale Track	Walk Off-road cycling on fire trail only	Grade 3 	3 hours RETURN	9km RETURN	Regional
Forty Ft Falls Track <i>Box Vale Trailhead to Falls</i>	Walk Off-road cycling on fire trail only	Grade 4 	2.5 hours RETURN	7km RETURN	Regional
Nattai Loop Track	Walk Only	Grade 5 	5 hours LOOP	12km LOOP	Regional



## 06 Implementation Plan

### STRATEGY

**B2** Enhance the network of existing recreational walking tracks within Mt Alexandra Reserve accessible from the Box Vale Trailhead to provide well defined and safe, yet challenging, opportunities for bushwalking as well as conservation of the environment.

### PRIORITY

High

### RATIONALE

- Highly valued and used recreational area, particularly the renowned Box Vale Track.
- Opportunity to promote as one of the key outdoor recreational destinations in the Shire.
- Opportunity to provide connectivity via existing trail alignments for the The Great Burragarang Valley Walk which is a proposed regional, multi-day trail concept linking Mittagong to the Blue Mountains.
- Many requests for improved safety and wayfinding. Reports of walkers frequently getting lost.
- Original trail names are generally representative of trail experiences although promotion of trail names and routes is very inconsistent across various information sources.
- Many informal tracks. Walking trail network not clearly distinguished from extensive fire trail network.
- Proposed walking trail network uses existing narrow walking tracks where possible and shares some sections with fire trails.
- Box Vale Trailhead requires upgrades to provide a regional-level trailhead precinct with adequate car parking capacity and support infrastructure (i.e. picnic facilities, amenities). Plans to be developed with consideration of land tenure constraints and incorporation of future plans for recreation at Welby Weir.
- Existing trailhead sign is aged, misleading, not consistent with other trail information and does not meet Australian Standard 2156.1.
- Existing reserve entry signs from Hume Highway and Box Vale Road are aged/damaged.
- Management/warning/caution signs are in varying condition and of varying styles which do not meet Australian Standard 2156.1. New and revised caution signs required to manage risks at hazardous trail features (i.e. the Incline, ladders/cliffs, Forty Foot Falls, intersections of Grade 5 trail and creek crossings along Nattai Loop Track).
- Requirement for engineering assessment of cable along 'The Incline' on Nattai Gorge Loop.
- Broken risers on stairs and ladders leading to Forty Foot Falls.
- Safety fencing at Nattai Gorge Lookout has exposed cement footings.
- Safety fencing at Forty Foot Falls is damaged.
- Footbridge north of Angus Wilson Corner has dislodged handrail.
- Picnic table chair set west of Forty Foot Falls has exposed concrete base.
- Various styles of waymarkers and directional signs existing across trail network in varying condition - noted to be contradictory and misleading (e.g. 'No signage beyond this point' is noted at top of 'The Incline' and at picnic area west of Forty Ft Falls, despite signage remaining beyond).
- Directional signage to Mittagong Pool from bottom of 'The Incline' is misleading.
- New waymarking system is being installed and this style is generally supported (i.e. arrow plaque on posts). Colour-coded plaques/arrows corresponding with trailhead map is proposed.
- Colours used on Concept Map broadly correspond with historic colour-coding system.
- Existing interpretation signage of varying styles is generally in poor condition (e.g. 100m tunnel, The Boulder Cutting, Nattai Gorge Lookout, The Incline, Box Cart Loading Area). Opportunity to enhance trail experience through replacement with consistent signage style and installation of new interpretation signage at key trail features (e.g. at Forty Foot Falls).
- Requirement for removal of obsolete signage and infrastructure.
- Regular maintenance required along walking tracks in line with service intervals for trail grade/difficulty.
- Erosion control measures need to be kept maintained to preserve trail surfaces and infrastructure (e.g. stairs).
- Off-road cycling known to occur on fire trail network. Off-road cycling is not supported on narrow walking trail network noting the significant and sensitive environmental values and presence of stairs.
- WSC Parks Strategy (2016) classifies as a Bushland Reserve with Level of Service 2.
- No known official active volunteer involvement or stewardship of trails and surrounding environment.



## 06 Implementation Plan

	ACTION	TIMEFRAME	COST
B2.1	Undertake an engineering assessment to inform the upgrade/re-design of the cable along 'The Incline' on Nattai Gorge Loop.	Immediate	Low
B2.2	Replace stairs and ladders leading to Forty Foot Falls noting broken risers and antiquated design. (Note: Immediate maintenance required on broken risers in the interim).	Short	Medium
B2.3	Enhance safety for walkers through installing/replacing caution signage in line with Australian Standard 2156.1 at hazardous trail features (i.e. at lookouts/cliffs, the Incline, ladders/cliffs leading to Forty Foot Falls, creek crossings along Nattai Loop Track, intersections of Grade 5 trail). (No.~10).	Short	Low
B2.4	Replace damaged safety fencing at Nattai Gorge Lookout and at Forty Foot Falls.	Short	Low
B2.5	Repair dislodged handrail on the footbridge north-east of Angus Wilson Corner.	Short	Low
B2.6	Replace picnic table chair set (No.1) along Forty Ft Falls Track which currently has an exposed concrete base, and address surface run off issues with erosion control measures for sustainability of new picnic set.	Short	Low
B2.7	Consolidate trail network to reflect Concept Plan by ensuring that the walking track route is well defined and distinct for fire trail network (noting that some sections of walking tracks utilise where required).	Short	Low
B2.8	Prepare a concept plan/design for the Box Vale Trailhead to provide a regional-level trailhead precinct incorporating a primary trailhead sign (No.1), car parking (for approximately 20 cars), new entrance signage from Box Vale Road and Hume Hwy (No.2) picnic facilities (No.~4) and public amenities. Consider location and design to cater for future integration of recreational activities at Welby Weir.	Short	Medium
B2.9	Strategically plan for and install waymarking signage at key intersections and at intervals along trails with incorporation of colour-coded plaques/arrows corresponding with trailhead map and provision of trail network map via QR Code from local access points. (No.~30). (Waymarking posts with plaques No.~15, Replacement waymarking plaques on existing posts No.~65).	Short	Medium
B2.10	Remove obsolete signage across the reserve.	Short	Low
B2.11	Install primary trailhead sign at Box Vale Trailhead as per concept plan developed in Action B2.9.	Short	Low
B2.12	Implement concept plan/design for Box Vale Trailhead developed in Action B2.8.	Medium	High
B2.13	Install/replace interpretation signage at key trail destinations and features (i.e. Box Vale Trailhead, the boulder cutting, tunnel, box cart loading area, Nattai Gorge Lookout, Forty Ft Falls, The Incline). (No.~7).	Medium	Low
B2.14	Review the WSC Parks Strategy (2016) and reclassify Mt Alexandra Reserve to acknowledge the presence of seats and picnic settings and the requirement for public toilets at Box Vale Trailhead. Consider classifying Box Vale Trailhead separate to the broader reserve to reflect the higher service-level requirements in this section of the reserve to provide a regional-level trailhead.	Medium	Low
B2.15	Maintain/upgrade the picnic table chair sets at Angus Wilson Corner and at Nattai Gorge Lookout along Box Vale Track. (No.2).	Long	Low
B2.16	Investigate the feasibility of creating a circuit trail around the Welby Weir with consideration of vegetation impacts, traffic management along Wombeyan Caves Road and land tenure.	Long	Low
B2.17	Inspect trails in line with recommended maintenance intervals (Grade 3: 6 months or less, Grade 4: 6 - 12 months, Grade 5: 6 - 18 months), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B2.18	Actively encourage the establishment of volunteer involvement and stewardship of trails and the surrounding environment in Mt Alexandra Reserve.	Ongoing	Low





## 06 Implementation Plan

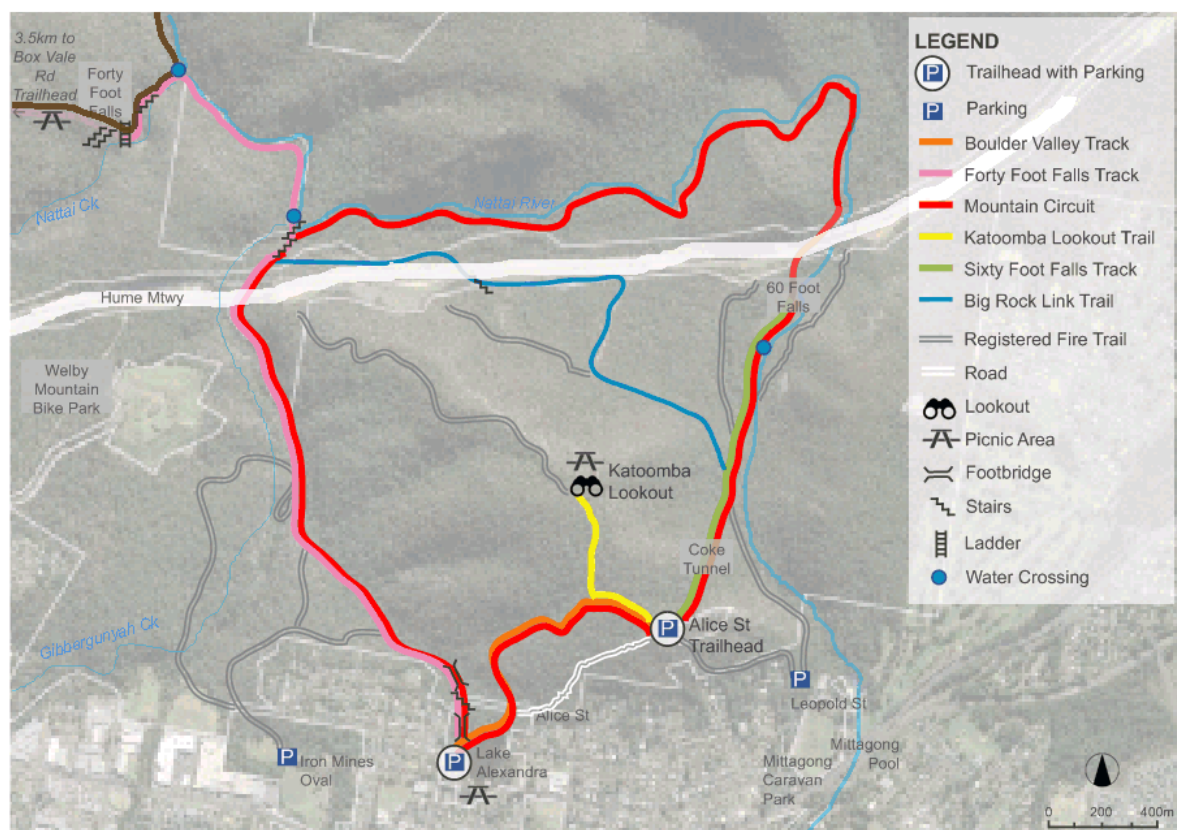
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## 06 Implementation Plan

### MT ALEXANDRA RESERVE (LAKE ALEXANDRA TRAILHEAD)



### CONCEPT PLAN



PROPOSED TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Boulder Valley Track	Walk Only	Grade 4 	1.5 hours RETURN	3km RETURN	Regional
Forty Ft Falls Track <i>Lake Alexandra to Falls</i>	Walk <i>Off-road cycling on fire trail only</i>	Grade 4 	2.5 hours RETURN	7km RETURN	Regional
Mountain Circuit	Walk <i>Off-road cycling on fire trail only</i>	Grade 5 	5 hours LOOP	10km LOOP	Regional
Katoomba Lookout Trail	Walk <i>Off-road cycling on fire trail only</i>	Grade 3 	1 hour RETURN	1.5km RETURN	Regional
Sixty Foot Falls Track	Walk <i>Off-road cycling on fire trail only</i>	Grade 4 	1.5 hours RETURN	3km RETURN	Regional
Big Rock Link Trail	Walk <i>Off-road cycling on fire trail only</i>	Grade 4 	30 mins EACH WAY	2km EACH WAY	Regional



## 06 Implementation Plan

### STRATEGY

**B3** Enhance the network of existing recreational walking tracks within Mt Alexandra Reserve accessible from the Lake Alexandra Trailhead to provide well defined and safe, yet challenging, opportunities for bushwalking as well as conservation of the environment.

### PRIORITY

High

### RATIONALE

- Highly valued and used recreational area, particularly the renowned Box Vale Track.
- Opportunity to promote as one of the key outdoor recreational destinations in the Shire.
- Opportunity to provide connectivity via existing trail alignments and trailhead signage for the The Great Burragorang Valley Walk which is a proposed regional, multi-day trail concept linking Mittagong to the Blue Mountains.
- Many requests for improved safety and wayfinding. Reports of walkers frequently getting lost.
- Original trail names are generally representative of trail experiences although promotion of trail names and routes is very inconsistent across various information sources.
- Existing walking trail network not clearly distinguished from extensive fire trail network.
- Proposed walking trail network uses existing narrow walking tracks where possible and shares some sections with fire trails.
- Primary Trailhead at Lake Alexandra is an existing high-quality community park with a wide range of support facilities such as car parking, amenities, play equipment, picnic facilities with accessibility provisions.
- Existing trailhead sign at Lake Alexandra is aged, misleading, not consistent with other trail information and does not meet Australian Standard 2156.1.
- Car parking at Alice Street Trailhead (located within reserve) requires surface improvements and installation of a trailhead sign.
- Trail network also accessible from local access points at Leopold Street and at Iron Mines Oval.
- Management/warning/caution signs are in varying condition and of varying styles which do not meet Australian Standard 2156.1. New and revised caution signs required to manage risks at hazardous trail features (i.e. water crossings, at Katoomba Lookout, cliffs at 60 Foot Falls).
- Requirement for engineering assessment of concrete balance structure for Gibbergunyah Creek crossing on Forty Foot Falls Track.
- Safety fencing at Katoomba Lookout is damaged.
- Timber stairs just north of Hume Motorway along Forty Ft Falls Track very aged/worn/damaged.
- Timber stairs north of Hume Motorway along Forty Ft Falls Track damaged/uplifted by roots of fallen tree.
- Picnic table chair sets at Katoomba Lookout in good condition.
- Various styles of waymarkers and directional signs existing across trail network in very poor condition. Colour-coded system proposed with plaques/arrows corresponding with trailhead map.
- Trail alignments difficult to follow, for example at Katoomba Lookout intersection.
- Directional signage directing to 'Mittagong Pool' is misleading.
- Trail destination/end point for 60 Foot Falls Track unclear. Destination naming recommended. Requirement to clearly outline trail and safety information prior to the Grade 5 Trail from this point.
- Requirement for removal of obsolete signage and infrastructure.
- Emergency location discs existing across reserve with GPS coordinates.
- No existing interpretation signage despite interesting landscape and historical features (e.g. Coke tunnel, Katoomba Lookout, 60 Foot Falls). Opportunity to define trail destinations using interpretation signage.
- Regular maintenance required along walking tracks in line with service intervals for trail grade/difficulty.
- Erosion control measures need to be kept maintained to preserve trail surfaces and infrastructure.
- Welby Mountain Bike Park is within Mt Alexandra Reserve. Proposal for re-purposing of Welby Tip into Mountain Bike Park (subject to suitability determined by Environmental Protection Authority (EPA)).
- Off-road cycling known to occur on fire trail network. Off-road cycling is not supported on narrow walking trail network noting the significant and sensitive environmental values and presence of stairs.
- WSC Parks Strategy (2016) classifies as a Bushland Reserve with Level of Service 2.
- No known official active volunteer involvement or stewardship of trails and surrounding environment.





## 06 Implementation Plan

	ACTION	TIMEFRAME	COST
B3.1	Undertake an engineering assessment to inform the action required for the concrete balance structure at the Gibbergunyah Creek crossing on Forty Foot Falls Track, noting the potential requirement for pedestrian boardwalk bridge.	Immediate	Medium
B3.2	Repair damage on stairs which have been uplifted by roots of fallen tree north of Hume Motorway along Forty Ft Falls Track.	Immediate	Low
B3.3	Upgrade damaged timber stairs in very poor condition just north of Hume Motorway along 40 Foot Falls Track.	Immediate	Low
B3.4	Upgrade damaged safety fencing at Katoomba Lookout.	Immediate	Low
B3.5	Enhance safety for walkers through installing/replacing caution signage in line with Australian Standard 2156.1 at hazardous trail features (i.e. at lookouts/cliffs, falls, water crossings, intersections of Grade 5 trail). (No.~10)	Short	Low
B3.6	Consolidate trail network to reflect Concept Plan by ensuring that the walking track route is well defined and distinct for fire trail network, noting that some sections of walking tracks utilise fire trails.	Short	Low
B3.7	Subject to vegetation assessment, establish a new trail alignment link at the intersection for the Katoomba Lookout Trail, Boulder Valley Track and Mountain Circuit.	Short	Low
B3.8	Replace primary trailhead sign at Lake Alexandra to include key trail information for trails within Mt Alexandra Reserve in line with Australian Standard 2156.1. (No.1). Consider options to incorporate future signage for the Great Burragorang Valley Walk.	Short	Low
B3.9	Improve car parking surface and install a trailhead sign at the Alice Street Trailhead to include key trail information in line with Australian Standard 2156.1. (No.1).	Short	Low
B3.10	Strategically plan for and install waymarking signage at key intersections and at intervals along trails with incorporation of colour-coded plaques/arrows corresponding with trailhead map and provision of trail network map via QR Code from local access points. (No.~30).	Short	Low
B3.11	Remove obsolete signage across the reserve.	Short	Low
B3.12	Install interpretation signage at key trail destinations and features (i.e. Coke Tunnel, Katoomba Lookout, 60 Foot Falls). (No.~3).	Medium	Low
B3.13	Review the <i>WSC Parks Strategy</i> (2016) and reclassify Mt Alexandra Reserve to acknowledge the presence of picnic settings.	Medium	Low
B3.14	Maintain/upgrade picnic table chair set at Katoomba Lookout. (No.2).	Long	Low
B3.15	Inspect trails in line with recommended maintenance intervals (Grade 3: 6 months or less, Grade 4: 6 - 12 months, Grade 5: 6 - 18 months), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B3.16	Actively encourage the establishment of volunteer involvement and stewardship of trails and the surrounding environment in Mt Alexandra Reserve. (Refer also B2.18).	Ongoing	Low



## 06 Implementation Plan

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## 06 Implementation Plan

### LAKE ALEXANDRA RESERVE

Lake Alexandra Reserve is a premier community park, located at the base of Alexandra Park in Mittagong. The lake was historically created as a dam supplying water for engines hauling coal to the Fitzroy iron mines. The reserve has been designed to include people who use a wheelchair, who are deaf and those who are deaf or have hearing loss. Facilities offered include barbecues, picnic settings, play equipment, amenities and a sealed path surrounding the lake with exercise equipment along the route.



### CONCEPT PLAN







## 06 Implementation Plan

### STRATEGY

**B4** Enhance Lake Alexandra Reserve to provide a high quality regional-level trailhead precinct and to continue to provide an accessible Grade 1 Walking Trail.

### PRIORITY

High

### RATIONALE

- Highly valued and used recreational area, particularly for its accessibility provisions.
- Opportunity to further promote as one of the key outdoor recreational destinations in the Shire, with provisions for people who use a wheelchair and who are blind, deaf or have hearing loss.
- Opportunity to provide key trailhead and trail destination for the The Great Burragorang Valley Walk which is a proposed regional, multi-day trail concept linking Mittagong to the Blue Mountains.
- No formal trail name, colloquially known as Lake Alexandra Circuit which is representative of trail experience.
- Existing trail is a sealed path in good condition, with high-quality support infrastructure.
- Existing interpretation signage (e.g. Fitz Roy Iron Works, Fauna of Lake Alexandra).
- No existing trailhead sign for Lake Alexandra Circuit. Installation of trailhead sign will support usage through clearly outlining the trail experience offered and managing expectations of difficulty, particularly for people with a disability.
- Regional-level trailhead sign required for walking tracks in Mt Alexandra Reserve.
- No requirement for waymarking for Lake Alexandra Circuit.
- Waymarking required within Lake Alexandra Reserve to support beginning of trails leading to Mt Alexandra Reserve.
- *WSC Parks Strategy* (2016) classifies Lake Alexandra Reserve as a Community Park with Level of Service 1.

	ACTION	TIMEFRAME	COST
B4.1	Install a trailhead sign specifically for the Grade 1 Accessible Trail at Lake Alexandra to include trail information for Lake Alexandra Circuit in line with Australian Standard 2156.1 and incorporating universal access (e.g. wheelchair-friendly positioning, braille). (No.1)	Short	Low
B4.2	Maintain interpretation signage along the Lake Alexandra Circuit.	Ongoing	Low
B4.3	Inspect trails in line with recommended maintenance intervals (Grade 1: 30 days or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B4.4	Monitor visitation to ensure adequate car parking, infrastructure (i.e. picnic, signage) and amenities are accessible to people with a disability to support the use of Mt Alexandra Circuit as a Grade 1 Accessible Trail.	Ongoing	Low

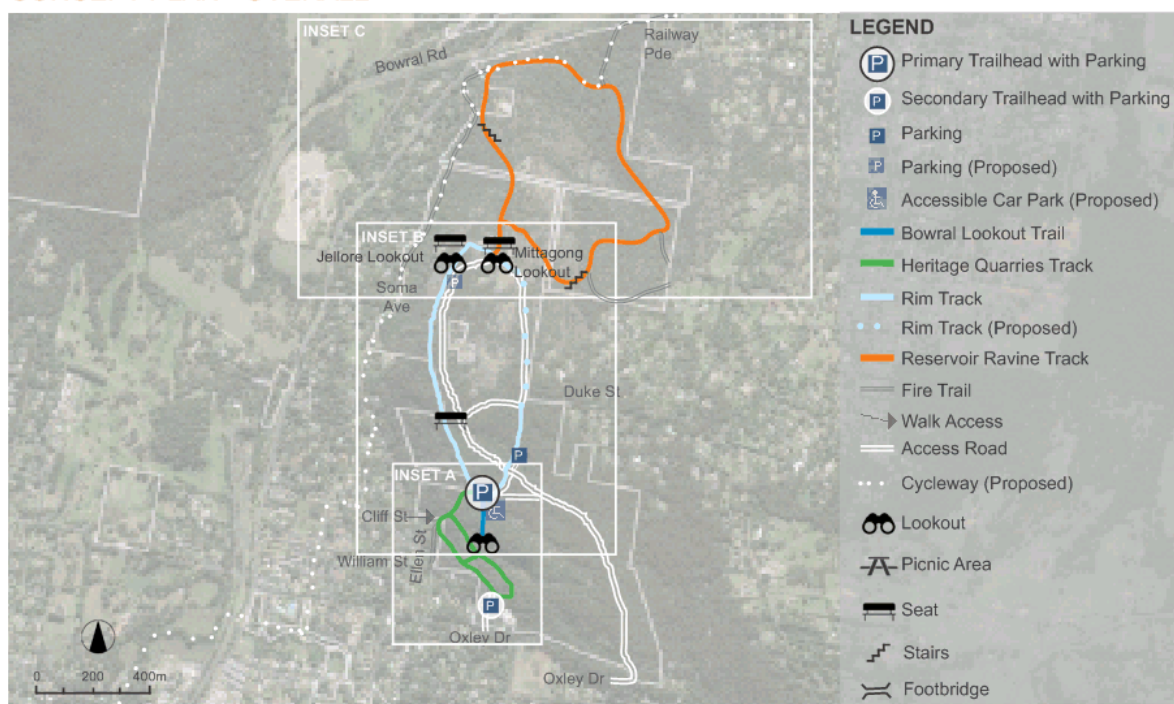
## 06 Implementation Plan



### MOUNT GIBRALTAR RESERVE

Mount Gibraltar Heritage Reserve is an iconic 130ha reserve noted for its State Heritage Significance for both its Endangered Ecological Communities and for the Heritage Quarries Complex. It is protected by the Federal Environmental Protection and Biodiversity Act (1999) for the presence of *Uplands Basalt Eucalypt Forest of the Sydney Basin Bio-region*. Mount Gibraltar is the highest point between Sydney and Canberra and is a volcanic intrusion of 863m, composed of a unique trachyte called microsyenite that was quarried for 100 years (1886-1986) and used in many heritage structures. The reserve is situated between Bowral and Mittagong and is a popular bushwalking reserve.



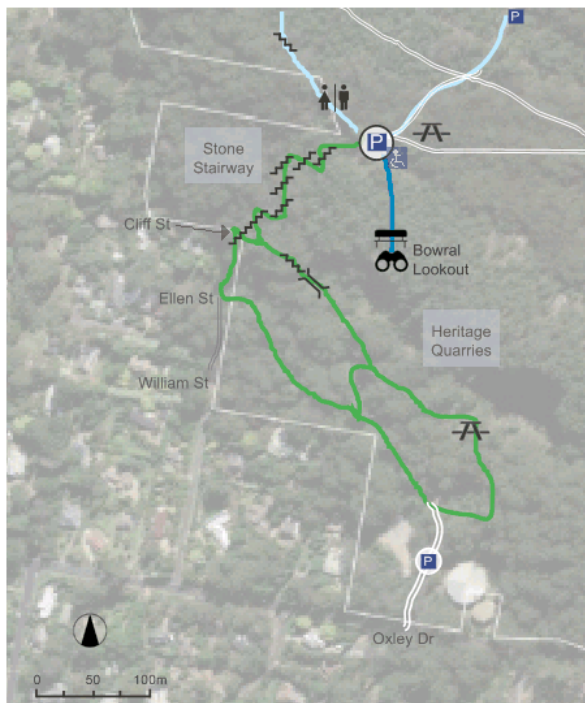
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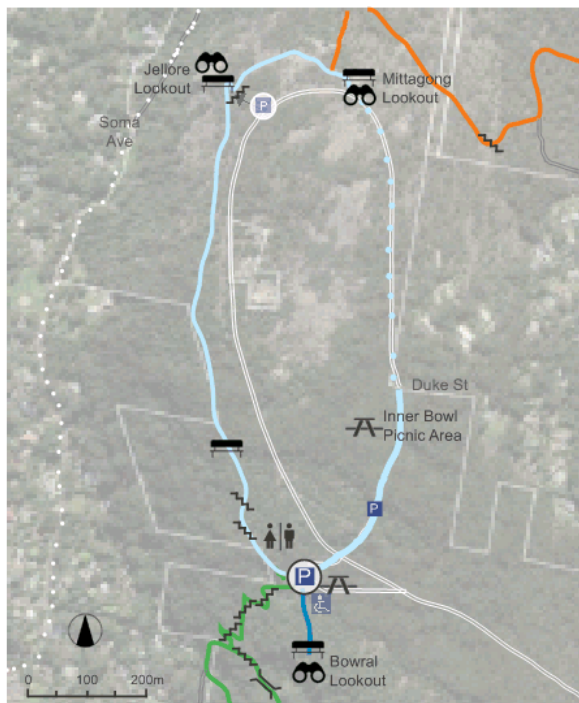
PROPOSED TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Bowral Lookout Trail	Walk Only	Grade 1 	10 min RETURN	250m RETURN	Regional
Heritage Quarries Track	Walk Only	Grade 3 	30 min LOOP	1.5km LOOP	Regional
Rim Track	Walk Only	Grade 3 	45 min LOOP	2.5km LOOP	Regional
Reservoir Ravine Track	Walk Off-road cycling on fire trail only	Grade 4 	1.5 hours LOOP	3km LOOP	Regional

## 06 Implementation Plan

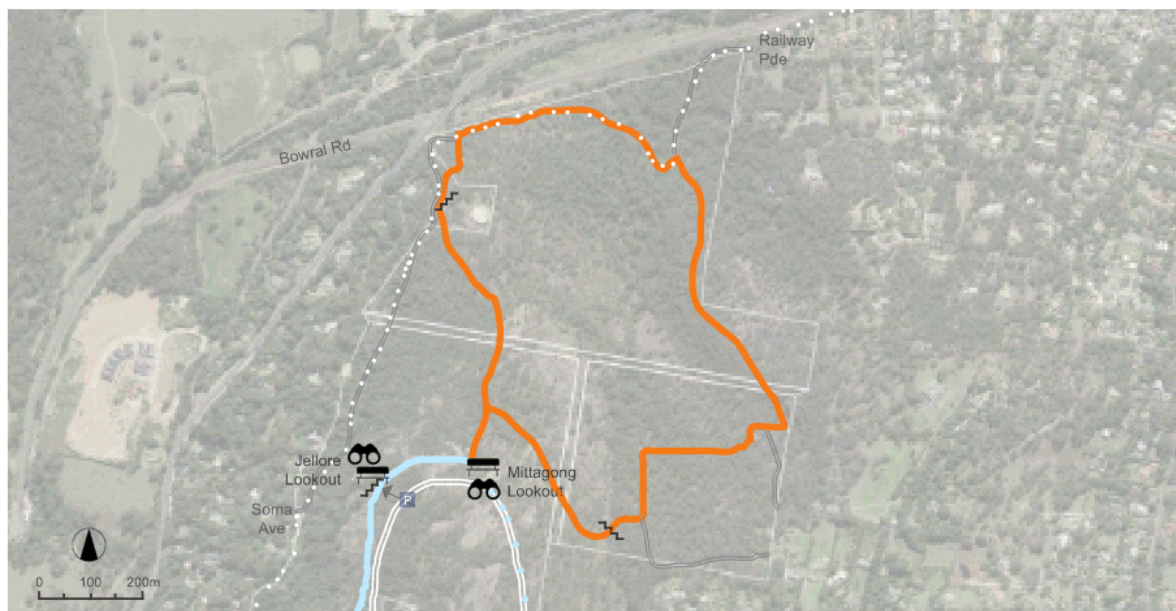
CONCEPT MAP - INSET A






















CONCEPT MAP - INSET B



CONCEPT MAP - INSET C



### LEGEND

	Primary Trailhead with Parking		Bowral Lookout Trail		Fire Trail		Lookout
	Secondary Trailhead with Parking		Heritage Quarries Track		Walk Access		Picnic Area
	Parking		Rim Track		Access Road		Seat
	Parking (Proposed)		Rim Track (Proposed)		Cycleway (Proposed)		Stairs
	Accessible Car Park (Proposed)		Reservoir Ravine Track		Footbridge		





## 06 Implementation Plan

### STRATEGY

**B5** Enhance the network of existing recreational walking tracks within Mt Gibraltar Heritage Reserve to provide for recreational use, on loop trails where possible, while prioritising conservation of the environment and heritage.

### PRIORITY

Medium

### RATIONALE

- Very high ecological and heritage significance. Requirement to manage impacts of recreation to ensure successful conservation of environmental and heritage values.
- Existing and well established network of walking trails with trail surfaces and infrastructure in varying conditions. Fire trail networks primarily at reserve boundaries and northern and southern extents.
- Existing trail names are generally representative of trail experiences.
- Opportunity to improve trail experience through providing safe loop options for Rim Track and Reservoir Ravine Track, including improving safety for walkers along Oxley Drive.
- Primary trailhead provides support infrastructure such as car parking, amenities and picnic areas. Additional accessibility provisions required to support use of Bowral Lookout Trail as a Grade 1 Accessible Trail, such as parking, picnic areas and amenities accessible to people with a disability.
- Requirement for upgrade/replacement/restoration of amenities at trailhead maintaining heritage design where possible. Constraints noted regarding existing electricity and plumbing infrastructure.
- Existing trailhead signs at primary trailhead and southern access point are relatively modern, though do not meet Australian Standard 2156.1.
- Car parking at primary trailhead and southern access point have capacity for increased usage.
- Amenities at primary trailhead are aged and known to attract anti-social behaviour. Proposed incorporation of universal design principles and principles of crime prevention through environmental design (CPTED).
- Historic amenities at Inner Bowl Picnic Area are unserviceable.
- Derelict picnic infrastructure existing along western route of Rim Track.
- Existing caution signs do not meet Australian Standard 2156.1 (e.g. Beware of cliff edges along Rim Track). Requirement for additional caution signage associated with cliff edges/fall heights at lookouts.
- Various styles of waymarkers existing across trail network in varying condition. New waymarking system is being installed and this style is generally supported (i.e. arrow plaque on posts). Colour-coded plaques/arrows corresponding with trailhead map is proposed.
- Requirement for upgrade/replacement/restoration of aged infrastructure across reserve such as seating and shelters maintaining heritage design where possible.
- Requirement for removal of obsolete signage and infrastructure.
- Existing interpretation signage at key trail features, particularly along Heritage Quarries Track, is generally in good condition. Continued implementation of interpretation signage outlined in *Mount Gibraltar Heritage Reserve Interpretation Plan* (2016) is supported to further enhance trail experience.
- Some trail sections in poor condition due to erosion impacts and minimal maintenance (especially on Reservoir Ravine Track). Erosion control (i.e. installation of water bars, swales and berms) and additional trail surface maintenance are required.
- Significant number of steps, including recently restored Heritage Stone Stairway, require regular and ongoing maintenance.
- If additional car parking capacity is required long-term, there is opportunity to optimise car parking at the primary trailhead and to reinstate closed car park near Jellore Lookout. This would provide for users of Reservoir Ravine Track and visitors driving to lookouts. It is noted that re-opening of this car park would require mitigation of antisocial behaviour such as rubbish dumping.
- Idea for future development of additional loop known as 'South Track' linking Heritage Quarry to Bowral Lookout Picnic Area incorporating a viewpoint over south-east Bowral. Feasibility to be determined.
- *WSC Parks Strategy* (2016) classifies Mt Gibraltar Reserve as a Bushland Reserve Level of Service 1.
- *WSC Bicycle Plan* (2016) proposes a cycling route along Gib West Fire Trail providing an off-road active transport route between Bowral and Mittagong - this is supported.
- Mountain bike usage (i.e. berms and jumps) evident around Gib East Fire Trail. Off-road cycling is supported only on fire trails, noting the significant and sensitive environmental values of the reserve.
- Active volunteer involvement and stewardship through Mt Gibraltar Landcare and Bushcare which was appointed to assist Council in care control and management of the reserve in 1993 and have worked on a weekly basis restoring bushland and heritage within the reserve.



## 06 Implementation Plan

	ACTION	TIMEFRAME	COST
B5.1	In consultation with Mt Gibraltar Landcare and Bushcare, confirm details for walking track improvements including trail experiences, names, and key trail features for enhancement and promotion on signage. I.e. lookouts, heritage stone staircase, heritage quarries complex, trachyte shelters, stone wall viewpoint, Inner Bowl Picnic Area.	Immediate	Low
B5.2	Enhance safety for walkers through installing caution signage in line with Australian Standard 2156.1 at cliff edges/lookouts/road (No.~8).	Short	Low
B5.3	Determine feasibility of creating a loop trail for the Rim Track, between Mittagong Lookout and the Inner Bowl Picnic Area. Key consideration regarding provision of pedestrian safety along or adjacent to Oxley Drive.	Short	Low
B5.4	Remove obsolete signage and infrastructure (i.e. derelict picnic facilities on Rim Track).	Short	High
B5.5	Consolidate trail network to reflect Concept Plan and protect environmental values by closing informal/unsustainable tracks through revegetation and brushing except where required for alternative function (e.g. fire trails, control lines).	Short	Low
B5.6	Provide additional accessible features such as parking, picnic infrastructure and amenities which are accessible to people with a disability to support the use of Bowral Lookout Trail as a Grade 1 Accessible Trail.	Short	Medium
B5.7	Enhance the section of walking track originally known as 'Ravine Track' to provide connectivity for the Reservoir Ravine Track as a loop trail. Incorporate erosion control (i.e. installation of swales & berms) to ensure sustainability and minimise maintenance requirements.	Short	Low
B5.8	Develop and implement a Waymarking Plan for the continued implementation of waymarking signage with incorporation of colour-coded plaques/arrows corresponding with trailhead map and provision of trail network map via QR Code from local access points. (No.~25).	Short	Medium
B5.9	Replace trailhead signs at primary and secondary trailheads to include key trail information in line with Australian Standard 2156.1. (No.3).	Short	Low
B5.10	Upgrade public amenities at primary trailhead with consideration of maintaining heritage style, incorporating principles of crime prevention through environmental design (CPTED) and providing accessibility for people with a disability.	Medium	High
B5.11	Upgrade picnic table and chair sets at the primary trailhead, at the Heritage Quarries Complex and at the Inner Bowl Picnic Area. (No.~7).	Medium	Low

## 06 Implementation Plan

	ACTION	TIMEFRAME	COST
B5.12	Upgrade seats within the heritage shelters along Rim Track. (No.3).	Medium	Low
B5.13	Restore heritage seat along Heritage Stone Stairway. (No.1).	Medium	Low
B5.14	Upgrade the stone block structures (disused toilets) at the Inner Bowl Picnic Ground as heritage items, in line with the <i>Mount Gibraltar Heritage Reserve Interpretation Plan</i> (2016). This may include exhibition of information relating to the reserve's history, geology and ecology.	Medium	High
B5.15	Review the <i>WSC Parks Strategy</i> (2016) and reclassify Mt Gibraltar Reserve to acknowledge the presence of and requirement for unsealed on-site car parking and seats/shelters which are not associated with picnic facilities.	Medium	Low
B5.16	Subject to increased usage of reserve and requirement for additional car parking capacity, upgrade car parking at the primary trailhead and consider reinstating closed car park near Jellore Lookout.	Long	Medium
B5.17	Improve the surface of bitumen loop road off Oxley Drive to trailhead zone.	Long	High*
B5.18	In consultation with key stakeholders, consider the of feasibility establishing a potential 'South Track' to provide a loop trail option which links the Heritage Quarry to Bowral Lookout Picnic Area, incorporating a viewpoint over south-east Bowral.	Long	Low
B5.19	Continue implementation of interpretation signage in line with <i>Mount Gibraltar Heritage Reserve Interpretation Plan</i> (2016). (No.6).	Ongoing	Low
B5.20	Communicate (via signage and reserve information) the prohibition of off-road cycling beyond fire trails (Gib West and Gib East Fire Trails) noting the significant environmental values and incompatibility with the environment.	Ongoing	Low
B5.21	Inspect trails in line with recommended maintenance intervals (Grade 1: 30 days or less, Grade 3: 6 months or less, Grade 4: 6 - 12 months), to ensure the trails are kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B5.22	Actively encourage continued volunteer involvement and stewardship of trails and the surrounding environment in Mt Gibraltar Reserve.	Ongoing	Low





## 06 Implementation Plan

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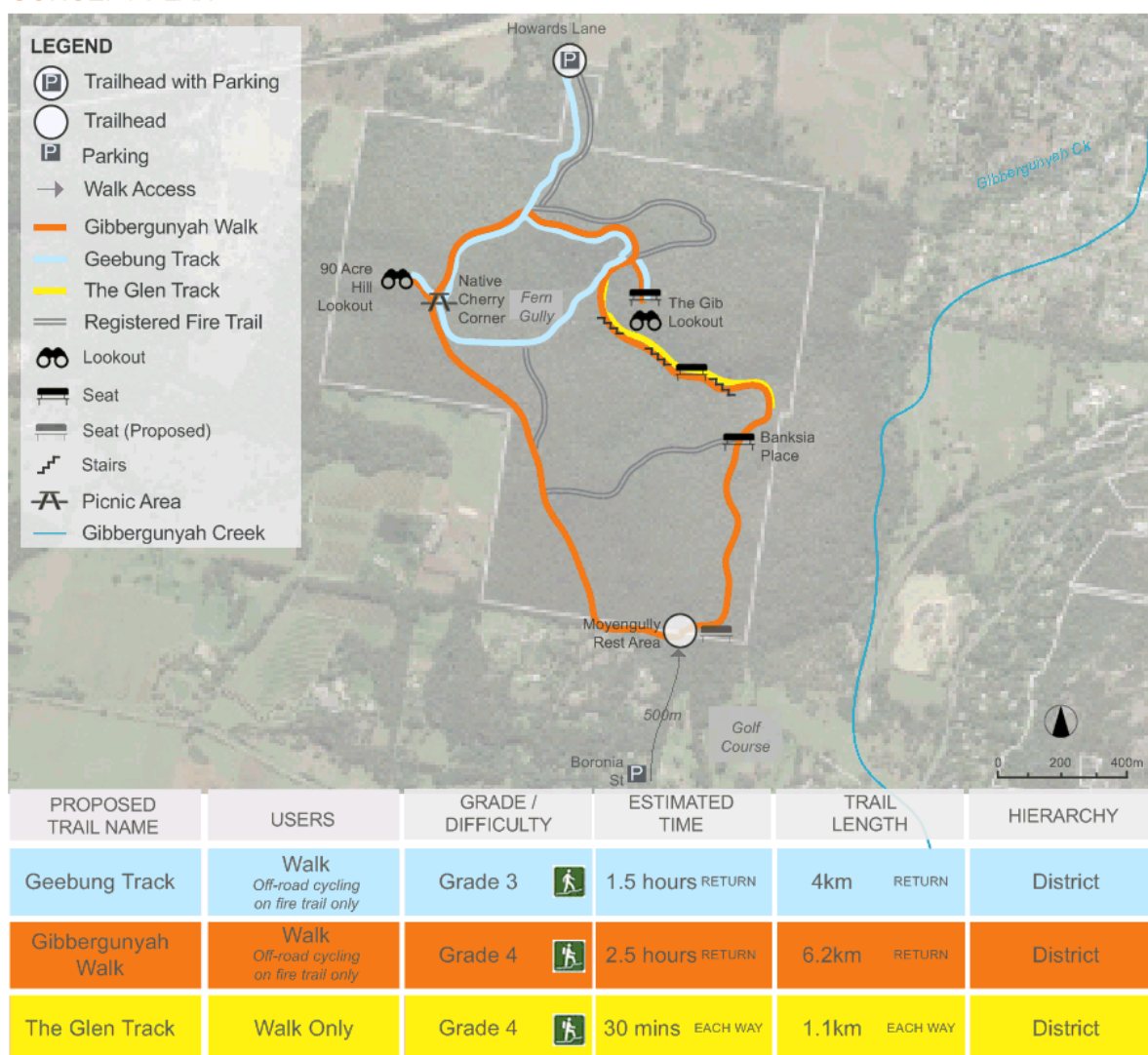
## 06 Implementation Plan

### GIBBERGUNYAH RESERVE

Gibbergunyah Reserve is a bushland reserve located between Mittagong and Bowral. The reserve covers an area of approximately 185 hectares and provides for bushwalking with two notable lookout points. The reserve takes its name from Gibbergunyah Creek which flows to the east of the reserve.



### CONCEPT PLAN



## 06 Implementation Plan

### STRATEGY

**B6** Formalise and enhance walking tracks within Gibbergunyah Reserve recreational use as well as conservation of the environment.

### PRIORITY

Medium

### RATIONALE

- Existing walking trail network, names and routes are not clearly distinguished from fire trail network.
- Distance and time are not clear for various route options shown on trailhead map.
- Northern trailhead has limited car parking capacity. Southern trailhead is located at Country Club with more car parking capacity.
- Existing trailhead signs are aged and do not meet Australian Standard 2156.1.
- Existing waymarking signage in poor condition and not effective for wayfinding.
- No existing caution signs associated with cliff edges/fall heights at lookouts.
- Existing interpretation signage in varying condition with some in good condition (i.e. plaques at 90 Acre Hill Lookout) and others in poor condition (i.e. botanical names).
- Interesting and distinct interpretation content associated with Indigenous history.
- Section of trail through fern gully on Geebung Track is proposed for decommission due to sensitive environment. This section appears not well used due to terrain and is not required as link for trail network.
- Proposed walking track network uses existing narrow walking tracks where possible and shares some sections with fire trails. Additional maintenance is required along narrow walking tracks, particularly along 'The Glen Track', access to lookouts and the access track alongside golf course.
- Infrastructure at Moyengully Rest Area (southern trailhead) is in poor condition and requires redesign/ replacement (i.e. fencing, bollards, signage). Antiquated step-over and timber bollards no longer required.
- Infrastructure in poor condition at Banksia Place (seating), Native Cherry Corner (seating and picnic facilities) and The Gib Lookout (lookout/barrier, interpretation signage and seating).
- Opportunity to enhance trail experience through more interpretation signage, particularly relating to Indigenous context.
- WSC Parks Strategy (2016) classifies as a Bushland Reserve with Level of Service 3.
- No known official active volunteer involvement in trails and surrounding environment. However, map box at northern trailhead seems to be regularly re-stocked with paper copies of reserve information and maps.



## 06 Implementation Plan

	ACTION	TIMEFRAME	COST
B6.1	Consolidate walking trail network to reflect Concept Plan by closing unsustainable tracks through fern gully on Geebung Track through revegetation and brushing.	Immediate	Low
B6.2	Install a lookout fencing/barrier at 90 Acre Hill Lookout and upgrade lookout fencing/barrier at The Gib Lookout. (No.2).	Immediate	Low
B6.3	Install caution signage at lookouts warning walkers of cliff edges/fall heights. (No.2)	Immediate	Low
B6.4	Remove redundant waymarking posts.	Immediate	Low
B6.5	Establish Moyengully Rest Area (southern trailhead) as a trail feature/destination by installing seating (No.1), interpretation signage relating to Indigenous context, timber fencing and pedestrian access gate/style, and removing existing step-over and bollards.	Short	Low
B6.6	Improve surface of the access track alongside the golf course, addressing surface erosion issues.	Short	Low
B6.7	Install waymarking signage at key intersections and at intervals along trails. (No.~30).	Short	Low
B6.8	Replace trailhead signs to include key trail information in line with Australian Standard 2156.1. (No.2), and ensure that unauthorised access (e.g. motorcycles) is effectively prevented.	Short	Low
B6.9	Upgrade seating at Banksia Place, Native Cherry Corner, Gib Lookout and Glen Track. (No.5).	Medium	Low
B6.10	Upgrade picnic table and chair set at Native Cherry Corner. (No.2).	Medium	Low
B6.11	Install interpretation signage at key trail features/locations (i.e. lookouts, rest areas, Indigenous heritage locations). (No.6).	Medium	Low
B6.12	Review the <i>WSC Parks Strategy</i> (2016) and reclassify Gibbergunyah Reserve to acknowledge the presence of and requirement for seating and picnic facilities as trail support infrastructure.	Medium	Low
B6.13	Improve surface of car parking areas at trailheads.	Long	Low*
B6.14	Continue environmental enhancements/re-vegetation.	Ongoing	Low
B6.15	Inspect trails in line with recommended maintenance intervals (Grade 3: 6 months or less, Grade 4: 6 - 12 months), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B6.16	Actively encourage the establishment of volunteer involvement and stewardship of trails and the surrounding environment in Gibbergunyah Reserve.	Ongoing	Low



## 06 Implementation Plan

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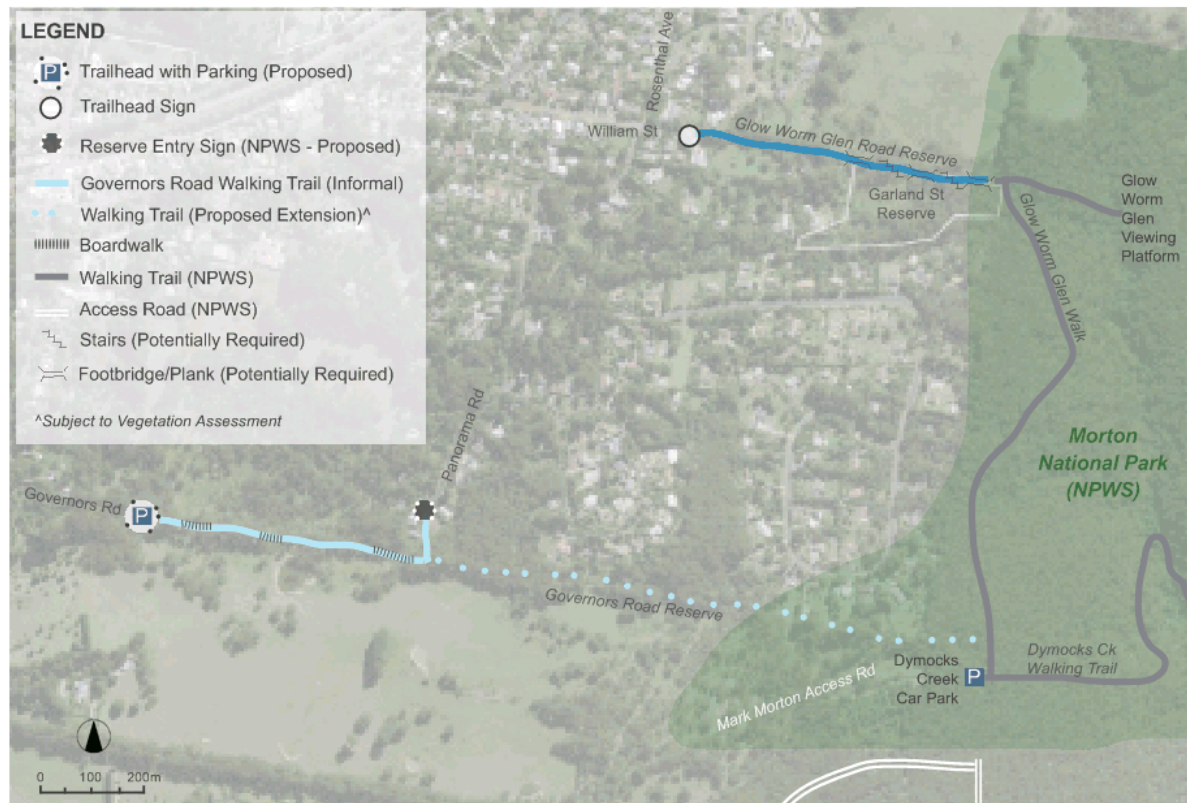
## 06 Implementation Plan

### GLOW WORM GLEN (BUNDANOON ACCESS)

Glow Worm Glen is a key trail destination within Morton National Park which is managed by the NSW National Parks and Wildlife Service (NPWS). While the National Park has trailhead facilities, the Glow Worm Glen Walk and viewing platform are most easily accessed from Council land (Glow Worm Glen Road Reserve & Garland Street Reserve) in Bundanoon. This section of Morton National Park, and the surrounding bushland and tracks, has been significantly burnt during the 2019/20 bushfires. The nearby Governors Road Boardwalk (Road Reserve) links residential areas from Governors Rd to Panorama Rd, but does not currently link to the National Park.



### CONCEPT PLAN



PROPOSED TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Glow Worm Glen - William St Access*	Walk Only	Grade 3 	N/A Access to other trails	600m EACH WAY	Regional
Governors Road Walking Trail	Walk Only	Grade 2 	15 min EACH WAY	600m EACH WAY	Local
Governors Road Walking Trail (Extension)	Walk Only	N/A	15 min EACH WAY	1km EACH WAY	Local

\* Trail not ground-truthed due to access restrictions after bushfire damage



## 06 Implementation Plan

### STRATEGY

**B7** Enhance and progressively develop trails on Council managed land at William Street and Governors Road Reserves linking with Glow Worm Glen Walk in Morton National Park.

### PRIORITY

High

### RATIONALE

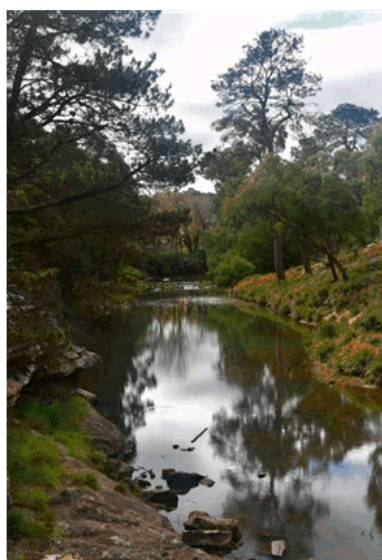
- Glow Worm Glen is a highly valued and used recreational destination.
- Significant bushfire damage to bushland, tracks and infrastructure requires works on both NPWS and WSC land to reinstate access. Bushfire relief funds (\$25,000) allocated on 31 January 2020.
- Access track from William Street is currently closed due to bushfire damage.
- Car parking at William Street is limited to on-road car parking in residential areas. Limited capacity for high volumes of usage/access from Bundanoon with current car parking/trailhead arrangement.
- Existing access track from William St is steep with steps - infrastructure currently in disrepair due to bushfire damage.
- Using a torch is recommended for night time use of Glow Worm Glen Walk.
- Dogs are not permitted within the National Park or along the access tracks.
- Existing trail along the Governors Road (Road Reserve) incorporates both natural surface and boardwalk trail surface. No trail support infrastructure or signage is provided and trail destination/s are not defined.
- There may be potential to establish a trailhead with car parking at the beginning of the Governors Road Reserve to provide a walking access track into Morton National Park. The viability of this proposal will be subject to the outcomes of a vegetation assessment along the road reserve.
- WSC *Parks Strategy* (2016) classifies Garland Street Reserve (Glowworm Glen) as a Bushland Reserve with Level of Service 3. The road reserves are not included in the *WSC Parks Strategy* (2016).
- Active volunteer involvement and stewardship through Glow Worm Glen Bush Care.

	ACTION	TIMEFRAME	COST
B7.1	Work in partnership with NPWS to develop a timeline/plan for reinstating the Glow Worm Glen Walk, with local access available from Bundanoon via an access track from William Street.	Short	Low
B7.2	Progress key stakeholder negotiations, refined costings and repairs to trail after bushfire damage to reinstate access to Glow Worm Glen via the Road Reserve from William Street. Likely to include infrastructure such as basic timber plank bridges over small gullies (No.~3) and sections of box steps (No.~2).	Short	Medium
B7.3	Undertake a vegetation assessment of the Governors Road Reserve to determine the feasibility of extending the existing trail to connect with Dymocks Creek Car Park.	Short	Low
B7.4	Install trailhead signs at William St and Governors Rd access points to include key trail information in line with Australian Standard 2156.1. (No.2). Trailhead signage to note authorised activities (walking only) and no dogs permitted.	Short	Low
B7.5	Install waymarkers along Glow Worm Glen Road Reserve and Governors Road Reserve (access to Glow Worm Glen Walk). (No.~4).	Short	Low
B7.6	Install an interpretation sign along the Glow W orm Glen Road Reserve and Governors Road Reserve. (No.~2).	Short	Low
B7.7	Subject to the outcomes of the vegetation assessment (refer Action B7.3) and consultation with stakeholders (e.g. NPWS) and the community, develop a trailhead with car parking at Governors Rd and extend the existing trail along Governors Road Reserve to connect with Glow Worm Glen Walk within Morton National Park.	Medium	High
B7.8	Inspect trails in line with recommended maintenance intervals (Grade 2: 90 days or less, Grade 3: 6 months or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B7.9	Actively encourage continued volunteer involvement and stewardship of trails and the surrounding environment along Governors and Glow Worm Glen Road Reserves, and in Garland Street Reserve.	Ongoing	Low

## 06 Implementation Plan


### STONE QUARRY WALK

Stone Quarry Walk is a bushland reserve located along the Wingecarribee River, within close walking distance from the historic town centre of Berrima. The reserve has an interesting history relating to the quarrying of sandstone, showcased as a building material in the Holy Trinity Anglican Church along the trail. The reserve has an existing walking trail through the historic quarry site.



### CONCEPT PLAN



TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Stone Quarry Walk	Walk Only	Grade 3 	30 min LOOP	650m LOOP	District

## 06 Implementation Plan

### STRATEGY

**B8** Progressively enhance Stone Quarry Walk to provide a well defined walking track offering opportunities for recreational use as well as conservation of the environment.

### PRIORITY

Medium

### RATIONALE

- Well established and defined trail name 'Stone Quarry Walk' is representative of trail experience.
- Trail alignment is generally well defined. Requirement for some waymarking/directional signage.
- Loop option (i.e. alignment along Argyle Street) is not clearly identified as part of the trail.
- Existing trailhead signage (north of church) is aged and does not meet Australian Standard 2156.1. Refers to 'The Quarry Path' as part of the 'Berrima River Walk' which is misleading.
- Car parking has capacity for increased reserve usage.
- Reserve entry signage (at access point south of church) does not represent difficulty of trail experience ahead or information regarding reserve management.
- Steep stairs have modern handrails in good condition which improves accessibility.
- Safety fencing required to improve safety at hazardous fall height at quarry (between seats).
- Opportunity to link Stone Quarry Walk to Berrima Weir Reserve via footbridge/river crossing.
- No existing interpretation signage along trail despite interesting historical features.
- Opportunity to enhance trail experience through interpretation signage relating Historical Sandstone Quarry and Holy Trinity Anglican Church.
- Opportunity to enhance trail experience through formalising loop section along Argyle Street.
- Seats in poor condition requiring replacement. (No.2).
- WSC Parks Strategy (2016) classifies Stone Quarry Walk as a Bushland Reserve with Level of Service 2.
- Active volunteer involvement and stewardship through Berrima Bush Care.

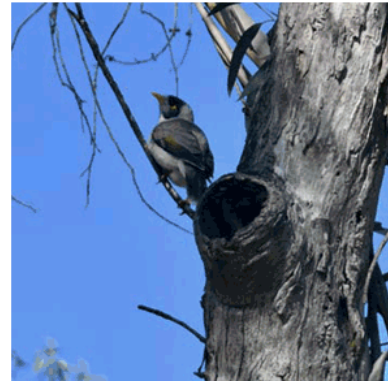
	ACTION	TIMEFRAME	COST
B8.1	Establish a management and maintenance agreement with landowners (i.e. Anglican Church Property Trust) to ensure ongoing connectivity for loop trail.	Short	Low
B8.2	Install a new primary trailhead sign to include key trail information for Stone Quarry Walk in line with Australian Standard 2156.1. Consider options to later integrate the proposed trail extension to Berrima Weir Walk. (No.1)	Short	Low
B8.3	Remove existing trailhead sign and 'Stone Quarry Walk' sign at southern access point (from Argyle Street) and replace with reserve entry sign providing key trail information via QR code.	Short	Low
B8.4	Install safety barrier at hazardous fall height at quarry (No.1) and install caution signage warning walkers of cliff edges/fall height (No.1)	Short	Low
B8.5	Install waymarking signage at key intersections. (No.~4).	Short	Low
B8.6	Replace seating in poor condition. (No.2)	Short	Low
B8.7	Upgrade trail surface where damaged from tree roots and/or erosion.	Short	Low
B8.8	Install interpretation signage at key trail features (e.g. Historic Quarry, Wingecarribee River, Holy Trinity Anglican Church). (No.~3).	Medium	Low
B8.9	Review the WSC Parks Strategy (2016) to acknowledge the presence of seating along Stone Quarry Walk and support for interpretive signs.	Medium	Low
B8.10	Improve surface of car parking at trailhead.	Long	Low*
B8.11	Continue environmental enhancements/re-vegetation.	Ongoing	Low
B8.12	Inspect trails in line with recommended maintenance interval (Grade 3: 6 months or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B8.13	Actively encourage continued volunteer involvement and stewardship of Stone Quarry Walk and the surrounding environment.	Ongoing	Low



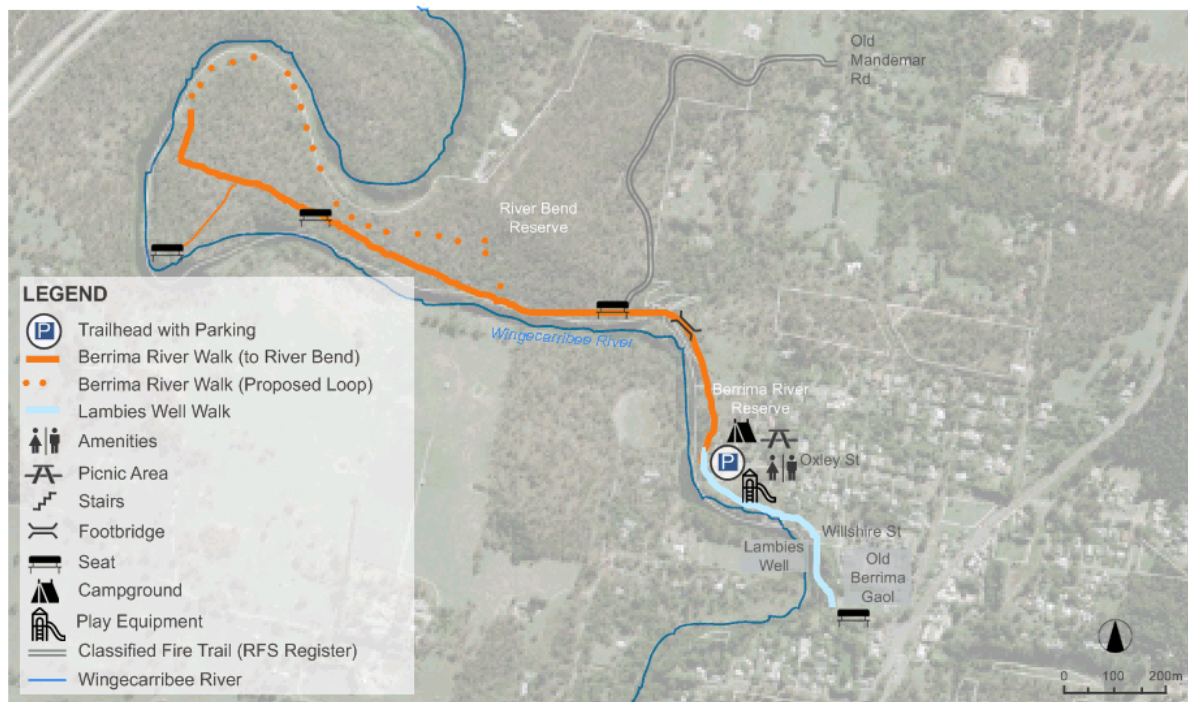
## 06 Implementation Plan


### RIVER BEND RESERVE & BERRIMA RIVER RESERVE

River Bend Reserve and Berrima River Reserve are bushland reserves located along the Wingecarribee River, within close walking distance from the historic town centre of Berrima. The reserves have an important historical context including use for recreation by German internees during WWI. The reserves provide for a range of recreational activities including bushwalking, camping, picnicking, bird watching, fishing and canoeing. Council adopted the *Plan of Management for Berrima River Reserve* in 2009. The reserves are not directly connected, with the existing walking trail situated on various land tenures.



### CONCEPT PLAN



TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Berrima River Walk	Walk Off-road cycling on fire trail only	Grade 2 	1 hour RETURN	3.6km RETURN	District
Berrima River Walk Via Proposed Loop	Walk Only	Grade 2 	1 hour RETURN	3.6km RETURN	District
Lambies Well Walk	Walk Only	Grade 2 	15 min EACH WAY	900m EACH WAY	District

## 06 Implementation Plan

### STRATEGY

**B9** Progressively enhance the Berrima River Walk and Lambies Well Walk to provide well defined walking tracks offering opportunities for recreational use, showcase of historical significance and conservation of the environment.

### PRIORITY

Medium

### RATIONALE

- Trail name varies between signs/brochures (e.g. 'River Walk'; 'WWI German Internee River Walk'; 'Berrima River Walk').
- Beginning of trail from trailhead is not clearly identified.
- Existing trailhead sign is relatively modern, though does not meet Australian Standard 2156.1.
- Car parking requires further management to prevent day users from parking in designated camp sites.
- High quality interpretation signage existing along trail.
- Existing directional/waymarking signage misleading due to location and some arrow directions.
- No reserve entry signage existing at Willshire St Access. Opportunity to provide trail information via QR code for users accessing the reserve at this entry point.
- Requirement for connectivity and consistency of trail across various land tenures.
- Opportunity to enhance trail experience through interpretation signage relating Lambies Well and improved waymarking.
- WSC Parks Strategy (2016) classifies Berrima River Reserve (Camping Grounds) as a Community Park with Level of Service 2.
- WSC Parks Strategy (2016) classifies River Bend Reserve as a Bushland Reserve Level of Service 2.
- Active volunteer involvement and stewardship through Berrima Bush Care.

	ACTION	TIMEFRAME	COST
B9.1	Establish a management and maintenance agreement with landowners (i.e. Crown Land; Department of Communities and Justice) to ensure ongoing trail connectivity.	Short	Low
B9.2	Formalise car parking arrangements for day users, separate to camp sites.	Short	Low
B9.3	Formalise the existing informal trail alignment to promote a loop for the Berrima River Walk, subject to a vegetation assessment.	Short	Low
B9.4	Replace information panel on trailhead sign to include key trail information for Berrima River Walk and Lambies Well Walk in line with Australian Standard 2156.1. (No.1)	Short	Low
B9.5	Remove existing waymarking/directional signs.	Short	Low
B9.6	Install waymarking signage at key intersections including QR Code with trail map at Willshire St access point and directional signage to historic town centre. (No.~15).	Short	Low
B9.7	Renew toilet block/amenities in Berrima River Reserve (Campground).	Short	High
B9.8	Maintain existing interpretation signage along Berrima River Walk and install new interpretation signage at Lambies Well. (No.1)	Medium	Low
B9.9	Review the WSC Parks Strategy (2016) to acknowledge presence of interpretive signs in Berrima River Reserve and picnic facilities in River Bend Reserve.	Medium	Low
B9.10	Progressively renew/replace trail support infrastructure, such as seating.	Long	Low
B9.11	Improve entrance loop road into Berrima River Reserve.	Long	Low*
B9.12	Continue environmental enhancements/re-vegetation.	Ongoing	Low
B9.13	Inspect trails in line with recommended maintenance intervals (Grade 2: 90 days or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B9.14	Actively encourage continued volunteer involvement and stewardship of trails and the surrounding environment in Berrima River Reserve and River Bend Reserve. Consider opportunities to promote Berrima trail experiences together as an integrated trail network.	Ongoing	Low



## 06 Implementation Plan



### BERRIMA WEIR RESERVE

Berrima Weir Reserve is a bushland reserve located along the Wingecarribee River, across from the historic town centre of Berrima. The reserve informally caters for a range of recreational pursuits such as bushwalking, fishing, canoeing and off-road cycling. The reserve has informal walking trails and fire trails.



### CONCEPT PLAN



PROPOSED TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Berrima Weir Walk	Walk Off-road cycling on fire trail only	Grade 2 	45 min RETURN	2.8km RETURN	District
Berrima Weir Proposed Extension	Walk Only	Grade 3 	30 min EACH WAY	2.2km EACH WAY	District



## 06 Implementation Plan

### STRATEGY

**B10** Establish a well defined recreational walking track in Berrima Weir Reserve to provide opportunities for recreational use as well as conservation of the environment.

### PRIORITY

Low

### RATIONALE

- Existing informal network of walking tracks utilising both narrow informal walking tracks and fire trails.
- Reserve used informally for bushwalking, fishing, canoeing and off-road cycling.
- Currently primary access is from entrance on Berrima Road via fire trail to river. Not suitable as trailhead due to limited opportunity for car parking and trailhead infrastructure.
- Proposed development of trailhead at Oldbury Street. Informal walking track existing to weir.
- Proposal for formalisation of walking trail route to be distinguished from fire trail network
- No existing reserve entry signage at Oldbury Street access point or via existing informal river crossing
- Proposed link to Stone Quarry Walk via and Berrima Historic Town Centre through establishment of a footbridge/formal river crossing and proposed trail extension.
- Car parking at Stone Quarry Walk has adequate capacity for increased usage.
- Proposed trail extension requires connectivity and consistency of trail across land tenures between Stone Quarry Walk and Berrima Weir Reserve.
- Caution signage required at Berrima Weir.
- Opportunity to enhance trail experience through waymarking signage at key intersections and interpretation signage relating key trail features such as Wingecarribee River and Berrima Weir.
- Opportunity to enhance trail through installation of seating and picnic facilities at key trail destinations.
- WSC Parks Strategy (2016) classifies Berrima Weir Reserve as a Bushland Reserve Level of Service 2.
- Active volunteer involvement and stewardship (i.e. Berrima Bush Care and Berrima Residents Association).

	ACTION	TIMEFRAME	COST
B10.1	In consultation with key user groups (e.g. Berrima Bush Care), determine a formal name for the identified trail experience (e.g. Berrima Weir Walk).	Short	Low
B10.2	Determine feasibility of connecting the Berrima Weir Walk with Stone Quarry Walk and the Berrima Historic Town Centre via the proposed trail extension and footbridge/river crossing addressing varied land tenure.	Short	Low
B10.3	Review current car parking and road entry arrangements at Oldbury Street and re-design to ensure optimal use of space to establish a Primary Trailhead and control of unauthorised access. Consider options to later integrate the proposed trail extension to Stone Quarry Walk into the Primary Trailhead Sign. (No. 1)	Medium	High
B10.4	Install waymarking signage at key intersections including QR Code with trail map at the Berrima Road access point. (No.~10).	Medium	Low
B10.5	Install picnic table & chair set at the Proposed Picnic Area (Trail destination). (No. 1)	Medium	Low
B10.6	Install seating at Berrima Weir and at the Proposed Picnic Area.	Medium	Low
B10.7	Review the WSC Parks Strategy (2016) to support the establishment of seating, picnic facilities and interpretive signs along Berrima Weir Walk.	Medium	Low
B10.8	Install interpretation signage at key trail features (e.g. Wingecarribee River, Berrima Weir). (No.~3).	Long	Low
B10.9	Formalise river crossing via footbridge to connect Berrima Weir Walk with Stone Quarry Walk and Berrima Historic Town Centre via the proposed trail extension (subject to outcomes of Action B10.2).	Long	Medium
B10.10	Continue environmental enhancements/re-vegetation.	Ongoing	Low
B10.11	Inspect trails in line with recommended maintenance intervals (Grade 2: 90 days or less, Grade 3: 6 months or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B10.12	Actively encourage continued volunteer involvement and stewardship of trails and the surrounding environment in Berrima Weir Reserve.	Ongoing	Low

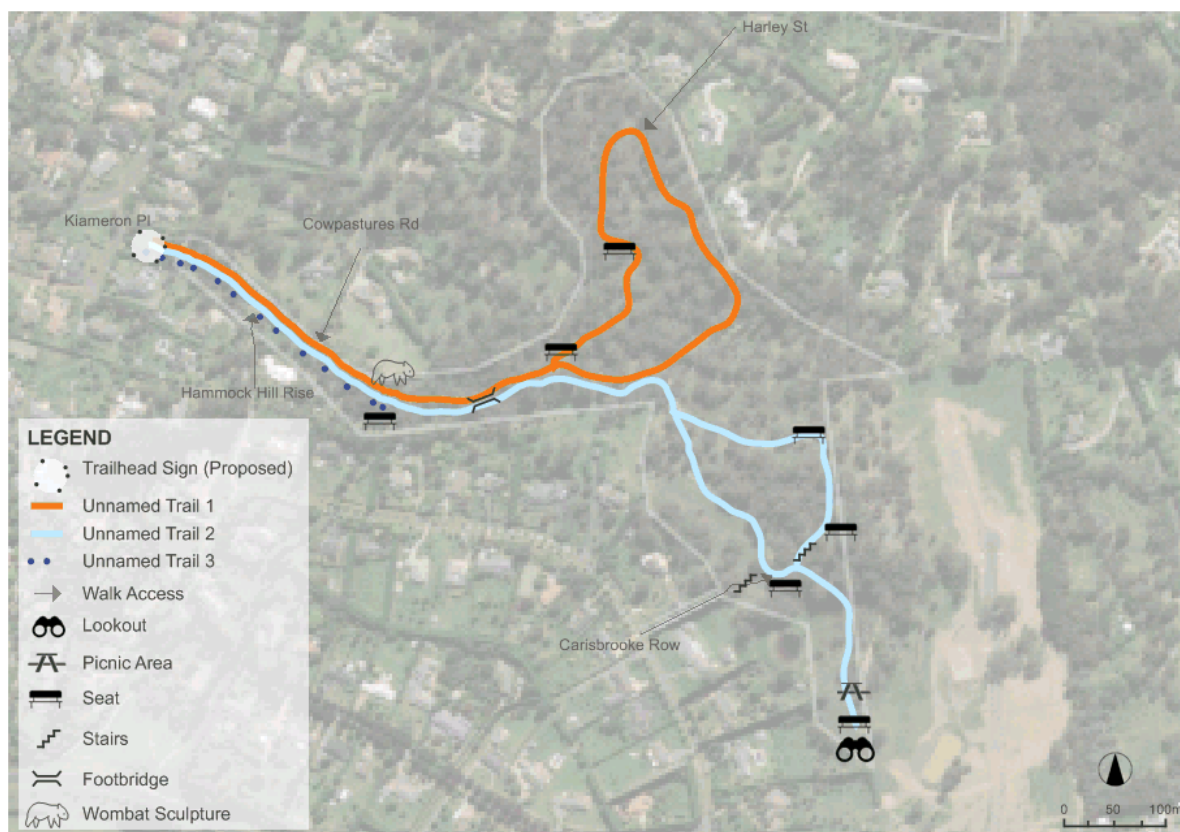
## 06 Implementation Plan

### HAMMOCK HILL RESERVE

Hammock Hill Reserve is a bushland reserve located in East Bowral. The reserve covers an area of approximately 12.0 hectares and plays a significant role in the conservation and protection of the Southern Highlands Shale Woodland Endangered Ecological Community. The reserve contributes substantially to the beauty, character and charm of the local area, and reflects the tranquil surroundings of the region. The reserve provides opportunities for enjoyment of walking and picnicking in a natural setting. The *Hammock Hill Reserve Plan of Management* was adopted by Council in 2009.



### CONCEPT PLAN



TRAIL IDENTIFIER	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Unnamed Trail 1	Walk & Cycle	Grade 2 	30 min RETURN	1.8km RETURN	Local
Unnamed Trail 2	Walk Only	Grade 3 	40 min RETURN	2.5km RETURN	Local
Unnamed Trail 3 Proposed	Walk Only	Grade 1 	10 min RETURN	550m RETURN	Local

## 06 Implementation Plan

### STRATEGY

**B11** Progressively enhance Hammock Hill Reserve to provide formalised walking tracks offering opportunities for recreational use as well as conservation of the environment.

### PRIORITY

Low

### RATIONALE

- No formal trail name/s, though informally referred to as 'Wombat Trail'. It is noted that a formalised trail known as 'Wombat Track' exists in nearby Mansfield Reserve.
- Limited capacity for high volumes of reserve usage. Car parking constrained by residential surrounds.
- No existing trailhead signage. Waymarking signage is unserviceable contributing to deviation from trail.
- Opportunity to enhance trail experience through interpretation signage and enhancement of key trail features such as the wombat sculpture, fairy garden and lookout.
- Opportunity to promote accessibility through formalisation of a Grade 1 Accessible Trail.
- *WSC Bicycle Plan* (2016) identifies existing bicycle route connecting Kiameron Place and Harley St. Concern for suitability of the identified bicycle route extension south to the lookout.
- Evidence of unauthorised mountain bike usage with berms and jumps in eastern section of reserve.
- *WSC Parks Strategy* (2016) classifies as a Bushland Reserve with Level of Service 2.
- Active volunteer involvement and stewardship through Hammock Hill Bush Care.

	ACTION	TIMEFRAME	COST
B11.1	In consultation with Hammock Hill Reserve Bush Care, determine a formal name for each of the two identified trail experiences.	Short	Low
B11.2	Consolidate trail network to reflect Concept Plan (i.e. decommission tracks not in concept except where required for alternative function) and improve surface of formal trail network.	Short	Low
B11.3	Formalise Unnamed Trail 3 as a Grade 1 Accessible Trail to meet the requirements of Australian Standard 1428 Suite (Design for access and mobility), ensuring continuous accessible paths of travel.	Short	Low
B11.4	Install trailhead signage to include key trail information in line with Australian Standard 2156.1. (No.1).	Short	Low
B11.5	Remove redundant waymarking posts.	Short	Low
B11.6	Install waymarking signage at key intersections and at regular intervals along the route, ensuring that the trail network map is available via QR Code from all access points. (No.~12).	Short	Low
B11.7	Enhance key trail features such as wombat sculpture and garden.	Short	Low
B11.8	Replace damaged seating (near lookout & Carisbrooke Row). (No.2).	Short	Low
B11.9	Install bollard at Cowpastures Road access point to prohibit unauthorised vehicle access. (No.1).	Short	Low
B11.10	Install interpretation signage at key trail features/locations (i.e. lookout, wombat sculpture, environmentally sensitive areas). (No.3).	Medium	Low
B11.11	Review the <i>WSC Bicycle Plan</i> (2016) and reconsider the need of/benefit for a bicycle route to the lookout.	Medium	Low
B11.12	Review the <i>WSC Parks Strategy</i> (2016) and reclassify Hammock Hill Reserve to acknowledge the presence of and requirement for seating, picnic shelter and public art as trail support infrastructure.	Medium	Low
B11.13	Renew picnic table and chair shelter set near lookout to improve this area as key trail destination. (No.1).	Long	Low
B11.14	Continue environmental enhancements/re-vegetation.	Ongoing	Low
B11.15	Inspect trails in line with recommended maintenance intervals (Grade 2: 90 days or less, Grade 3: 6 months or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B11.16	Actively encourage continued volunteer involvement and stewardship of trails and the surrounding environment at Hammock Hill Reserve.	Ongoing	Low



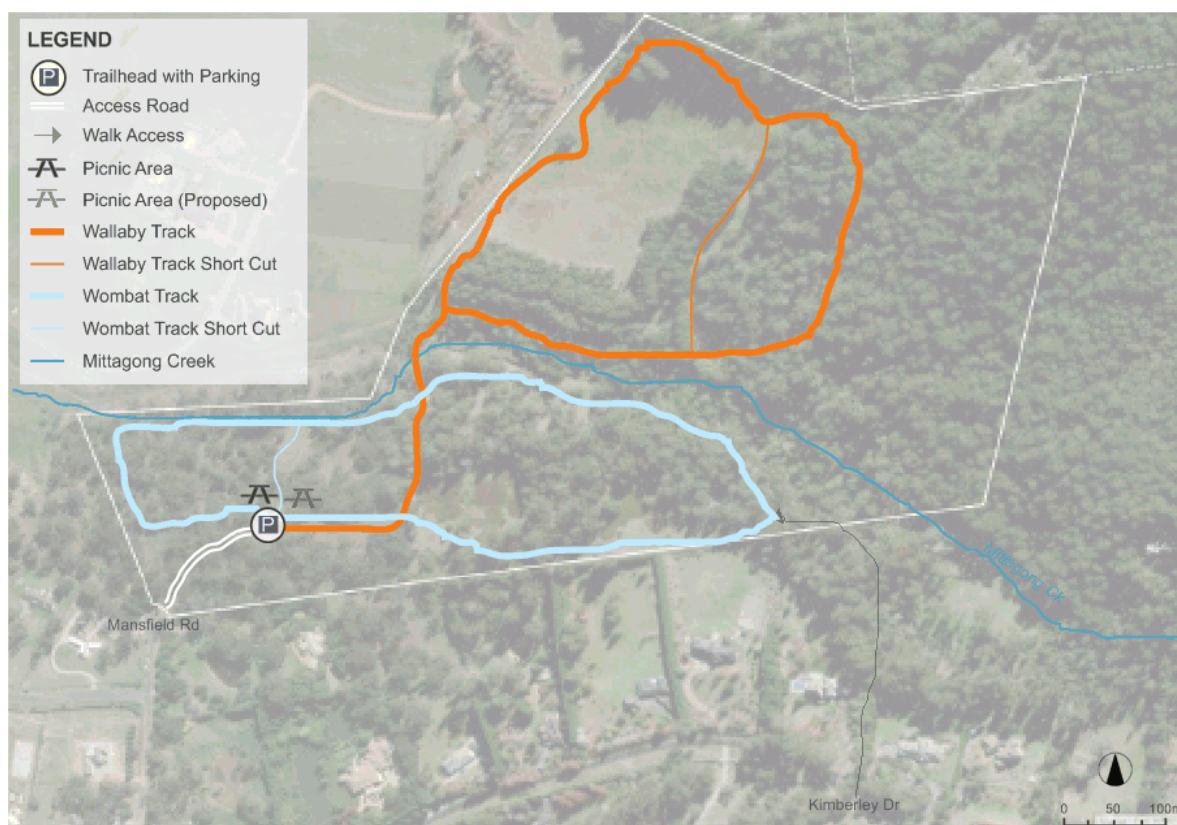
## 06 Implementation Plan

### MANSFIELD RESERVE

Mansfield Reserve is a bushland reserve located in East Bowral. The reserve covers an area of approximately 34.4 hectares and is a significant area of the Southern Highlands Shale Woodland. The reserve has high conservation value including samples of native vegetation types that are classified as endangered and species that are nationally endangered as a result of habitat loss. The reserve provides opportunities for enjoyment of recreational walking and picnicking in a natural setting. The *Mansfield Reserve Plan of Management* was adopted by Council in 2009.



### CONCEPT PLAN



PROPOSED TRAIL NAME	USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Wallaby Track	Walk Only	Grade 2 	30 min LOOP	2km LOOP	Local
Wombat Track	Walk Only	Grade 2 	20 min LOOP	1.5km LOOP	Local

## 06 Implementation Plan

### STRATEGY

**B12** Progressively enhance Mansfield Reserve to provide formalised walking tracks offering opportunities for recreational use as well as conservation of the environment.

### PRIORITY

Low

### RATIONALE

- Existing trail names (Wallaby Track & Wombat Track) are representative of trail experience. Noted that a trail known colloquially as Wombat Trail exists in nearby Hammock Hill Reserve.
- Existing alignment for Wallaby Track does not begin at trailhead. Alignment of Wombat Track unnecessarily incorporates entrance road. Concept Plan proposed both trails beginning from trailhead.
- Distance and time are not clear for the various route options shown on trailhead map.
- Car parking has adequate capacity for increased reserve usage.
- Existing trailhead signage is relatively modern, though does not meet Australian Standard 2156.1.
- Waymarking signage is in poor condition and not effective for providing direction. Colour arrows do not match trailhead map.
- Kimberley Drive access point does not currently have bollards to prevent unauthorised vehicle access.
- Existing reserve entry signage at Kimberley Drive does not provide trail information such as grade. Opportunity to provide trail information via QR code for users accessing the reserve at this entry point.
- Opportunity to enhance trail experience through interpretation signage relating to the environmentally sensitive area, koalas, wombats, reserve history and landscape features.
- Opportunity to enhance trail experience through provision of additional capacity for picnicking at trailhead.
- WSC Parks Strategy* (2016) classifies as a Bushland Reserve with Level of Service 2.
- Active volunteer involvement and stewardship through Mansfield Reserve Bush Care.

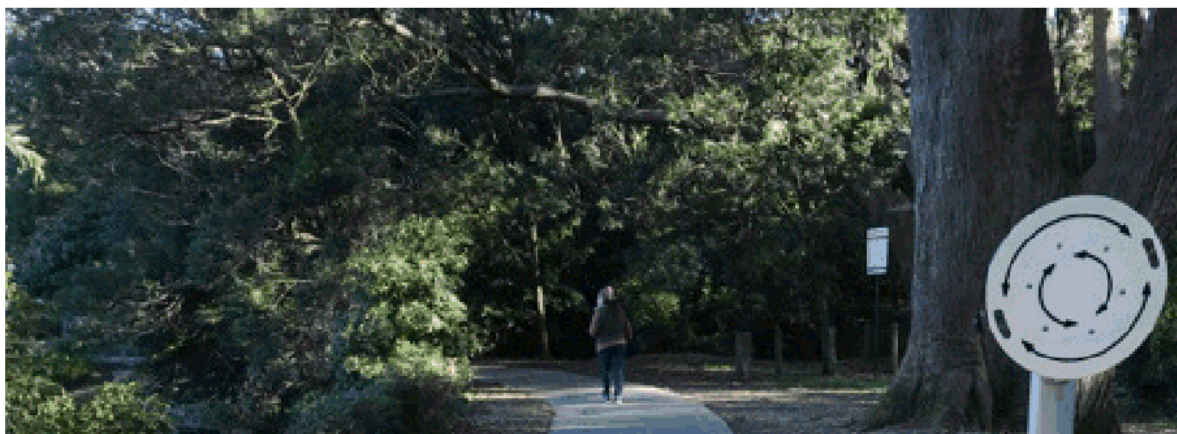
ACTION		TIMEFRAME	COST
B12.1	Continue to work with key stakeholders to consolidate trail network to reflect Concept Plan (i.e. decommission tracks not in concept except where required for alternative function).	Short	Low
B12.2	Replace information panel on trailhead sign to include key trail information in line with Australian Standard 2156.1.	Short	Low
B12.3	Remove redundant waymarking posts.	Short	Low
B12.4	Install waymarking signage at key intersections and at regular intervals along the route, ensuring that the trail network map is available via QR Code from the Kimberley Drive access point. (No.~15).	Short	Low
B12.5	Provide additional picnic table and chair set within Trailhead Zone.	Short	Low
B12.6	Install bollards at Kimberley Drive access point to prohibit unauthorised vehicle access. (No.1)	Short	Low
B12.7	Install interpretation signage at key trail features/location s (i.e. koala/wombat habitat, environmentally sensitive areas, landscape features). (No.3)	Medium	Low
B12.8	Review the <i>WSC Parks Strategy</i> (2016) and reclassify Mansfield Reserve to acknowledge the presence of and requirement for picnic facilities as trail support infrastructure.	Medium	Low
B12.9	Improve the surface of the entrance road and the car park.	Long	Low*
B12.10	Continue environmental enhancements/re-vegetation.	Ongoing	Low
B12.11	Inspect trails in line with recommended maintenance intervals (Grade 2: 90 days or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B12.12	Actively encourage continued volunteer involvement and stewardship of trails and the surrounding environment in Mansfield Reserve.	Ongoing	Low



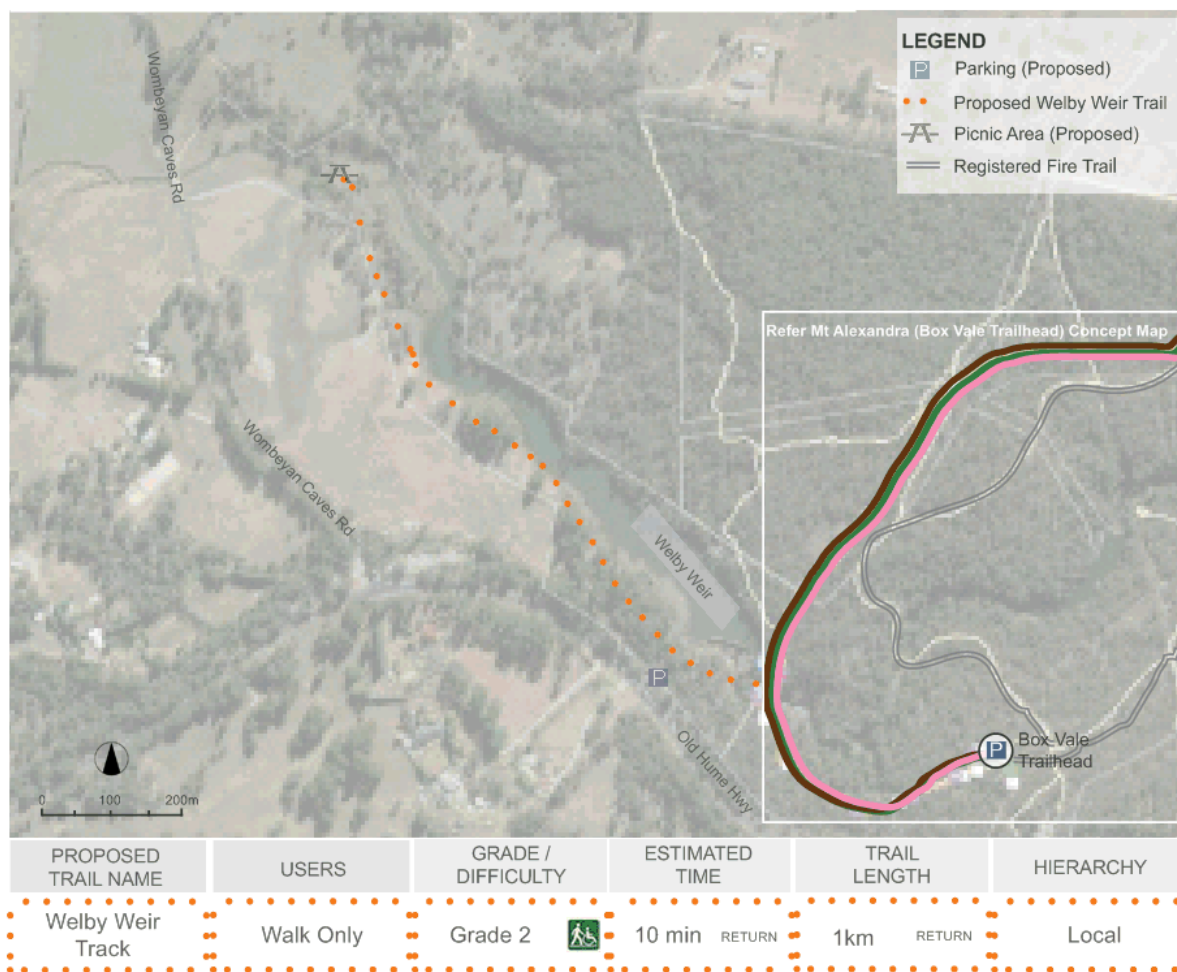
## 06 Implementation Plan

### WELBY WEIR

Welby Weir is an undeveloped bushland reserve located along the Old Hume Highway adjacent to Mt Alexandra Reserve with the weir of the Nattai Creek. The reserve is used for recreational fishing. Walking trails which begin at Box Vale Trailhead pass through the eastern extent of the reserve. The reserve offers opportunity for environmentally-sensitive development, such as a walking track and picnic area, which is likely to require a formalised car parking arrangement accessible from the Old Hume Highway.



### CONCEPT PLAN





## 06 Implementation Plan

### STRATEGY

**B13** Develop Welby Weir Reserve for provision of a formalised walking track along Nattai Creek offering opportunities for recreational use as well as conservation of the environment.

### PRIORITY

Low

### RATIONALE

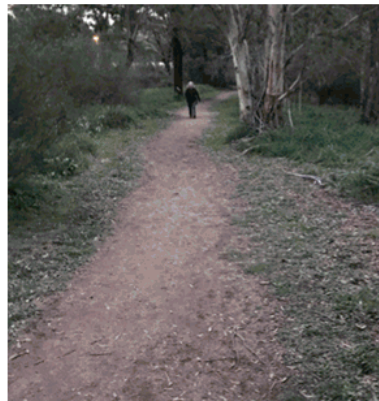
- Welby Weir currently utilised informally for recreational pursuits, primarily trout fishing.
- Future opportunity to develop as a recreational destination incorporating a formalised walking track with a designated parking area off Old Hume Highway.
- Opportunity to link with proposed development of Box Vale Trailhead.
- Ongoing requirement to prevent unauthorised vehicle access.
- Bushland restoration occurring as part of the *Nattai Creek-Box Vale Track Restoration Project*.

ACTION		TIMEFRAME	COST
B13.1	Prepare a Concept Plan for the development of Welby Weir as a recreational destination incorporating designated car parking and provisions for picnicking and a walking trail which connects to the walking trail network in Mt Alexandra Reserve.	Short	Medium
B13.2	Implement the Concept Plan for Welby Weir developed in Action B13.1.	Medium	High
B13.3	Continue environmental enhancements/re-vegetation.	Ongoing	Low
B13.4	Actively encourage continued volunteer involvement and stewardship of bushland and trails surrounding Welby Weir.	Ongoing	Low

## 06 Implementation Plan

### BONG BONG COMMON (LINK TO CECIL HOSKINS NATURE RESERVE)

Bong Bong Common is a large linear open space with a sealed shared-use path along the Wingecarribee River between the towns of Moss Vale and Burradoo. The south eastern extent of the reserve provides connectivity to Cecil Hoskins Nature Reserve via an established decomposed granite path. Cecil Hoskins Nature Reserve is a wetland area managed by NSW National Parks and Wildlife Service (NPWS) providing opportunities for walking, picnicking and birdwatching. The *Bong Bong Common Masterplan* (2019) illustrates the plan for this reserve incorporating signage and infrastructure to improve this link between the reserves.



### CONCEPT PLAN



PROPOSED TRAIL NAME	PROMOTED USERS	GRADE / DIFFICULTY	ESTIMATED TIME	TRAIL LENGTH	HIERARCHY
Cecil Hoskins Link Track	Walk Only	Grade 2 	N/A Access to other trail/s	170m EACH WAY	District



## 06 Implementation Plan

### STRATEGY

**B14** Enhance connectivity for walkers between Bong Bong Common and Cecil Hoskins Nature Reserve.

### PRIORITY

Low

### RATIONALE

- The Council-adopted *Bong Bong Common Masterplan* (2019) illustrates the plan for this reserve which incorporates signage and infrastructure to improve this link between the reserves.
- Bong Bong Common and Cecil Hoskins Nature Reserve are highly valued and used recreational destinations within sensitive natural environments.
- Shared-use path network which traverses through Bong Bong Common and along Argyle Street provides connectivity for active transport. Cycleway does not extend into this section of the reserve. Bikes are prohibited in Cecil Hoskins Nature Reserve.
- Existing decomposed granite trail surface between reserves is in good condition.
- Existing interpretation signage along the trail is in good condition and enhances the trail experience.
- Opportunity to enhance the trail experience and connectivity between the reserves by installing trailhead signage with directional totem at the Argyle Road access point, in line with the *Bong Bong Common Masterplan* (2019).
- Car parking at Argyle Street adequate for high volumes of reserve usage.
- *WSC Parks Strategy* (2016) classifies Bong Bong Common as a Linear Park with Level of Service 2.
- Active volunteer involvement and stewardship at Bong Bong Common through WSC Rivercare Group.

	ACTION	TIMEFRAME	COST
B14.1	Install a trailhead sign to include key trail information for Bong Bong Common and Cecil Hoskins Nature Reserve in line with Australian Standard 2156.1. Consider options to later integrate the new trail developments proposed in the <i>Bong Bong Common Masterplan</i> (2019).	Short	Low
B14.2	In line with the <i>Bong Bong Common Master Plan</i> (2019) install a seat at the 'key vista' overlooking the Wingecaribbee River along the link track.	Medium	Low
B14.3	In line with the <i>Bong Bong Common Master Plan</i> (2019) install wayfinding signage (No.~2) which incorporates the link track to Cecil Hoskins Nature Reserve.	Medium	Low
B14.4	Maintain existing interpretation signage along the trail and replace when at the end of useful life.	Long	Low
B14.5	Inspect trail in line with recommended maintenance intervals (Grade 2: 90 days or less), to ensure surface is kept in line with requirement for grade of trail and management of risk.	Ongoing	Low
B14.6	Actively encourage continued volunteer involvement and stewardship of trails and the surrounding environment in Bong Bong Common.	Ongoing	Low
B14.7	Maintain a working relationship with NPWS to ensure alignment of plans for enhancing connectivity between Bong Bong Common and Cecil Hoskins Nature Reserve.	Ongoing	Low



## 06 Implementation Plan

### STRATEGIC OUTCOME C: INFORMATION, PROMOTION AND MARKETING

#### STRATEGY

**C1** Provide consistent and reliable signage, maps and supporting information for walking tracks.

#### PRIORITY

High

#### RATIONALE

Trail signage has been identified as a key issue on the existing walking tracks through community consultation and on-ground site visits. Installing effective trail signage is a key component to upgrading each of the walking tracks to enhance trails for both enjoyment and safety. Australian Standard AS2156.1 *Walking Tracks Classification and Signage* outlines the requirements for trail signage. Signage on the walking tracks generally does not meet this standard and requires upgrade. Templates for trail signage have been provided as part of this Strategy (refer Appendix) and it is intended that this will be used to clearly define the walking trail experiences. It is important that trails have effective signage which aligns with the requirements for their level of difficulty/classification.

The website [www.visitsouthernhighlands.com.au](http://www.visitsouthernhighlands.com.au) provides information about opportunities to walk in the Shire and it is important that this is continually updated, particularly to align with the outcomes of this Strategy. The limited existing information relating to walking tracks across the region is generally inconsistent, outdated and unreliable. A range of books have been published which contain historic information relating to original walking tracks, particularly for tracks within Mount Alexandra Reserve. Information relating to walking tracks in the Wingecarribee Shire is also available on a range of third-party online sources.

As part of the development of this Strategy, existing trails were audited, including ground-truthed mapping layers of trail alignments. This information can now be used to develop reliable trail maps and supporting information which can be in printed form, online content and integrated into interactive online applications.

It is important that trail maps and information are presented in a range of formats including online, via web apps and as printed information for distribution at the Southern Highlands Welcome Centre. It is also important that out-dated trail information is removed from circulation, noting that some sources could be placed in historical archives noting the strong community initiative in early trail developments.

Action		Timeframe	Cost
C1.1	Develop a series of trail user maps/brochures that are consistent in terms of design and levels of information provided – available as printed copies at the Southern Highlands Welcome Centre and online for download.	Short	Low
C1.2	Review and expand on the webpage hosted at <a href="http://www.visitsouthernhighlands.com.au">www.visitsouthernhighlands.com.au</a> to ensure that all trails are promoted with clear distinction of their alignment and trail grade/difficulty (Grade 1 - 5 rating) in line AS2156.1.	Short	Low
C1.3	Distribute endorsed trail network concept maps to known publishers of trail related information across the Southern Highlands to encourage consistency of information.	Short	Low
C1.4	Investigate options for the provision and maintenance of interactive trail mapping via a mobile app. Consider options for in-house app development using ground-truthed trail data, as well as use of third party apps (e.g. Avenzamaps, Gaia GPS).	Short	Low
C1.5	Promote the 'Three Peaks Trail' (refer Action B1.6) as a key integrated walking track opportunity which identifies key iconic lookouts surrounding Mittagong.	Medium	Low
C1.6	Develop a coordinated approach to marketing of recreational walking tracks (as well as other recreational trails) and integrate this approach into tourism strategic planning. Consider opportunities to 'package' nature-based experiences together.	Medium	Low
C1.7	Expand on the number of walks currently promoted as the '5 Best Walks of the Southern Highlands' to include a broader selection including a variety of grades/difficulty levels. Promote this as a 'booklet' with a map of each trail - available as printed copies at the Southern Highlands Welcome Centre and available online for download.	Medium	Low
C1.8	Install/upgrade trailhead, wayfinding/directional, management/warning and interpretation signage using the templates provided (Appendix 1) to align with requirements specified in AS2156.1 <i>Walking Tracks Classification and Signage</i> . Remove obsolete signage and infrastructure where required. (Refer also actions contained within Strategic Outcome B).	Ongoing	High
C1.9	Ensure that sufficient resources are budgeted for periodic reviews and updates of trail maps and information including on-ground signage, online and printed resources.	Ongoing	Low

## 06 Implementation Plan

### STRATEGIC OUTCOME D: MANAGEMENT & MAINTENANCE

#### STRATEGY

**D1** Clearly define management structures and maintenance schedules for walking tracks.

#### RATIONALE

To ensure that all walking tracks are managed appropriately, management responsibilities must be clearly identified, alongside the development of maintenance schedules. Where trails cross multiple land tenures it is essential that trail management and maintenance responsibilities are assigned to a designated body, which may be Council or an established community group with the necessary resources and expertise.

Australian Standard *AS2156.1 Walking Tracks Classification and Signage* outlines guidance for managers relating to each grade of walking track classification, such as recommended inspection intervals for each grade of walking track. The relevant inspection interval for each trail is specified within the actions in Strategic Outcome B.

Risks associated with walking tracks can also be managed through planning and mitigation measures such as periodic inspection and maintenance intervals, restricting access to reserves on high risk days (e.g. days at risk of bushfire or flood events) and through clear communication of risks associated with the walking trails experience on offer.

#### PRIORITY

High

	Action	Timeframe	Cost
D1.1	Establish a Recreational Trails Working Group to manage the implementation of the Recreational Walking Tracks Strategy. Refer also Action A1.1.	Short	Low
D1.2	Formalise a system for the closure of reserves to public/unauthorised access on days of "high" risk (e.g. days at risk of bushfire or flood events) and the process for the communication of this to the community.	Short	Low
D1.3	Develop a management and maintenance manual as a guide for all trail managers, community and volunteer groups.	Short	Low
D1.4	Update existing and develop new Plans of Management for all bushland reserves, integrating trail management, maintenance requirements and management of risk to reserve users.	Short	Medium
D1.5	With the development of a Plan of Management incorporating Mt Alexandra Reserve, consider re-naming as 'Greater Mt Alexandra Reserve' to reflect the inclusion of the extensive bushland areas incorporating trails accessible from both Box Vale Trailhead and Lake Alexandra Trailhead, as well as the bushland beyond linking to Colo Vale.	Short	Low
D1.6	Ensure that sufficient resources are budgeted for periodic trail inspections and maintenance on trail surfaces, infrastructure and signage, in line with maintenance intervals outlined in <i>Australian Standard AS2156.1 Walking Tracks Classification and Signage</i> . (Refer Appendix 2).	Ongoing	Low
D1.7	Integrate post-bushfire and flood inspections into Council's works program.	Ongoing	Low

## 06 Implementation Plan

### STRATEGIC OUTCOME E: COMMUNITY, TOURISM & ECONOMIC DEVELOPMENT

#### STRATEGY

**E1** Use trail development and provision as a tool for economic and community development.

#### PRIORITY

High

#### RATIONALE

Sustainable and accessible walking tracks are able to bring significant benefits to the region, particularly from health, economic and tourism perspectives.

The Southern Highlands has a wide variety of walking tracks which suit a range of abilities and fitness levels. For example, from the Grade 1 Bowral Lookout Trail (Mt Gibraltar Reserve) and Lake Alexandra Circuit, to the challenging and iconic Grade 5 walks in Mt Alexandra Reserve (Nattai Loop Track and Mountain Circuit). This variety of trails provides experiences for a wide range of people, encouraging active and healthy lifestyles and recreational pursuits.

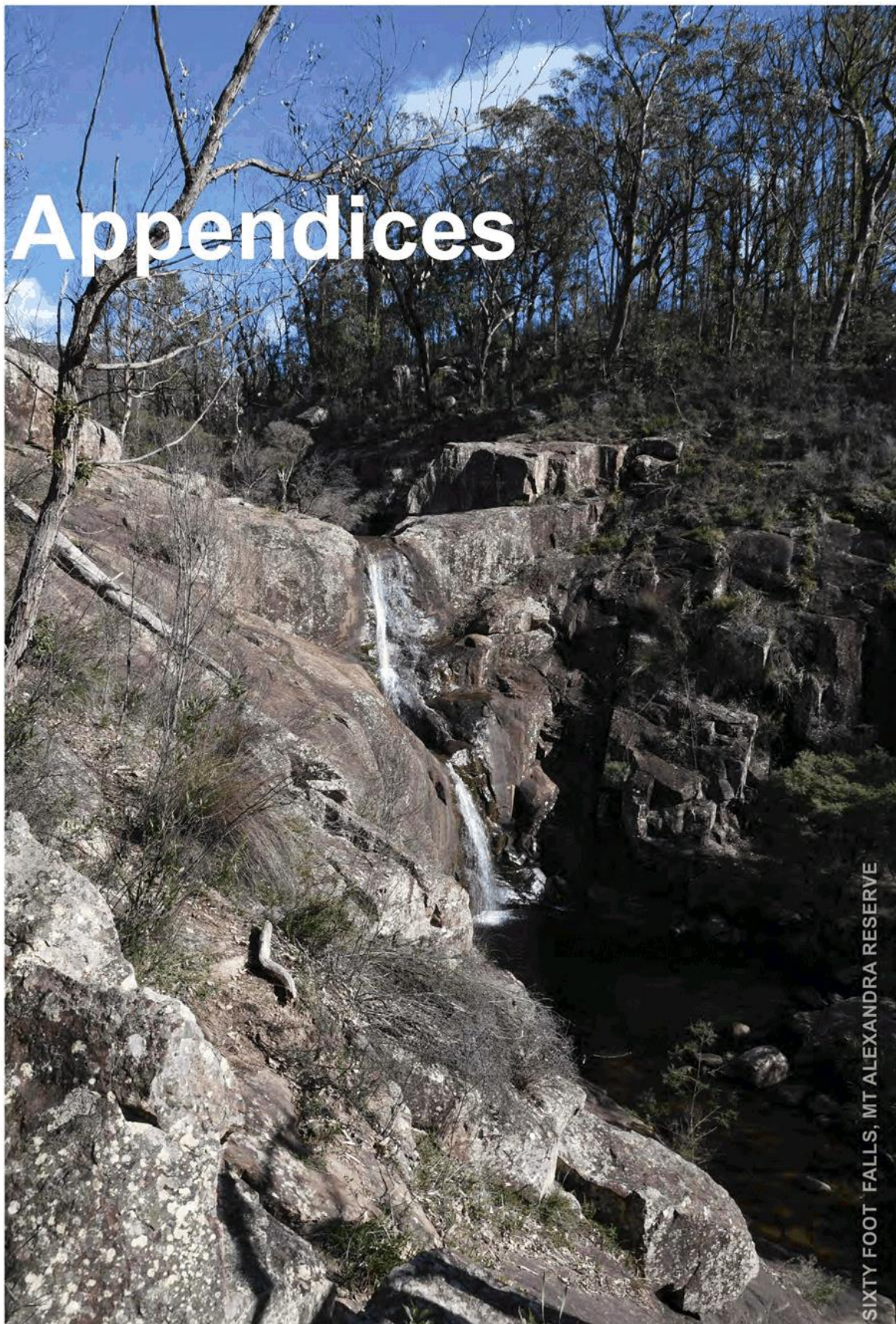
The development of special events in the region that use the walking tracks as their principle facility should be supported to assist in raising the profile of the trails network and providing economic spinoffs to the communities that host the events. These may include events such as fun runs, orienteering competitions, bushwalking programs and nature-based education programs.

There is an opportunity to establish the Southern Highlands as a key outdoor recreation and nature-based tourism destination which could provide significant economic and tourism benefits to the region.

	Action	Timeframe	Cost
E1.1	Use Indigenous naming and incorporate Indigenous cultural context into walking tracks and their surrounds where appropriate and supported.	Ongoing	Low
E1.2	Support the establishment of regular programs and special events using walking tracks (e.g. walking groups, bird watching events, environmental education events).	Ongoing	Low
E1.3	Encourage trail users to visit towns across the Southern Highlands through installation of directional signage where economic centres are within walking distance. For example, directional signage in Berrima River Reserve outlining 'Historic Town Centre 200m'.	Ongoing	Low
E1.4	Encourage businesses (e.g. tour operators, associated retail outlets, hospitality venues, accommodation providers) to promote and utilise walking tracks, with opportunities to contribute to the delivery of 'tourism packages' targeted at nature-based tourism markets.	Ongoing	Low
E1.5	Encourage trail managers and interest groups to share trail information, such as maps/data, trail and asset management resources.	Ongoing	Low



# Appendices



SIXTY FOOT FALLS, MT ALEXANDRA RESERVE



## Appendices

### List of Appendices

Appendix 1: Signage Template

Appendix 2: Inspection Intervals

Appendix 3: Funding Opportunities

Appendix 4: Order of Probable Costs



## Appendix 1

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### Appendix 1: Signage Templates





# Trail Network or Reserve Name

## Sub-Heading



### Introduction

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### Environmental Sensitivities

**Example - Endangered Ecological Communities**  
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### Safety/Management

**Advice:**  
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**Trail User Conduct:**  
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**Bush Fire Safety:**  
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**Land Manger/emergency contact details:**  
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**Download Map Here**  
Scan the QR code below for a free map download:



### Trail Classification System

<b>Grade 1</b>  No bushwalking experience required. Flat even surface with no steps or steep sections. Suitable for wheelchair use.	<b>Grade 2</b>  No bushwalking experience required. The track is a hardened or compacted surface and may have a gentle hill section or sections and occasional steps.	<b>Grade 3</b>  Some bushwalking experience recommended. Tracks may have short steep hill sections, a rough surface and many steps.	<b>Grade 4</b>  Bushwalking experience recommended. Tracks may be long, rough and very steep.	<b>Grade 5</b>  Very experienced bushwalkers with specialised skills, including navigation and emergency first aid. Tracks are likely to be very rough, very steep and unmarked.
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- Trail Network Map to include:**
- Scale
  - North arrow
  - Legend
  - Trail alignment (colour coded)
  - Key trail features (e.g. lookouts)
  - Key support infrastructure (e.g. picnic areas, car parking area)
  - Key landscape features (e.g. rivers/creeks, contours if relevant)
  - Key reference points (e.g. town centre, road names)

### Trails

Name of Trail	Name of Trail	Name of Trail	Name of Trail
<b>Distance</b> xxxkm.	<b>Distance</b> xxxkm.	<b>Distance</b> xxxkm.	<b>Distance</b> xxxkm.
<b>Time</b> xx hrs / xx mins	<b>Time</b> xx hrs / xx mins	<b>Time</b> xx hrs / xx mins	<b>Time</b> xx hrs / xx mins
<b>Grade x</b> 	<b>Grade x</b> 	<b>Grade x</b> 	<b>Grade x</b> 
<b>Trail Description/Overview</b> Description of trail - Description of trail - Description of trail	<b>Trail Description/Overview</b> Description of trail - Description of trail - Description of trail	<b>Trail Description/Overview</b> Description of trail - Description of trail - Description of trail	<b>Trail Description/Overview</b> Description of trail - Description of trail - Description of trail







# Trail Network or Reserve Name

## Sub-Heading



### Introduction

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### Environmental Sensitivities

#### Example - Endangered Ecological Communities

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#### Trail User Conduct:

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#### Bush Fire Safety:

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#### Land Manger/emergency contact details:

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CLIFF EDGE



SLIPPERY WHEN WET



STEEP DESCENT



SLIPPERY ROCKS/SURFACE



WARNING

### Native Flora and Fauna

#### Example - A

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#### Example - B

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#### Example - C

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#### Example - D

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### Trail Classification System



**Grade 1**  
No bushwalking experience required. Flat even surface with no steps or steep sections. Suitable for wheelchair use.



**Grade 2**  
No bushwalking experience required. The track is a hardened or compacted surface and may have a gentle hill section or sections and occasional steps.



**Grade 3**  
Some bushwalking experience recommended. Tracks may have short steep hill sections, a rough surface and many steps.



**Grade 4**  
Bushwalking experience recommended. Tracks may be long, rough and very steep.



**Grade 5**  
Very experienced bushwalkers with specialised skills, including navigation and emergency first aid. Tracks are likely to be very rough, very steep and unmarked.

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# Trail Network or Reserve Name

## Trail Network Map


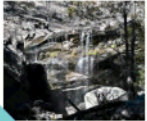




Trail Network Map to include:

- Scale
- North arrow
- Legend
- Trail alignment (colour coded)
- Key trail features (e.g. lookouts)
- Key support infrastructure (e.g. picnic areas, car parking area)
- Key landscape features (e.g. rivers/creeks, contours if relevant)
- Key reference points (e.g. town centre, road names)

Trail Network Map to include:

- Scale
- North arrow
- Legend
- Trail alignment (colour coded)
- Key trail features (e.g. lookouts)
- Key support infrastructure (e.g. picnic areas, car parking area)
- Key landscape features (e.g. rivers/creeks, contours if relevant)
- Key reference points (e.g. town centre, road names)

Trails

<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>	<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>	<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>	<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>	<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>	<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>	<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>	<div><div>Name of Trail</div><div><div>Distance</div><div>xxxkm.</div></div><div><div>Grade x</div><div></div></div><div><div>Time</div><div>xx hrs / xx mins</div></div><div><div>Trail Description/Overview</div><div>Description of trail - Description of trail - Description of trail - Description of trail</div><div></div></div></div>
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Download Map Here

Scan the QR code for a free map download:



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# Wingecarribee Signage Suite

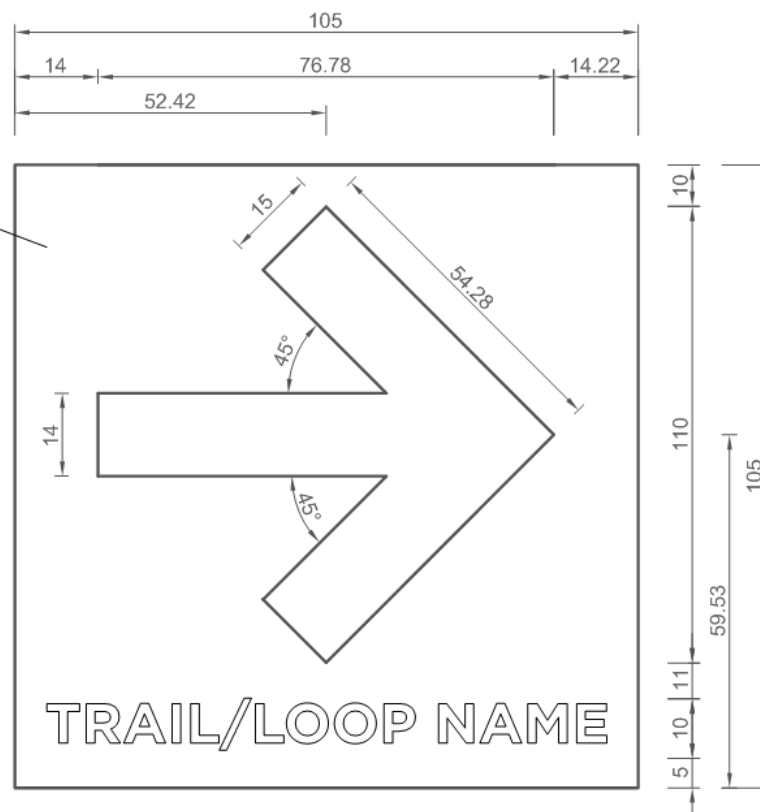
## Wayfinding Signage

### Waymarker Concept and Dimensions

Scale 1:1 @ A4

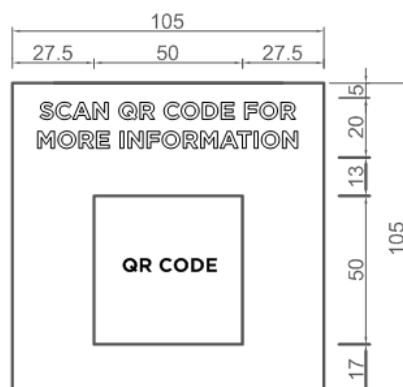
1.6mm aluminium symbol plate with painted arrow and text to be fixed to existing 125mm wide totem poles.

Refer to following pages for Waymarker Placement, Arrow Orientation and Colour Palette.



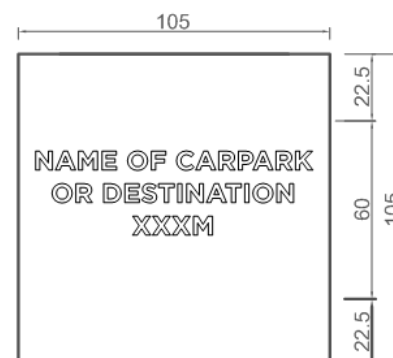
### QR Code Marker Dimensions

Scale 1:2 @ A4



### Carpark Distance Marker Dimensions

Scale 1:2 @ A4

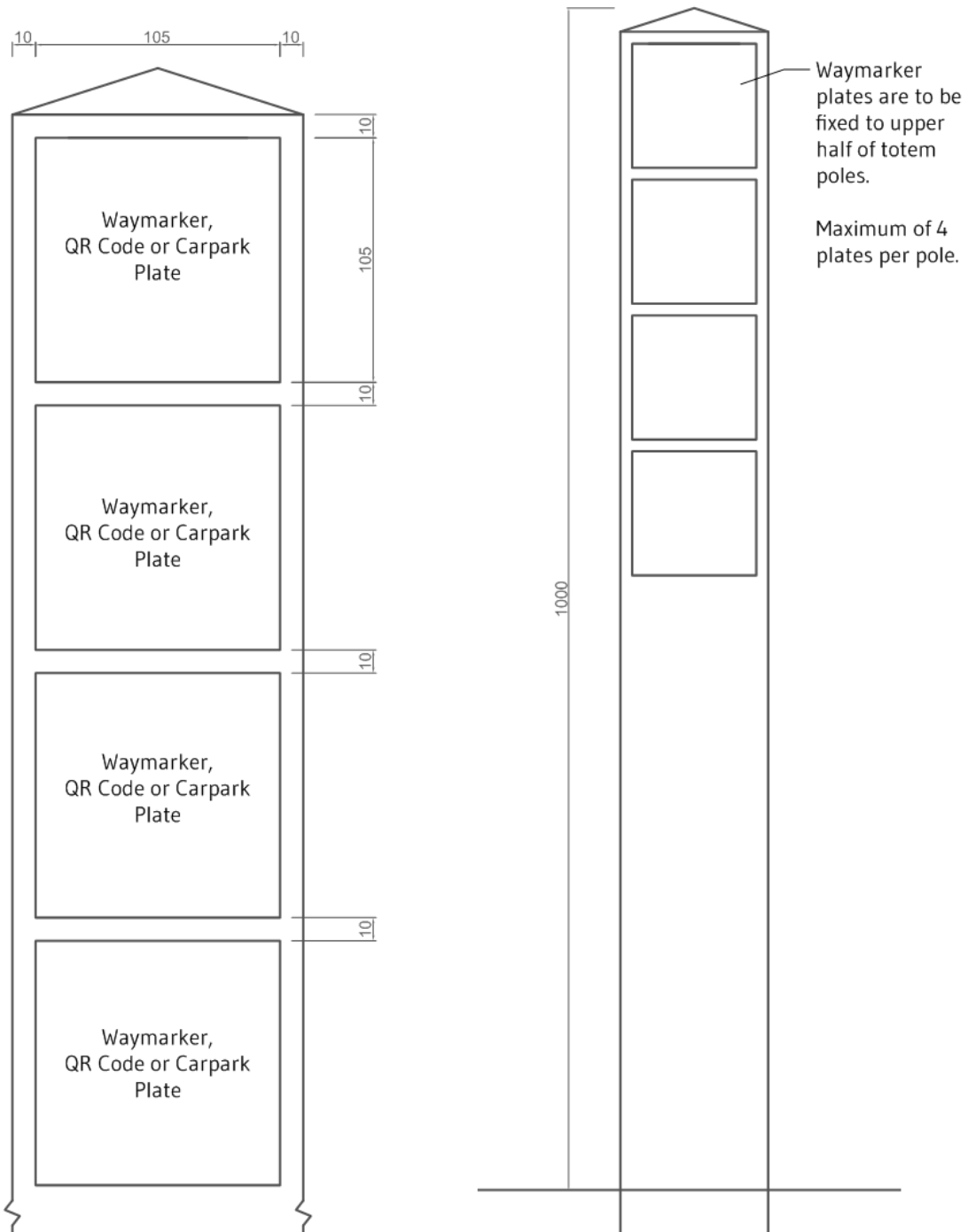


# Wingecarribee Signage Suite

## Wayfinding Signage

### Waymarker Placement

Not to Scale



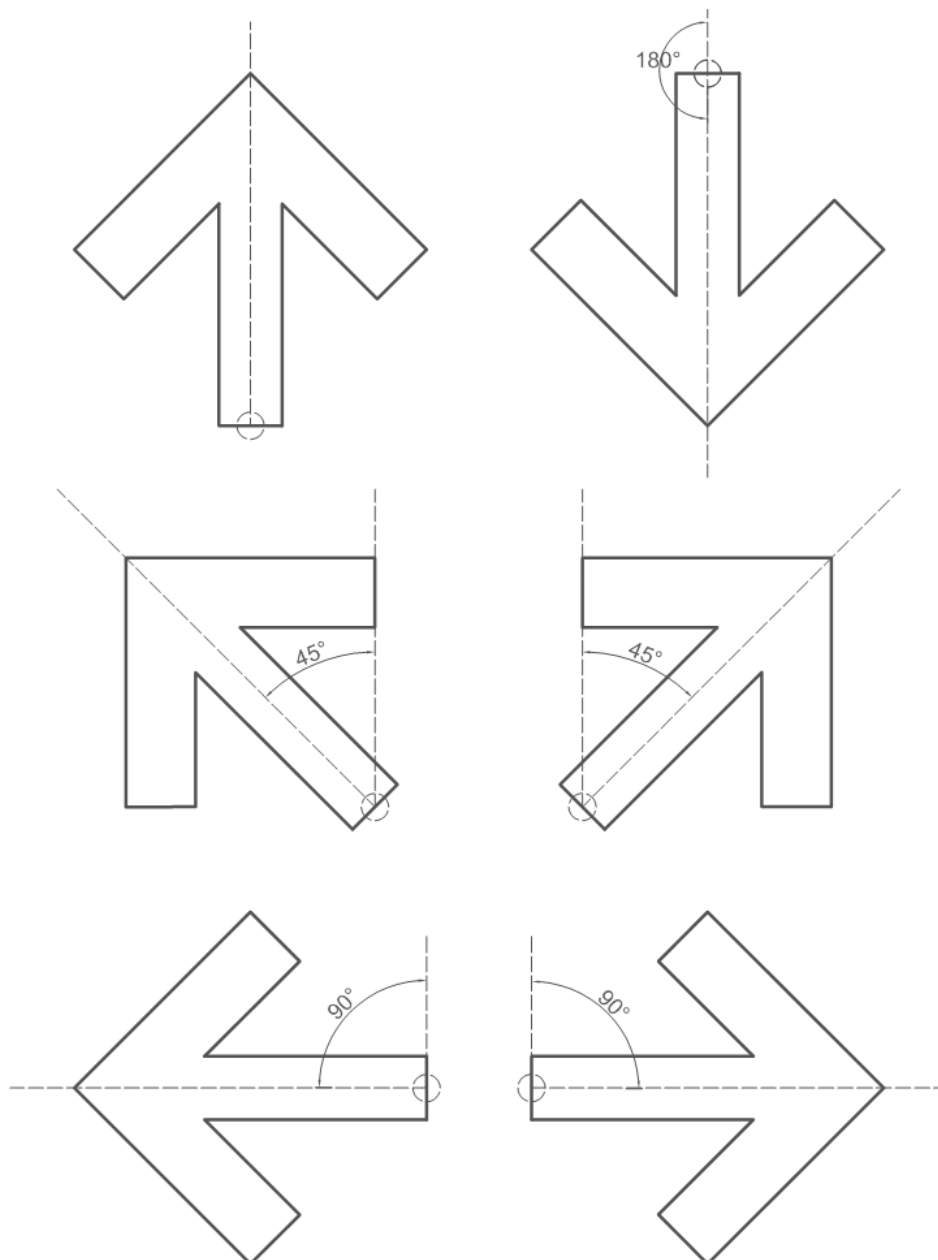
# Wingecarribee Signage Suite

## Wayfinding Signage

### Waymarker Arrow Orientation

Scale 1:2 @ A4

Arrows are to be oriented at 90° and 45° angles only.





# Wingecarribee Signage Suite

## Wayfinding Signage

### Colour Palette

Colour of waymarkers and track identification are to where possible utilise the Shire of Wingecarribee Brand Style Guides Colour Palette.

It is recommended that only one colour from each of the Teal, Red, Navy and Green colour palettes below are used at a single trail network to ensure a suitable contrast of colours between waymarking signs.

Where necessary, for example if there is more than four trails, more colours may be utilised from outside of the Shires identified color palette to ensure a broad spectrum of colours to eliminate confusion between trails.

PMS white arrow and/or text to be painted over selected background colour.






\*Not to scale - colour reference only




#### TEAL

Light		C50 M0 Y22 K0 R121 G205 B205 PMS 630 C
Mid		C67 M0 Y25 K10 R50 G175 B182 PMS 2233 C
Dark		C80 M10 Y30 K20 R0 G142 B152 PMS 321 C




#### NAVY

Light		C80 M30 Y10 K50 R0 G86 B116 PMS 2161 C
Mid		C95 M55 Y20 K60 R0 G51 B82 PMS 7463 C
Dark		C100 M50 Y35 K75 R0 G37 B54 PMS 546 C

#### RED

Light		C0 M90 Y75 K0 R239 G64 B68 PMS 1788 C
Mid		C10 M95 Y85 K10 R199 G45 B50 PMS 711 C
Dark		C20 M100 Y90 K20 R167 G27 B40 PMS 187 C

#### GREEN

Light		C50 M0 Y100 K0 R141 G198 B63 PMS 7488 C
Mid		C55 M0 Y100 K15 R110 G170 B57 PMS 7737 C
Dark		C60 M0 Y100 K30 R81 G144 B50 PMS 363 C



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## Appendix 2

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### Appendix 2: Inspection Intervals

## Appendix 2

The following table provides an indicative guide to assist Council in determining the appropriate intervals for inspections of walking tracks, according to *Australian Standard 2156.1 – 2001: Walking Tracks Part 1- Classification and Signage*. The table provides the identified walking track's name, grade, applicable risk management guidelines, and guide to the frequency and timing of inspections across the calendar year.

### Inspection Intervals - Guide only

Trail Name	Grade	AS 2156.1-2001 Risk Management	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Mt Alexandra Reserve (primary access from Box Vale Trailhead)														
Box Vale Track	3	Built elements will be inspected and maintained regularly. Any built facilities will be managed for public risk. Inspection interval: 6 month or less			√						√			
40 Foot Falls Track (Box Vale Trailhead to Falls)	4	Tracks will be inspected on a regular basis and after major natural events such as cyclones or fires. Any built facilities will be managed for public risk. Inspection interval: 6 to 12 months.			√*						√*			
Nattai Loop Track	5	Tracks will not be managed for public risk. Users will be responsible for personal safety and need to exercise appropriate care.									√^			
Mt Alexandra Reserve (primary access from lake Alexandra Trailhead)														
Katoomba Lookout Trail	3	Built elements will be inspected and maintained regularly. Any built facilities will be managed for public risk. Inspection interval: 6 month or less			√						√			
Boulder Valley Track	4	Tracks will be inspected on a regular basis and after major natural events such as cyclones or fires. Any built facilities will be managed for public risk. Inspection interval: 6 to 12 months.			√*						√*			
40 Foot Falls Track (Lake Alexandra to Falls)	4				√*						√*			
60 Foot Falls Track	4				√*						√*			
Big Rock Link Track	4				√*						√*			
Mountain Circuit	5	Tracks will not be managed for public risk. Users will be responsible for personal safety and need to exercise appropriate care.												
Lake Alexandra Reserve														
Lake Alexandra Circuit	1	Tracks and adjacent natural and built elements will be inspected and maintained regularly. Inspection interval: 30 days or less	√	√	√	√	√	√	√	√	√	√	√	√





## Appendix 2

Trail Name	Grade	AS 2156.1-2001 Risk Management	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Mount Gibraltar Reserve														
Bowral Lookout Trail	1	Tracks and adjacent natural and built elements will be inspected and maintained regularly. Inspection interval: 30 days or less	√	√	√	√	√	√	√	√	√	√	√	√
Heritage Quarries Track	3	Built elements will be inspected and maintained regularly. Any built facilities will be managed for public risk. Inspection interval: 6 months or less			√						√			
Rim Track	3				√						√			
Reservoir Ravine Track	4	Tracks will be inspected on a regular basis and after major natural events such as cyclones or fires. Any built facilities will be managed for public risk. Inspection interval: 6 to 12 months.			√*						√*			
Gibbergunyah Reserve														
Geebung Track	3	Built elements will be inspected and maintained regularly. Any built facilities will be managed for public risk. Inspection interval: 6 month or less			√						√			
Gibbergunyah Walk	4	Tracks will be inspected on a regular basis and after major natural events such as cyclones or fires. Any built facilities will be managed for public risk. Inspection interval: 6 to 12 months.			√*						√*			
The Glen Track	4				√*						√*			
Hammock Hill														
Unnamed Trail 1	2	Tracks and adjacent natural and built elements will be inspected and maintained regularly. Inspection interval: 90 days or less		√			√			√			√	
Unnamed Trail 2	3	Built elements will be inspected and maintained regularly. Any built facilities will be managed for public risk. Inspection interval: 6 months or less		√						√				
Mansfield Reserve														
Wallaby Track	2	Tracks and adjacent natural and built elements will be inspected and maintained regularly. Inspection interval: 90 days or less		√			√			√			√	
Wombat Track	2			√			√			√			√	
Bundanoon														
Governors Road Walking Track	2	Tracks and adjacent natural and built elements will be inspected and maintained regularly. Inspection interval: 90 days or less		√			√			√			√	



## Appendix 2

Trail Name	Grade	AS 2156.1-2001 Risk Management	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Glow Worm Glen - William St Access	3	Built elements will be inspected and maintained regularly. Any built facilities will be managed for public risk. Inspection interval: 6 month or less		√						√				
Bong Bong Common (Link to Cecil Hoskins Nature Reserve)														
Cecil Hoskins Link Track	2	Tracks and adjacent natural and built elements will be inspected and maintained regularly. Inspection interval: 90 days or less		√			√			√			√	
Berrima														
Berrima River Trail	2	Tracks and adjacent natural and built elements will be inspected and maintained regularly. Inspection interval: 90 days or less		√			√			√			√	
Lambies Well	2			√			√			√			√	
Berrima Weir Walk	2			√			√			√			√	
Stone Quarry Walk	3	Built elements will be inspected and maintained regularly. Any built facilities will be managed for public risk. Inspection interval: 6 month or less					√						√	

√\* - Inspection interval has a range (6-12 months), however it is recommended that tracks with high levels of built features and usage are inspected more frequently than 12-monthly.

√^ -Level 5 classification notes that tracks will not be managed for public risk, however because there are built features associated with the track it is recommended that it be inspected once a year.



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## Appendix 3

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### Appendix 3: Funding Opportunities





## Appendix 3

A variety of external funding sources to support the development of recreational facilities, such as trails, are potentially available for the implementation of the Strategy, as outlined below. Funding can be procured from a variety of sources locally and at state and federal levels. These programs change regularly, and it is important to contact the funding agency/organisation to get up to date details on funding guidelines and determine eligibility and a funding strategy eligibility.

### Sport NSW Grants Schedule Summary

As part of Sport NSW's commitment to advocating for and strengthening the sports sector - grants information is provided as a Sport NSW Grants Schedule Summary document which is regularly updated to making this information easily accessible and in one place.

This regularly updated Grants Schedule is available online via  
<https://www.sportnsw.com.au/resources--reports/grants/>

### NSW Government

Current or recent grant programs available through the NSW Government which may be relevant to the implementation of this Strategy include:

- Community Building Partnership Program
- Stronger Country Communities Fund
- Regional Growth – Environment and Tourism Fund
- Emergency Bushfire Response Grants

### Federal Government

Current or recent grant programs available through the Australian Government which may be relevant to the implementation of this Strategy include:

- Building Better Regions Fund
- Stronger Communities Programme
- Community Development Grants Programme
- Volunteer Grants

### Commercial and Private Sector Funding

Commercial and private sector funding is often used by organisations to assist with facility developments and ongoing operations.

Opportunities such as naming rights and in-kind donations of labour and materials are a potential resource for new facility developments and upgrades.

For example, Jetstar's Flying Start Program – provides grants of up to \$30,000 to support community groups and organisations to fund a project that will enrich their local community. Refer <http://www.jetstar.com/au/en/flyingstart>

### Not-for-profit organisations

Australian Sports Foundation – The foundation operates the Fundraising4Sport Program to increase opportunities for Australians to participate in sport or excel in sport performance. Refer <https://asf.org.au/>.

Foundation for Rural and Regional Renewal – provides grant funding for charitable purposes that benefits the residents of Australia's rural, regional or remote communities. Refer: [http://www.frrr.org.au/cb\\_pages/grants.php](http://www.frrr.org.au/cb_pages/grants.php)

Trusts and Foundations - There are numerous trusts and foundations established in Australia and a number provide funding for projects such as this. Often, they are established by large corporations. Refer [www.philanthropy.org.au](http://www.philanthropy.org.au)

### Peak Bodies, Associations and Clubs -

Contributions from clubs and associations developing facilities and other initiatives is common. This may include funds generated through fundraising efforts, loans and savings. Peak bodies and associations may also have funds which could be contributed towards the projects.

### Other

There are other not for profit organisations that provide on the ground support in relation to trail maintenance and development, such as Green Corps, Conservation Volunteers Australia, "Friends of" Groups and Residents associations.



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## Appendix 4

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### Appendix 4: Order of Probable Cost



ORDER OF COST ESTIMATE

JULY 2020

## WINGECARRIBEE RECREATIONAL WALKING TRACKS





## WINGECARRIBBEE RECREATIONAL WALKING TRACKS

### Order of Cost Estimate

#### Project Details

##### Description

##### **Basis of Estimate**

This estimate is based upon measured quantities to which we have applied rates and conditions we currently believe applicable as at **July 2020**. We assumed that the project will be competitively tendered under standard industry conditions and form of contract.

This cost estimate is based on the documentation listed under the "Documents" section and does not at this stage provide a direct comparison with tenders received for the work at any future date. To enable monitoring of costs this estimate should be updated regularly during the design and documentation phases of this project.

Quantities for this estimate have been provided by Tredwell Management.

##### COVID-19 Impact

Our estimate has been prepared on the basis of normal economic and industry circumstances. The full impact of COVID-19 is unknown at this stage and changing daily. Our estimate makes no provision for the impacts of COVID-19 virus and we advise that an impact on the estimate is probable and could vary considerably depending on the extent of a variety of issues. These may include but are not limited to the following issues, which are intended as a guide as opposed to a comprehensive list:

- Economy, industry and society shut down
- Exchange rate fluctuations (our estimate reflects pricing as at the US\$0.70 market exchange rate at Q2 2020 and not the current rates).
- Off shore manufacturing capacity and delivery timing
- On shore site deliveries of plant, materials and equipment
- On site staff to manage productivity of the works
- On site labour to implement the works

RLB has observed that, for key construction components, there is an increasing reluctance by contractors to commit to a definitive programme or cost for future projects. This estimate does not consider increased project costs due to potential programme delays, alternative procurement methods of materials and/or labour nor the wider potential impact of COVID-19 on construction activities.

##### Potential COVID-19 Actions

RLB recommends that a project contingency provision is made for COVID-19 impacts dependent of the status of the design and delivery cycle of the project. We would be pleased to discuss suitable provisions.

RLB recommends undertaking a risk analysis of this issue and we would be pleased to assist in the preparation of an order of cost assessment and/or sensitivity analysis for the project based on defined criteria. Our new programming capability can also be of assistance in these matters.

Please let us know if you would like RLB to assist with a sensitivity analysis on the exchange rate fluctuations to inform on the impact of the current exchange rate and potentially include in any additional COVID-19 project contingency.

RLB anticipate that the impact on the estimate may only be in the short to medium term and that long-term impacts may revert to normal circumstances but this will be subject to ongoing monitoring.

##### **Items Specifically Included**

This estimate specifically includes the following:



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

### Order of Cost Estimate

#### Project Details

##### Description

##### Contingencies & Escalation

The estimate includes the following contingency allowances:

- ☐ Design Development Contingency which allows for issues that will arise during the design and documentation period as the design team develops the design through to 100% documentation
- ☒ Construction Contingency which allows for issues that will arise during the construction period including for latent conditions, design errors and omissions, design changes, client changes, extension of time costs and provisional sum adjustments.

##### ***Items Specifically Excluded***

The estimate **specifically excludes** the following which should be considered in an overall project feasibility study:

##### Risk Exclusions

- Relocation and upgrade of existing services
- Repair to any damage caused to unidentified services during the performing of the works
- Contaminated ground Removal and Reinstatement
- Removal and Reinstatement of any soft, wet and weak spots in sub-grade
- Asbestos and Hazardous Materials Removal
- Rock excavation
- Retaining walls
- Staging / Phasing costs

##### Other Project Cost Exclusions

- Land costs
- Legal fees
- Goods and Services Taxation
- Escalation in costs from **June 2020** to future construction period.

##### ***Documents***

The following documents have been used in preparing this estimate:

Date Received

##### Documents prepared by Tredwell Management

- Wingecarribee Walking Trail Costing 200623

23/06/20



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

### Order of Cost Estimate

Location Summary

Rates Current At July 2020

Location	Total Cost
A HAMMOCK HILL RESERVE	48,140.00
B MANSFIELD RESERVE	146,650.00
C RIVER BEND & BERRIMA RIVER RESERVES	812,950.00
D STONE QUARRY WALK	52,740.00
E BERRIMA WEIR RESERVE	227,550.00
F MOUNT GIBRALTAR RESERVE	1,268,020.00
G GIBBERGUNYAH RESERVE	205,470.00
H MT ALEXANDRA (BOX VALE TRAILHEAD)	755,690.00
I MT ALEXANDRA (LAKE ALEXANDRA TRAILHEAD)	298,100.00
J WELBY WEIR	38,720.00
K BONG BONG COMMON - CECIL HOSKINS NATURE RESERVE	6,100.00
L GLOW WORM GLEN - WILLIAM STREET RESERVE	101,950.00
M GOVERNORS ROAD	680,750.00
ESTIMATED NET COST	
	\$4,642,830.00
MARGINS & ADJUSTMENTS	
Escalation	Excl.
ESTIMATED TOTAL COST	
	\$4,642,830.00



## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy

**WINGECARRIBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**A HAMMOCK HILL RESERVE**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			3,000.00
<b>Preliminaries</b>				<b>\$3,000.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	1	6,500.00	6,500.00
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
4 Waymarkers on posts including footing	No	12	550.00	6,600.00
5 Timber bench seat Hammock hill style	No	2	1,600.00	3,200.00
6 Bollard	No	1	1,100.00	1,100.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	3	650.00	1,950.00
<b>Fitments</b>				<b>\$20,850.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	240	5.00	1,200.00
<b>Site Preparation</b>				<b>\$1,200.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
2 100mm thick Crushed gravel paving including boxing out, basecourse etc	m <sup>2</sup>	240	38.00	9,120.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$9,120.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	4	80.00	320.00
42 Demolition of existing bench seating including removal of debris off site	No	2	200.00	400.00
43 Demolition of existing picnic table including removal of debris off site	No	1	250.00	250.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$970.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			3,500.00
<b>Builders Margin</b>				<b>\$3,500.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			3,500.00
<b>Professional Fees</b>				<b>\$3,500.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			4,000.00
55 Construction contingency (5%)	Item			2,000.00
<b>Contingency</b>				<b>\$6,000.00</b>



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

A HAMMOCK HILL RESERVE (continued)

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			0.00
<i>Not Allocated to Element</i>				<b>\$0.00</b>
<b>HAMMOCK HILL RESERVE</b>				<b>\$48,140.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

## B MANSFIELD RESERVE

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			9,500.00
<b>Preliminaries</b>				<b>\$9,500.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	1	6,500.00	6,500.00
4 Waymarkers on posts including footing	No	15	550.00	8,250.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	3	650.00	1,950.00
9 New 2 panel trail head sign to existing structure including removal of existing sign	No	1	1,500.00	1,500.00
<b>Fitments</b>				<b>\$18,200.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	1,000	5.00	5,000.00
<b>Site Preparation</b>				<b>\$5,000.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
13 50mm Thick asphalt pavement including boxing out, basecourse etc. - assumed 5m wide	m <sup>2</sup>	750	85.00	63,750.00
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	250	38.00	9,500.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$73,250.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	1	300.00	300.00
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	5	80.00	400.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$700.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			10,500.00
<b>Builders Margin</b>				<b>\$10,500.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			11,000.00
<b>Professional Fees</b>				<b>\$11,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			11,500.00
55 Construction contingency (5%)	Item			6,500.00
<b>Contingency</b>				<b>\$18,000.00</b>





## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

B MANSFIELD RESERVE (continued)

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			500.00
<b>Not Allocated to Element</b>				<b>\$500.00</b>
<b>MANSFIELD RESERVE</b>				<b>\$146,650.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

## C RIVER BEND &amp; BERRIMA RIVER RESERVES

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			53,500.00
<b>Preliminaries</b>				<b>\$53,500.00</b>
<b>FT Fitments</b>				
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
4 Waymarkers on posts including footing	No	15	550.00	8,250.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	1	650.00	650.00
11 Timber bench seat River bend style	No	2	1,100.00	2,200.00
<b>Fitments</b>				<b>\$12,600.00</b>
<b>BW Builders Work In Connection with Specialist Services</b>				
58 Builders work in connection with services	Item			15,500.00
<b>Builders Work In Connection with Specialist Services</b>				<b>\$15,500.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	650	5.00	3,250.00
<b>Site Preparation</b>				<b>\$3,250.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
13 50mm Thick asphalt pavement including boxing out, basecourse etc. - assumed 5m wide	m <sup>2</sup>	500	85.00	42,500.00
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	150	38.00	5,700.00
21 Trail development to natural ground - assumed up to 1m wide	m	1,000	35.00	35,000.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$83,200.00</b>
<b>XB Outbuildings and Covered Ways</b>				
15 Allowance for Berrima camping park toilet renewal - as budgeted in Capex funding Berrima Camping Park Toilet Block Renewal (SRV) \$420,000 for 2022/23	Item			420,000.00
<b>Outbuildings and Covered Ways</b>				<b>\$420,000.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	2	300.00	600.00
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	5	80.00	400.00
42 Demolition of existing bench seating including removal of debris off site	No	2	200.00	400.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$1,400.00</b>

**WINGECARRIBBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**C RIVER BEND & BERRIMA RIVER RESERVES (continued)**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			59,000.00
<b>Builders Margin</b>				<b>\$59,000.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			60,000.00
<b>Professional Fees</b>				<b>\$60,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			65,000.00
55 Construction contingency (5%)	Item			35,500.00
<b>Contingency</b>				<b>\$100,500.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			4,000.00
<b>Not Allocated to Element</b>				<b>\$4,000.00</b>
<b>RIVER BEND &amp; BERRIMA RIVER RESERVES</b>				<b>\$812,950.00</b>



## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

## D STONE QUARRY WALK

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			3,500.00
<b>Preliminaries</b>				<b>\$3,500.00</b>
<b>FT Fitments</b>				
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
4 Waymarkers on posts including footing	No	4	550.00	2,200.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	3	650.00	1,950.00
12 Timber bench seat Stone quarry style	No	2	1,800.00	3,600.00
16 Safety sign 450mm x 600mm	No	2	650.00	1,300.00
<b>Fitments</b>				<b>\$10,550.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	510	5.00	2,550.00
<b>Site Preparation</b>				<b>\$2,550.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
2 100mm thick Crushed gravel paving including boxing out, basecourse etc	m <sup>2</sup>	360	38.00	13,680.00
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	150	38.00	5,700.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$19,380.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	4	300.00	1,200.00
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	2	80.00	160.00
42 Demolition of existing bench seating including removal of debris off site	No	2	200.00	400.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$1,760.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			4,000.00
<b>Builders Margin</b>				<b>\$4,000.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			4,000.00
<b>Professional Fees</b>				<b>\$4,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			4,000.00
55 Construction contingency (5%)	Item			2,500.00
<b>Contingency</b>				<b>\$6,500.00</b>



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

### Order of Cost Estimate

Location Element Item

D STONE QUARRY WALK (continued)

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			500.00
<b>Not Allocated to Element</b>				<b>\$500.00</b>
<b>STONE QUARRY WALK</b>				<b>\$52,740.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

## E BERRIMA WEIR RESERVE

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			15,000.00
<b>Preliminaries</b>				<b>\$15,000.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	1	6,500.00	6,500.00
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
4 Waymarkers on posts including footing	No	10	550.00	5,500.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	3	650.00	1,950.00
17 Bench seat	No	2	1,800.00	3,600.00
<b>Fitments</b>				<b>\$19,050.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	500	5.00	2,500.00
<b>Site Preparation</b>				<b>\$2,500.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	250	38.00	9,500.00
21 Trail development to natural ground - assumed up to 1m wide	m	700	35.00	24,500.00
22 Gravel entrance road paving including boxing out, basecourse etc - assumed 5m wide	m <sup>2</sup>	250	38.00	9,500.00
24 Pedestrian boardwalk bridge over Wingecarribee River - assumed 20m long and light weight construction (not a suspension bridge)	Item			85,000.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$128,500.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			16,500.00
<b>Builders Margin</b>				<b>\$16,500.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			17,000.00
<b>Professional Fees</b>				<b>\$17,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			18,000.00
55 Construction contingency (5%)	Item			10,000.00
<b>Contingency</b>				<b>\$28,000.00</b>





## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

E BERRIMA WEIR RESERVE (continued)

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			1,000.00
<i>Not Allocated to Element</i>				<b>\$1,000.00</b>
<b>BERRIMA WEIR RESERVE</b>				<b>\$227,550.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy

**WINGECARRIBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**F MOUNT GIBRALTAR RESERVE**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			83,500.00
<b>Preliminaries</b>				<b>\$83,500.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	7	6,500.00	45,500.00
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	3	1,500.00	4,500.00
4 Waymarkers on posts including footing	No	25	550.00	13,750.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	6	650.00	3,900.00
16 Safety sign 450mm x 600mm	No	8	650.00	5,200.00
18 Timber bench seat in trachyte shelters	No	4	1,900.00	7,600.00
<b>Fitments</b>				<b>\$80,450.00</b>
<b>BW Builders Work In Connection with Specialist Services</b>				
58 Builders work in connection with services	Item			24,500.00
<b>Builders Work In Connection with Specialist Services</b>				<b>\$24,500.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	2,760	5.00	13,800.00
<b>Site Preparation</b>				<b>\$13,800.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
2 100mm thick Crushed gravel paving including boxing out, basecourse etc	m <sup>2</sup>	360	38.00	13,680.00
13 50mm Thick asphalt pavement including boxing out, basecourse etc. - assumed 5m wide	m <sup>2</sup>	2,000	85.00	170,000.00
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	400	38.00	15,200.00
38 New disability parking space including bollard and lining marking	No	1	2,500.00	2,500.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$201,380.00</b>
<b>XB Outbuildings and Covered Ways</b>				
36 Allowance to upgrade existing public amenities to heritage building consisting of new floor tiling and screed, paint finishes to walls, ceiling finish, amenities, ventilation and lighting - note: \$160,000 budgeted in Capex Funding List for 'Upgrade Public Amenities and Recreational Track' 2024/25	No	2	100,000.00	200,000.00
61 Allowance to for new disability toilet matching existing heritage buildings. Connecting into existing site services consisting of a new envelope, slab, floor tiling and screed, wall tiles, ceiling finish, amenities, ventilation and lighting	Item			90,000.00
37 Allowance to restore derelict inner bowl amenities building for heritage value only not for use	No	2	110,000.00	220,000.00
<b>Outbuildings and Covered Ways</b>				<b>\$510,000.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

F MOUNT GIBRALTAR RESERVE (continued)

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XE External Electric Light and Power</b>				
50 No allowance for new power supply to toilets	Item			Excl.
<b>External Electric Light and Power</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	9	300.00	2,700.00
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	8	80.00	640.00
42 Demolition of existing bench seating including removal of debris off site	No	4	200.00	800.00
43 Demolition of existing picnic table including removal of debris off site	No	7	250.00	1,750.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$5,890.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			92,000.00
<b>Builders Margin</b>				<b>\$92,000.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			93,500.00
<b>Professional Fees</b>				<b>\$93,500.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			101,000.00
55 Construction contingency (5%)	Item			55,500.00
<b>Contingency</b>				<b>\$156,500.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			6,500.00
<b>Not Allocated to Element</b>				<b>\$6,500.00</b>
<b>MOUNT GIBRALTAR RESERVE</b>				<b>\$1,268,020.00</b>



## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

## G GIBBERGUNYAH RESERVE

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			13,500.00
<b>Preliminaries</b>				<b>\$13,500.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	2	6,500.00	13,000.00
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	2	1,500.00	3,000.00
4 Waymarkers on posts including footing	No	30	550.00	16,500.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	6	650.00	3,900.00
16 Safety sign 450mm x 600mm	No	2	650.00	1,300.00
17 Bench seat	No	5	1,800.00	9,000.00
<b>Fitments</b>				<b>\$46,700.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	1,000	5.00	5,000.00
<b>Site Preparation</b>				<b>\$5,000.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
2 100mm thick Crushed gravel paving including boxing out, basecourse etc	m <sup>2</sup>	600	38.00	22,800.00
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	400	38.00	15,200.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$38,000.00</b>
<b>XN Boundary Walls, Fencing and Gates</b>				
28 Lookout fencing/barrier fence - assumed 1500mm high black powdercoated metal fence (8H)	m	20	1,500.00	30,000.00
29 Entrance gate / pedestrian turnstile	No	1	2,200.00	2,200.00
46 Wood post and rail fence	m	10	195.00	1,950.00
<b>Boundary Walls, Fencing and Gates</b>				<b>\$34,150.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	8	300.00	2,400.00
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	9	80.00	720.00
42 Demolition of existing bench seating including removal of debris off site	No	5	200.00	1,000.00
43 Demolition of existing picnic table including removal of debris off site	No	2	250.00	500.00
44 Demolition of existing lookout fencing including removal of debris off site	m	20	250.00	5,000.00

**WINGECARRIBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**G GIBBERGUNYAH RESERVE (continued)**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
45 Demolition of existing pedestrian gate, wood post and rail fence and step over ladder including removal of debris off site	No	1	2,000.00	2,000.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$11,620.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			15,000.00
<b>Builders Margin</b>				<b>\$15,000.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			15,000.00
<b>Professional Fees</b>				<b>\$15,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			16,500.00
55 Construction contingency (5%)	Item			9,000.00
<b>Contingency</b>				<b>\$25,500.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			1,000.00
<b>Not Allocated to Element</b>				<b>\$1,000.00</b>
<b>GIBBERGUNYAH RESERVE</b>				<b>\$205,470.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

H MT ALEXANDRA (BOX VALE TRAILHEAD)

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			50,000.00
<b>Preliminaries</b>				<b>\$50,000.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	7	6,500.00	45,500.00
4 Waymarkers on posts including footing	No	15	550.00	8,250.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	7	650.00	4,550.00
10 Trail head sign including wooden shelter with metal roof sheeting (custom sign - steel frame with aluminium attached, 841mm x 1189mm)	No	1	4,000.00	4,000.00
16 Safety sign 450mm x 600mm	No	10	650.00	6,500.00
19 Replace current waymaker plaques with new, including the removal of existing plaques	No	65	200.00	13,000.00
20 Directional road sign	No	2	650.00	1,300.00
30 Allowance for metal ladder - assumed to be 3.5m-4.5m high	No	1	8,500.00	8,500.00
31 Allowance for metal staircase including two 10 step flights and one landing	Item			55,000.00
32 Allowance to repair existing pedestrian bridge handrails	Item			15,000.00
<b>Fitments</b>				<b>\$161,600.00</b>
<b>BW Builders Work In Connection with Specialist Services</b>				
58 Builders work in connection with services	Item			14,500.00
<b>Builders Work In Connection with Specialist Services</b>				<b>\$14,500.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	930	5.00	4,650.00
<b>Site Preparation</b>				<b>\$4,650.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
13 50mm Thick asphalt pavement including boxing out, basecourse etc. - assumed 5m wide	m <sup>2</sup>	750	85.00	63,750.00
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	180	38.00	6,840.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$70,590.00</b>
<b>XN Boundary Walls, Fencing and Gates</b>				
28 Lookout fencing/barrier fence - assumed 1500mm high black powdercoated metal fence (8H)	m	20	1,500.00	30,000.00
<b>Boundary Walls, Fencing and Gates</b>				<b>\$30,000.00</b>
<b>XB Outbuildings and Covered Ways</b>				
34 Allowance for new amenities building	Item			195,000.00
<b>Outbuildings and Covered Ways</b>				<b>\$195,000.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>



**WINGECARRIBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**H MT ALEXANDRA (BOX VALE TRAILHEAD) (continued)**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	8	300.00	2,400.00
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	5	80.00	400.00
43 Demolition of existing picnic table including removal of debris off site	No	7	250.00	1,750.00
44 Demolition of existing lookout fencing including removal of debris off site	m	20	250.00	5,000.00
47 Demolition of existing metal ladder including removal of debris off site	No	1	1,800.00	1,800.00
48 Demolition of existing metal staircase including removal of debris off site	No	1	10,000.00	10,000.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$21,350.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			55,000.00
<b>Builders Margin</b>				<b>\$55,000.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			55,500.00
<b>Professional Fees</b>				<b>\$55,500.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			60,500.00
55 Construction contingency (5%)	Item			33,000.00
<b>Contingency</b>				<b>\$93,500.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			4,000.00
<b>Not Allocated to Element</b>				<b>\$4,000.00</b>
<b>MT ALEXANDRA (BOX VALE TRAILHEAD)</b>				<b>\$755,690.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

I MT ALEXANDRA (LAKE ALEXANDRA TRAILHEAD)

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			19,500.00
<b>Preliminaries</b>				<b>\$19,500.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	2	6,500.00	13,000.00
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
4 Waymarkers on posts including footing	No	30	550.00	16,500.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	3	650.00	1,950.00
10 Trail head sign including wooden shelter with metal roof sheeting (custom sign - steel frame with aluminium attached, 841mm x 1189mm)	No	1	4,000.00	4,000.00
16 Safety sign 450mm x 600mm	No	10	650.00	6,500.00
<b>Fitments</b>				<b>\$43,450.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	200	5.00	1,000.00
<b>Site Preparation</b>				<b>\$1,000.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	200	38.00	7,600.00
26 Wooden boxed out steps including wooden frame, drainage, compacted fill material, etc...	No	10	1,000.00	10,000.00
27 Allowance to repair existing wooden boxed out steps including drainage, compacted fill material, etc...	Item			45,000.00
33 Trail development to natural ground including stripping of dense vegetation and removal from site	m	50	55.00	2,750.00
35 Pedestrian boardwalk bridge to Gibberguyah creek- assumed 15m long and light weight construction (not a suspension bridge)	Item			65,000.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$130,350.00</b>
<b>XN Boundary Walls, Fencing and Gates</b>				
28 Lookout fencing/barrier fence - assumed 1500mm high black powdercoated metal fence (8H)	m	10	1,500.00	15,000.00
<b>Boundary Walls, Fencing and Gates</b>				<b>\$15,000.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
44 Demolition of existing lookout fencing including removal of debris off site	m	10	250.00	2,500.00
49 Demolition of existing wooden box steps including removal of debris off site	No	10	80.00	800.00

**WINGECARRIBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**MT ALEXANDRA (LAKE ALEXANDRA TRAILHEAD) (continued)**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
59 Demolition of existing concrete creek crossover including removal of debris off site	No	1	3,500.00	3,500.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$6,800.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			21,500.00
<b>Builders Margin</b>				<b>\$21,500.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			22,000.00
<b>Professional Fees</b>				<b>\$22,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			24,000.00
55 Construction contingency (5%)	Item			13,000.00
<b>Contingency</b>				<b>\$37,000.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			1,500.00
<b>Not Allocated to Element</b>				<b>\$1,500.00</b>
<b>MT ALEXANDRA (LAKE ALEXANDRA TRAILHEAD)</b>				<b>\$298,100.00</b>



## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

J WELBY WEIR

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			2,500.00
<b>Preliminaries</b>				<b>\$2,500.00</b>
<b>FT Fitments</b>				
1 Picnic table including concrete slab	No	1	6,500.00	6,500.00
4 Waymarkers on posts including footing	No	6	550.00	3,300.00
16 Safety sign 450mm x 600mm	No	2	650.00	1,300.00
<b>Fitments</b>				<b>\$11,100.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	340	5.00	1,700.00
<b>Site Preparation</b>				<b>\$1,700.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
2 100mm thick Crushed gravel paving including boxing out, basecourse etc	m <sup>2</sup>	240	38.00	9,120.00
14 Crushed gravel car packing paving including boxing out, basecourse etc. - Assumed 100mm thick	m <sup>2</sup>	100	38.00	3,800.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$12,920.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			3,000.00
<b>Builders Margin</b>				<b>\$3,000.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			3,000.00
<b>Professional Fees</b>				<b>\$3,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			3,000.00
55 Construction contingency (5%)	Item			1,500.00
<b>Contingency</b>				<b>\$4,500.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			0.00
<b>Not Allocated to Element</b>				<b>\$0.00</b>
<b>WELBY WEIR</b>				<b>\$38,720.00</b>

**WINGECARRIBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**K BONG BONG COMMON - CECIL HOSKINS NATURE RESERVE**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			500.00
<b>Preliminaries</b>				<b>\$500.00</b>
<b>FT Fitments</b>				
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
17 Bench seat	No	1	1,800.00	1,800.00
<b>Fitments</b>				<b>\$3,300.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	1	300.00	300.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$300.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			500.00
<b>Builders Margin</b>				<b>\$500.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			500.00
<b>Professional Fees</b>				<b>\$500.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			500.00
55 Construction contingency (5%)	Item			500.00
<b>Contingency</b>				<b>\$1,000.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			0.00
<b>Not Allocated to Element</b>				<b>\$0.00</b>
<b>BONG BONG COMMON - CECIL HOSKINS NATURE RESERVE</b>				<b>\$6,100.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

L GLOW WORM GLEN - WILLIAM STREET RESERVE

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			6,500.00
<b>Preliminaries</b>				<b>\$6,500.00</b>
<b>FT Fitments</b>				
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
4 Waymarkers on posts including footing	No	4	550.00	2,200.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	1	650.00	650.00
<b>Fitments</b>				<b>\$4,350.00</b>
<b>XP Site Preparation</b>				
51 Allowance to clear existing topsoil and dispose on site	m <sup>2</sup>	480	5.00	2,400.00
<b>Site Preparation</b>				<b>\$2,400.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
2 100mm thick Crushed gravel paving including boxing out, basecourse etc	m <sup>2</sup>	480	38.00	18,240.00
25 Allowance for basic wooden plank bridges excluding handrail over small gullies - assumed 6m - 8m	No	3	10,000.00	30,000.00
26 Wooden boxed out steps including wooden frame, drainage, compacted fill material, etc...	No	12	1,000.00	12,000.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$60,240.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>XX Alterations and Renovations to Existing External Works</b>				
40 Demolition of existing trail head sign including removal of debris off site	No	1	300.00	300.00
41 Demolition of existing waymarkers including removal of debris off site - assumed 30% of new required	No	2	80.00	160.00
<b>Alterations and Renovations to Existing External Works</b>				<b>\$460.00</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			7,500.00
<b>Builders Margin</b>				<b>\$7,500.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			7,500.00
<b>Professional Fees</b>				<b>\$7,500.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			8,000.00
55 Construction contingency (5%)	Item			4,500.00
<b>Contingency</b>				<b>\$12,500.00</b>



**WINGECARRIBBEE RECREATIONAL WALKING TRACKS****Order of Cost Estimate**

Location Element Item

**L GLOW WORM GLEN - WILLIAM STREET RESERVE (continued)**

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			500.00
<b>Not Allocated to Element</b>				<b>\$500.00</b>
<b>GLOW WORM GLEN - WILLIAM STREET RESERVE</b>				<b>\$101,950.00</b>

## 11.1 Walking Tracks Strategy

## ATTACHMENT 2 Draft Walking Tracks Strategy



## WINGECARRIBEE RECREATIONAL WALKING TRACKS

## Order of Cost Estimate

Location Element Item

M GOVERNORS ROAD

Rates Current At July 2020

Description	Unit	Qty	Rate	Total
<b>PR Preliminaries</b>				
52 Preliminaries and supervision (10%)	Item			45,000.00
<b>Preliminaries</b>				<b>\$45,000.00</b>
<b>FT Fitments</b>				
3 Trail head sign custom sign - steel frame with aluminium attached, 841 x 1189mm	No	1	1,500.00	1,500.00
4 Waymarkers on posts including footing	No	4	550.00	2,200.00
7 Interpretative sign steel frame with aluminium attached 594mm x 841mm	No	2	650.00	1,300.00
<b>Fitments</b>				<b>\$5,000.00</b>
<b>XR Roads, Footpaths and Paved Areas</b>				
21 Trail development to natural ground - assumed up to 1m wide	m	450	35.00	15,750.00
23 Wooden boardwalk trail development - assumed on grade up to 1m wide	m	450	950.00	427,500.00
<b>Roads, Footpaths and Paved Areas</b>				<b>\$443,250.00</b>
<b>XK External Stormwater Drainage</b>				
60 No allowance for stormwater to general pavement types	Item			Excl.
<b>External Stormwater Drainage</b>				<b>Excl.</b>
<b>MA Builders Margin</b>				
53 Margin and overheads (10%)	Item			49,500.00
<b>Builders Margin</b>				<b>\$49,500.00</b>
<b>PF Professional Fees</b>				
56 Professional fees (8%)	Item			50,000.00
<b>Professional Fees</b>				<b>\$50,000.00</b>
<b>CO Contingency</b>				
54 Design contingency (10%)	Item			54,500.00
55 Construction contingency (5%)	Item			30,000.00
<b>Contingency</b>				<b>\$84,500.00</b>
<b>NA Not Allocated to Element</b>				
57 Statutory fees and charges (0.5%)	Item			3,500.00
<b>Not Allocated to Element</b>				<b>\$3,500.00</b>
<b>GOVERNORS ROAD</b>				<b>\$680,750.00</b>



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## **ATTACHMENTS TO REPORT**

### **Item 12.3**

**DA20/1069 Robertson Hotel Redevelopment, 1 Fountaindale Road  
Robertson - Consultant Reports in relation to the Ecologically Endangered  
Community (EEC)**

#### **Attachment 1**

Attachment 1 Updated Biodiversity Development Assessment Report

12.3 DA20/1069 Robertson Hotel Redevelopment, 1 Fountaindale Road Robertson  
- Consultant Reports in relation to the Ecologically Endangered Community  
(EEC).

ATTACHMENT 1 Attachment 1 Updated Biodiversity Development Assessment  
Report



## Biodiversity Development Assessment Report

The Robertson Hotel

Report prepared by Narla Environmental

for Con Kotis c/- XPACE Design Group

July 2020

# 12.3 DA20/1069 Robertson Hotel Redevelopment, 1 Fountaindale Road Robertson - Consultant Reports in relation to the Ecologically Endangered Community (EEC).

## ATTACHMENT 1 Attachment 1 Updated Biodiversity Development Assessment Report



**NARLA**  
*environmental*

<b>Report:</b>	<b>Biodiversity Development Assessment Report</b>
<b>Prepared for:</b>	Con Kotis c/- XPACE Design Group
<b>Prepared by:</b>	Narla Environmental Pty Ltd
<b>Project no:</b>	Xpac2
<b>Date:</b>	July 2020
<b>Version:</b>	Final v2.0

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Any survey of flora and fauna will be unavoidably constrained in a number of respects. In an effort to mitigate those constraints, we applied the precautionary principle described in the methodology section of this report to develop our conclusions. Our conclusions are not therefore based solely upon conditions encountered at the site at the time of the survey. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Narla Environmental has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law. This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Narla Environmental for use of any part of this report in any other context. The review of legislation undertaken by Narla Environmental for this project does not constitute an interpretation of the law or provision of legal advice. This report has not been developed by a legal professional and the relevant legislation should be consulted and/or legal advice sought, where appropriate, before applying the information in particular circumstances. This report has been prepared on behalf of, and for the exclusive use of, the client who commissioned this report, and is subject to and issued in accordance with the provisions of the contract between Narla Environmental and the client who commissioned this report. Narla Environmental accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party. Narla Environmental Pty Ltd has completed this assessment in accordance with the relevant federal, state and local government legislation as well as current industry best practices including guidelines. Narla Environmental Pty Ltd accepts no liability for any loss or damages sustained as a result of reliance placed upon this report and any of its content or for any purpose other than that for which this report was intended.

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### 12.3 DA20/1069 Robertson Hotel Redevelopment, 1 Fountaindale Road Robertson - Consultant Reports in relation to the Ecologically Endangered Community (EEC).

#### ATTACHMENT 1 Attachment 1 Updated Biodiversity Development Assessment Report



## Report Certification

Works for this report were undertaken by:

Staff Name	Position
Alexander Graham <i>BSc</i>	Narla Environmental Accredited Biodiversity Assessor (BAAS19040) and Senior Ecologist
Stefan Giessler <i>BSc</i>	Narla Environmental Ecologist
Jonathan Coy <i>BEnv</i>	Narla Environmental Ecologist
Jack Tatler <i>Bcs Hons PHD</i>	Narla Environmental Project Manager and Ecologist
Sarah Cardenzana <i>BEnvSc</i>	Narla Environmental Ecologist/Botanist

## Document Control

Revision	Document Name	Issue Date	Internal Document Review	Approved for Issue
Draft v1.0	Biodiversity Development Assessment Report (BDAR) for The Robertson Hotel	02/05/2019	Alexander Graham	Alexander Graham
Draft v1.1	Biodiversity Development Assessment Report (BDAR) for The Robertson Hotel	19/03/2020	Alexander Graham Jack Tatler	Alexander Graham
Final v1.0	Biodiversity Development Assessment Report (BDAR) for The Robertson Hotel	23/02/2020	-	Alexander Graham
Final v2.0	Biodiversity Development Assessment Report (BDAR) for The Robertson Hotel	30/07/2020	Sarah Cardenzana Alexander Graham	Alexander Graham

**12.3 DA20/1069 Robertson Hotel Redevelopment, 1 Fountaindale Road Robertson  
- Consultant Reports in relation to the Ecologically Endangered Community  
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## Glossary

Acronym/ Term	Definition
BAM	The NSW Biodiversity Assessment Method
BAMC	The NSW Biodiversity Assessment Method Calculator
BC Act	New South Wales Biodiversity Conservation Act 2016
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
Biodiversity credit report	the report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
Biodiversity Offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity from the impacts of development.
BOS	NSW Biodiversity Offset Scheme.
Biodiversity Values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BioNet	BioNet is made up of a number of data collections. Refer to the links under 'Data collections' for more information. These collections are mostly contained within two core applications; BioNet Atlas and BioNet Vegetation Classification.
BioNet Vegetation Classification	Information about the NSW vegetation communities is maintained in the BioNet Vegetation Classification application. This includes Plant Community Types (PCTs), the master community-level typology used in NSW's planning and assessment tools and vegetation mapping programs.
DA	Development Application
DBH	'diameter at breast height' the cylindrical diameter of a tree trunk in centimetres sampled at 1.37 metres above the ground
Ecosystem credit	A credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FFA	Flora and Fauna Assessment
ha	Hectare

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Acronym/ Term	Definition
km	Kilometre
KTP	Key Threatening Process (as listed in the BC Act)
LGA	Local Government Area
Locality	The area within a 10km radius of the subject land. The same meaning when describing a local population of a species or local occurrence of an ecological community.
m	metres
MNES	Matters of National Environmental Significance
Native Vegetation	means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub or any scrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland.
NPWS	NSW National Parks and Wildlife Services
NSW	The State of New South Wales
OEH	Office of Environment and Heritage
PCT	NSW Plant Community Type
Proposal	The development, activity or action proposed.
SAIL	Serious and Irreversible Impacts
SAIL entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAILs)
SEPP	State Environmental Planning Policy
Species Credit	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject Land	The location of the proposed activity, the subject of this report.  The land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Subject Property	1 Fountaindale Road, Robertson, 2577 (Lot 2/DP610676)
Threatened biota	Threatened species, populations or ecological communities listed under the BC Act and/or the EPBC Act.
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1, 1A and 2 and ' <i>threatened species, population or ecological community</i> ' means a species, population or ecological community specified in any of those Schedules.



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Acronym/ Term	Definition
VMP	Vegetation Management Plan
VIS Plot	Vegetation Integrity Survey Plot

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## Executive Summary

Con Kotis c/- XPACE Design Group propose to renovate the heritage hotel, located at 1 Fountaindale Road, Robertson, NSW, 2577 (Lot 2, DP610676). This will involve the construction of a new eastern hotel wing, thirteen (13) eco-cabins and seven (7), three-storey villas, leisure facilities and an associated network of footpaths and roads. This Biodiversity Development Assessment Report (BDAR) has been prepared by Narla Environmental Pty Ltd to identify the potential impacts of the proposal on biodiversity values within the subject land. This assessment has been completed in accordance with the Biodiversity Assessment Method (BAM) and includes:

- Comprehensive literature review and desktop assessment to describe the historically recorded environmental and landscape features of the subject land and to identify the suite of threatened biota potentially affected by the proposal;
- Site assessment to describe the biodiversity values of the subject land and to determine the likelihood of threatened biota and their habitats occurring within the proposed development footprint;
- Targeted field surveys for a suite of candidate species credit species identified by the Biodiversity Assessment Method Calculator (BAMC) as likely to occur within the native vegetation of the subject land in accordance with the relevant NSW threatened species survey guidelines;
- Discussion and recommendation of measures to avoid and minimise impacts to biodiversity values; and
- Biodiversity Assessment Method calculations using the credit calculator version 1.2.7.2 to quantify the level of biodiversity impacts of the proposal following implementation of measures to avoid and minimise impacts and to determine the biodiversity credits that will need to be purchased and retired to offset the residual impacts of the proposal.

The proposed development is located within a bushland landscape in land zoned *E3-Environmental Management*. The proposal has been purposefully designed to minimise impacts on biodiversity values, including a redesign to avoid high conservation value entities including Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions- Critically Endangered Ecological Community (CEEC) (**Figure 13**).

The proposed development is expected to result in impacts to one plant community type (PCT) comprising removal or APZ management of 3.3 hectares (ha) of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion. PCT 1129 conforms to the Endangered Ecological Community (EEC) Robertson Rainforest in the Sydney Basin Bioregion, which is listed as an 'SAIL entity' within the BioNet Threatened Biodiversity Data Collection (OEH 2019b). Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the proposed impacts are serious and irreversible has been undertaken in accordance with Section 10.2.2 of the BAM (OEH 2017a): 'Additional impact assessment provisions for ecological communities'. In addition, Robertson Basalt Tall Open-forest CEEC is listed as an 'SAIL entity' within the BioNet Threatened Biodiversity Data Collection (OEH 2019b). Although this CEEC will not be directly impacted by the proposed development, an SAIL determination has been undertaken to examine any potential indirect impacts this CEEC will be subjected to.

The proposed development is not expected to impact any threatened biota listed under the Fisheries Management Act 1994 (FM Act).

The biodiversity assessment and credit calculations have been performed in accordance with the BAM (OEH 2017a) and BAMC. The following credits are required to be purchased and retired to offset the biodiversity impacts of the proposal:

- 36 ecosystem credits to offset impacts to 3.3 ha of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion.

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Other threatened species identified as potentially being impacted by the proposal are classed as ecosystem credit species which are to be offset through the retirement of the above listed ecosystem credits.

In order to avoid and minimise potential impacts of the proposal on local biodiversity values, a series of mitigation and management measures have been identified. These include measures to:

- Ensure all contractors employed to work within and around identified biodiversity values within the subject land are suitably qualified and experienced;
- Assign a Project Ecologist to conduct and oversee all ecological compliance requirements associated with conducting a proposed development in line with all relevant state and commonwealth legislation and guidelines;
- Prepare a site-specific Vegetation Management Plan (VMP) that will guide the implementation of all required revegetation efforts in order to minimise and mitigate the potential biodiversity impacts of the proposed activity;
- Have an ecologist present during the clearing of all vegetation both native and exotic related to the proposed development;
- Use native species in all landscape planting within the subject land;
- Install two (2) nest boxes for each hollow removed, in the event a hollow-bearing tree is removed for APZ management;
- Protect trees indicated to remain through successful implementation of the Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970);
- Relocate and reinstate threatened fauna habitat features identified within the proposed impact area; and
- Implement all relevant biological hygiene protocols and requirements as per NSW Government guidelines.

During operation there is potential for the proposal to indirectly impact surrounding vegetation and habitat values through:

- Generation of additional light and noise;
- Erosion and sedimentation as a result of runoff from hard stand areas;
- Introduction of weed propagules by vehicle and/or residents/businesses;
- Fauna mortality as a result of collision with vehicles;
- Increased risk of fire; and
- Rubbish dumping.

Mitigation measures are to be implemented to minimise potential operational impacts. These would include:

- Ongoing management of priority weeds according to statutory requirements; and
- Measures to reduce the increased risk of fire.

Considering the nature of the proposal, and the proposed impact mitigation measures proposed, there are unlikely to be any notable indirect impacts on biodiversity values arising from the proposed development. Only the direct impacts of vegetation clearing associated the proposal will require biodiversity offsets as per the BAM.

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate credits from stewardship sites that comply with the trading rules of the NSW Biodiversity Offsets Scheme (BOS) in accordance with the 'like for like' report generated by the BAM calculator. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the Biodiversity Conservation Trust would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.



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## 1. Introduction

### 1.1 Overview

Narla Environmental Pty Ltd (Narla) was engaged by XPACE Design Group on behalf of Con Kotis ('the proponent') to deliver this BDAR to accompany a DA for the redesign of the Robertson Hotel, including the renovation of the heritage hotel, the construction of a new eastern hotel wing, thirteen (13) eco-cabins and seven (7), three-storey villas, leisure facilities and an associated network of footpaths and roads.

This report describes the biodiversity values at the site, with particular emphasis on identification of native PCTs and threatened ecological communities, populations, species and their habitats. It assesses the impact of the proposal, contains measures to avoid and minimise impacts and describes and quantifies the biodiversity credits required to offset the residual impacts of the proposal on biodiversity values.

Narla have produced this report in order to assess any potential impacts associated with the DA and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority, Wingecarribee Shire Council, and in accordance with the objectives of the BOS.

### 1.2 Site Location and Description

The Robertson Hotel is situated at 1 Fountaindale Road, Robertson, NSW, 2577 (the 'subject property') (**Figure 1**). The subject property encompasses approximately 5.03 ha and is located within the Wingecarribee Local Government Area (LGA).

The subject property is bounded by the Illawarra Highway to the north and Fountaindale Road to the west and the Unanderra-Moss Vale railway line to the south.

The subject land covers an area of approximately 4 ha of land including 3.3 ha of vegetation and 0.7 ha of existing infrastructure. It is situated within a transition area between bushland and urban landscapes. The Robertson Hotel grounds encompass the historic Robertson Hotel, and its well-manicured gardens with the peripheries of the subject land comprised of remnant rainforest and scattered woodland.

### 1.3 Proposed Development

The proposed DA includes the construction of a new eastern-wing of the Robertson Hotel, thirteen (13) eco-cabins and seven (7), three-storey villas and includes ancillary facilities and infrastructure (roads and paths). The subject land is mapped as Fire Prone Land (Peterson 2020) and as such, the creation of a 2.1 ha Asset Protection Zone (APZ) will be required around the subject land.

Impacts to vegetation required to facilitate the proposed development are presented in **Table 1**. The number and species of trees impacted by the development have been determined in consultation with the final architectural plans and the associated tree plans produced for the subject property.

**Table 1. Impacts to vegetation to facilitate development.**

Vegetation type	Removed (ha)	APZ Managed (ha)	Total (ha)
Intact native bushland	0.21	0.42	0.63
Native regrowth	0.21	0.43	0.64
Modified native bushland	0.01	0.025	0.035

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Vegetation type	Removed (ha)	APZ Managed (ha)	Total (ha)
Grassland	0.28	0.34	0.62
Manicured Garden	0.48	0.89	1.37

Narla have produced this report in order to assess any potential impacts associated with the DA and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the consent authority, Wingecarribee Shire City Council.

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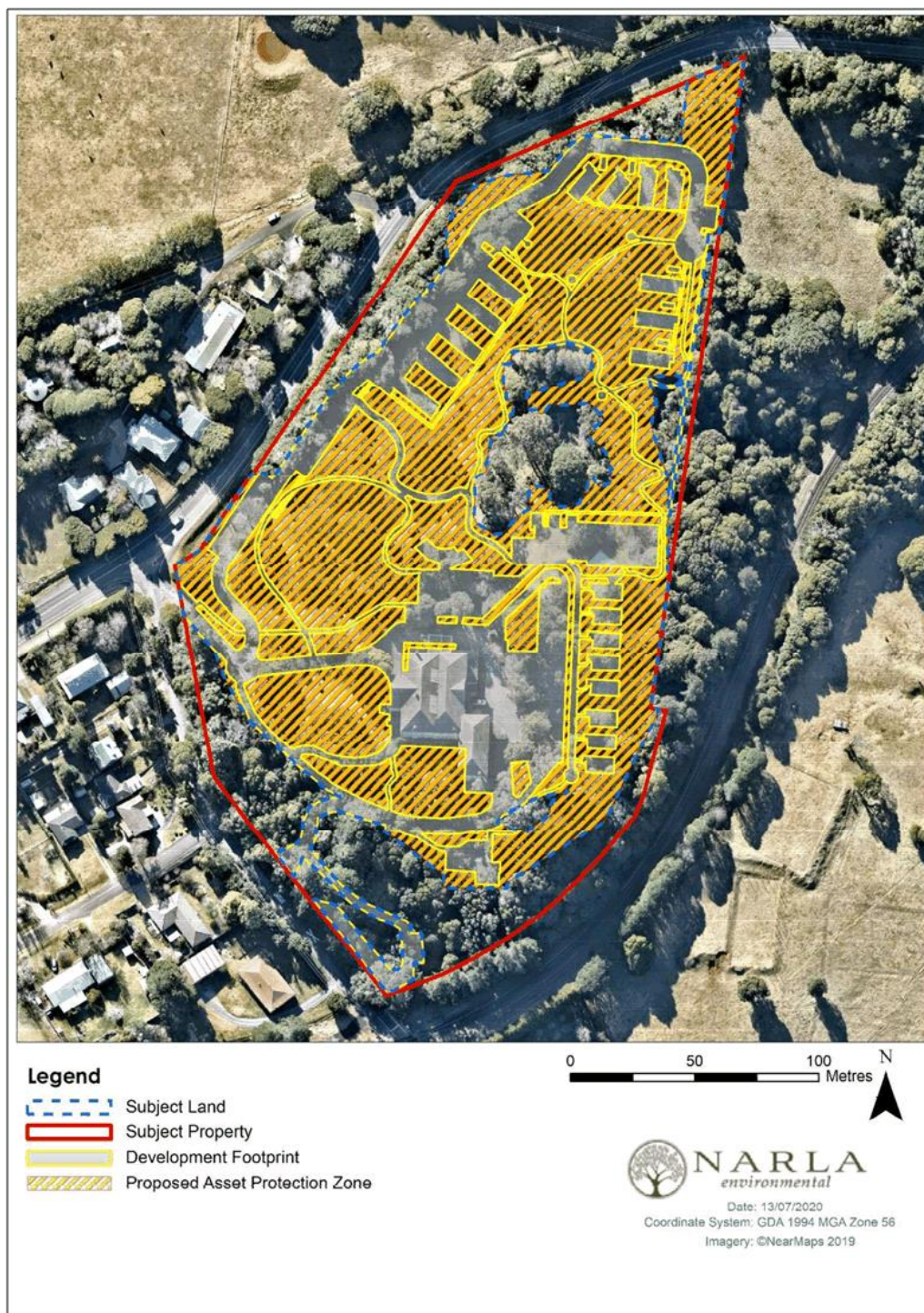


Figure 1. Site overview showing proposed development footprint and proposed bushfire APZ. Derived from plans



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#### 1.4 Sources of Information Used

A thorough literature review was undertaken into the ecology in the locality and Wingecarribee LGA. Relevant data and literature reviewed in preparation of this report included:

- Relevant State and Commonwealth Databases:
  - NSW BioNet. The website of the Atlas of NSW Wildlife (OEH 2019a)
  - NSW Bionet. Threatened Biodiversity Data Collection (OEH 2020a)
  - NSW Bionet. Vegetation Classification System (OEH 2020b)
  - NSW Government Spatial Services: Six Maps Clip & Ship (NSW Government Spatial Services 2020).
- NSW Scientific Committee Final Determinations for:
  - Robertson Rainforest in the Sydney Basin Bioregion – endangered ecological community listing (NSW Scientific Committee 2011a)
  - Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions (NSW Scientific Committee 2017)
  - Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion – Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act (NSW Scientific Committee 2011b)
- Commonwealth Approved Conservation Advice for:
  - Upland Basalt Eucalypt Forest of the Sydney Basin Bioregion EEC (DoEE 2011)
  - Robertson Rainforest in the Sydney Basin Bioregion CEEC (DoEE 2019)
- Vegetation Mapping:
  - Wingecarribee Biodiversity Strategy (Phase 1) – Vegetation Mapping (Ecological 2003)
  - New South Wales Vegetation Information System (VIS) 2.1 (OEH 2017)
  - NSW State Guidelines:
  - Threatened Species Survey and Assessment: Guidelines for activities and activities. Working Draft (DEC 2004)
  - Threatened species survey and assessment guidelines: field survey methods for fauna: Amphibians (DEC 2009)
  - NSW Guideline to Surveying Threatened Plants (OEH 2016b)
  - 'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (OEH 2018c)
  - Guidance to assist a decision-maker to determine a serious and irreversible impact (OEH 2017c)
- Council Documents:
  - Wingecarribee Local Environmental Plan (WLEP) 2010
  - Robertson Village Development Control Plan (DCP) 2017
  - Wingecarribee Shire Council Flora and Fauna Assessment Guidelines for Development Applications 2013
  - Wingecarribee Shire Council - Checklist for the assessment of a Flora and Fauna Report
  - Wingecarribee Biodiversity Strategy Phase 1 Maps – Local Corridors, Regional Corridors, Priority habitat and Corridors for Conservation (Eco Logical 2003)
  - Weeds declared in the South East (Wingecarribee Shire Council) (DPI 2019)

Preparation of this BDAR also involved the review of the following accompanying project documents:

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- Proposed Architectural Plan (XPAGE Design Group 2019)
- Bushfire Hazard Report for 1 Fountaindale Road, Robertson, 2577 (Peterson Bushfire 2019)

Online databases and literature review were used to gain an understanding of the natural environment and ecology of the subject land and its surrounds. Searches using NSW Wildlife Atlas (BioNet) were conducted to identify current threatened flora and fauna records within a 10km<sup>2</sup> search area centred on the subject land. These data were used to assist in establishing the presence or likelihood of any such ecological values as occurring on or adjacent the subject land and helped inform our Ecologist on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment on the subject land and assist in determining whether any threatened flora or ecological communities may occur there (Hazelton 1992).

### **1.5 Aim and Approach**

This report has been prepared in accordance with the BAM (OEH 2017a) and aims to:

- Describe the biodiversity values present within the subject land, including the extent of native vegetation, vegetation integrity and the presence of threatened ecological communities (TECs);
- Determine the habitat suitability within the subject land for candidate threatened species;
- Prepare an impact assessment in regard to potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and serious and irreversible impacts (SAIIs) within the subject land;
- Discuss and recommend efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e. ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker (Wingecarribee Council) as to the number and class of offset credits required to be purchased and retired as a result of the proposed development.

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## 2. Landscape Features

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### 2.1 IBRA Bioregions and Mitchell Landscapes

The subject land occurs within the Moss Vale Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion (version 7) subregion of the Sydney Basin IBRA Bioregion.

New South Wales Landscapes Mapping: Background and Methodology (Mitchell 2002) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided location information and a meaningful descriptive landscape term. The subject land occurs entirely within the 'Robertson Basalts' NSW Mitchell Landscape (**Figure 2**).

#### 2.1.1 Robertson Basalts (Moss Vale Basalts)

Flat top hills and small plateau standing above undulating shale hills of the Moss Vale Highlands landscape on Tertiary basalt flows, general elevation 800 to 850m, local relief 40m. Red and red-brown structured loam and clay loam with uniform or gradational profiles, good water holding capacity and high fertility. Tall forests of; *Eucalyptus piperita* (Sydney peppermint), *Eucalyptus elata* (River Peppermint), *Eucalyptus fastigata* (Brown Barrel), *Eucalyptus viminalis* (Manna Gum), *Eucalyptus moluccana* (Coastal Grey Box), *Eucalyptus stellulata* (Black Sallee) and *Eucalyptus pauciflora* (Snow Gum). Rainforest elements in protected gorges; *Doryphora sassafras* (Sassafras), *Ceratopetalum apetalum* (Coachwood), *Eucryphia moorei* (Eastern Leatherwood), *Diploglottis australis* (Native Tamarind), *Schizomeria ovata* (White Cherry), *Acmena smithii* (Lilly Pilly), *Acacia melanoxylon* (Blackwood), *Ficus obliqua* (Small-leaved Fig) with *Dicksonia Antarctica* (Soft Tree-fern) and *Cyathea australis* (Rough tree-fern) understorey.



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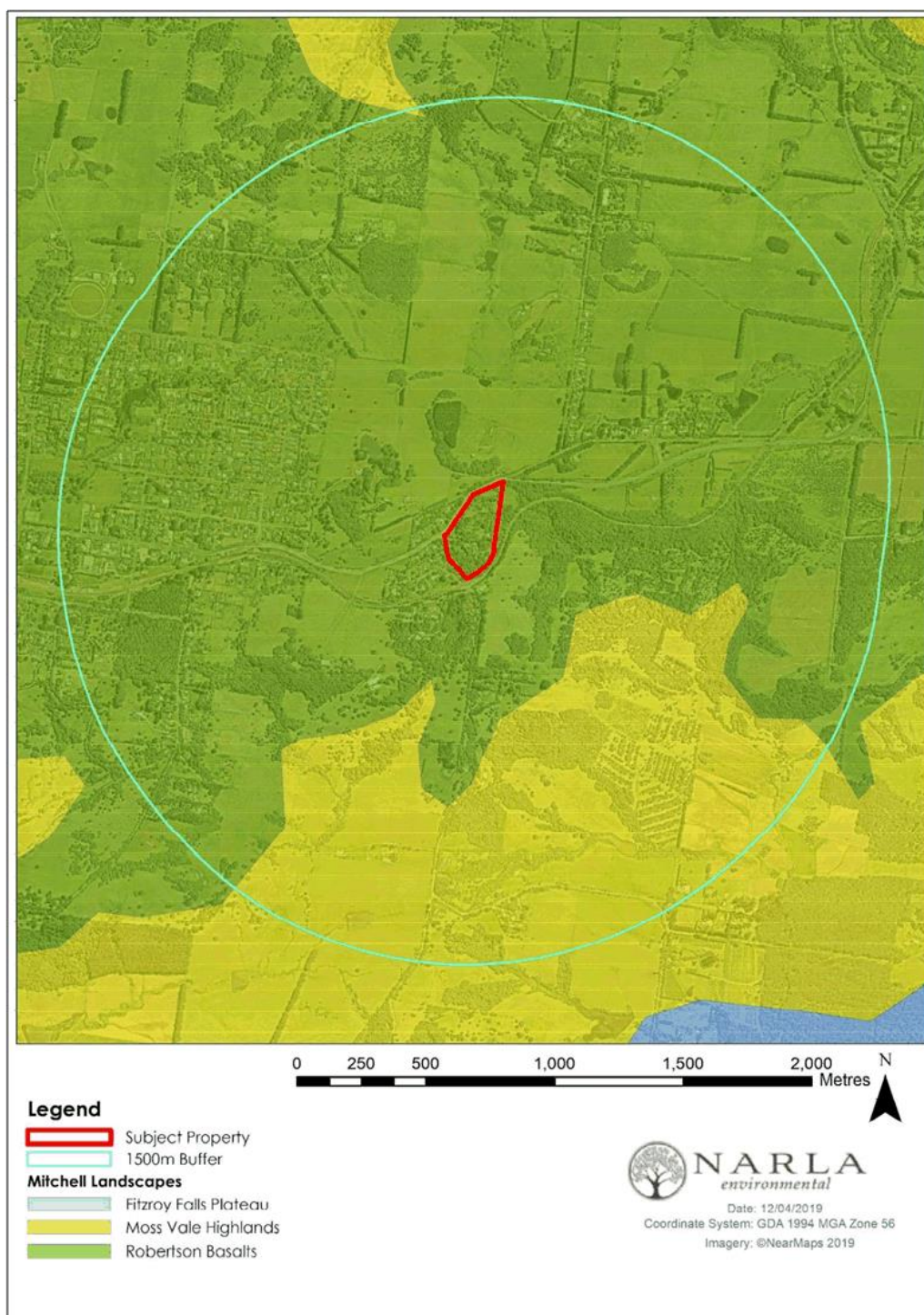


Figure 2. Location map identifying NSW Mitchell Landscapes within 1500m buffer.



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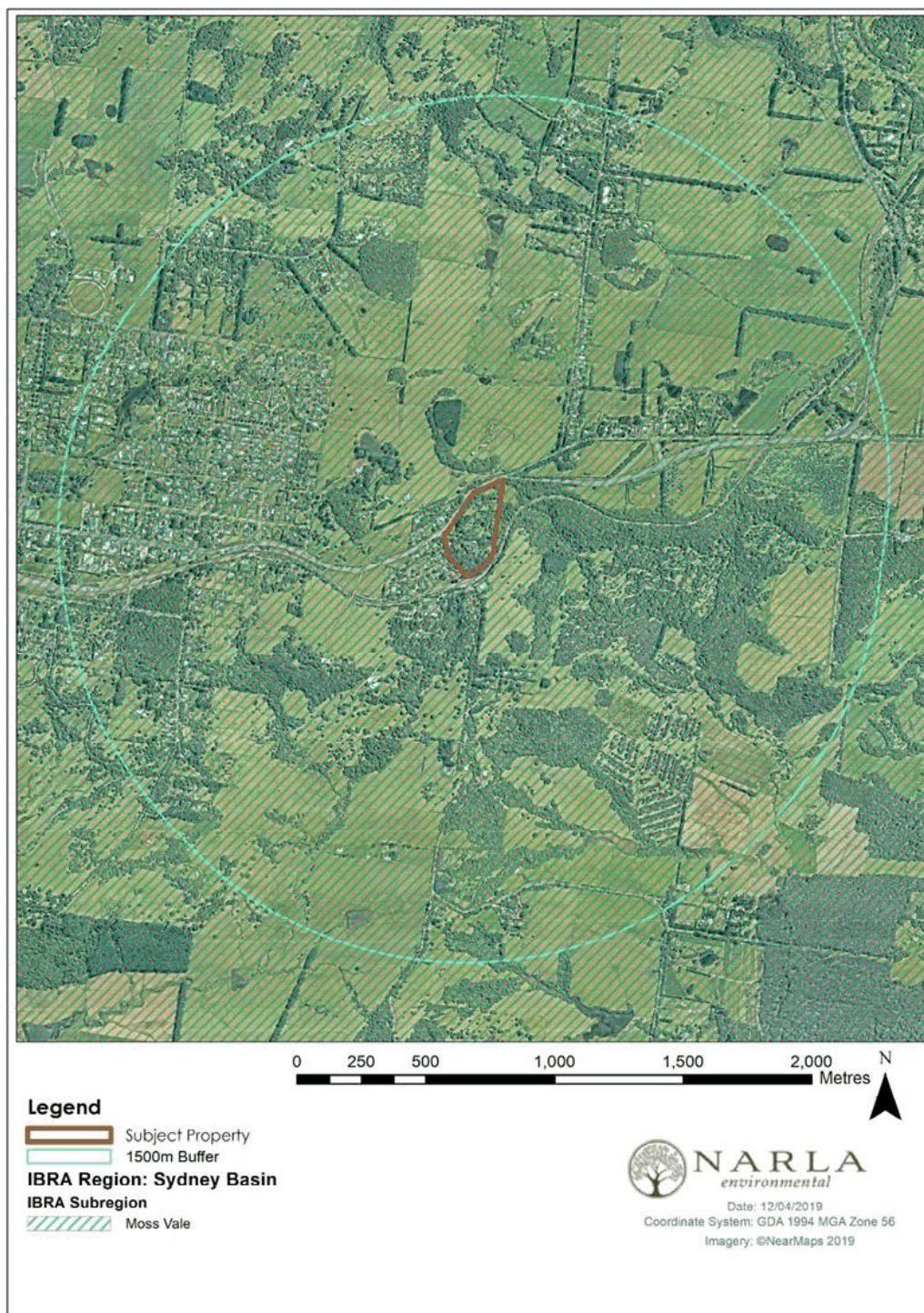


Figure 3. Location map identifying IBRA Subregion within 1500m buffer.

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## 2.2 Topography, Geology and Soils

The subject land is situated within the 'Robertson' soil landscape identified by Hazelton (1992). The Robertson soil landscape is characterised by undulating to rolling hills with flat-topped ridges on basalt and basanite. Relief 30-100m, Slopes 5-15%. Remnant knolls and small rounded flat-topped crests. Extensively cleared with isolated stands of low woodland and closed-forest. Elevation ranges between 757m above sea level (asl) in the south-east and 771m asl in the north-east of the site (Google 2019).

## 2.3 Hydrology

No watercourses or water bodies have been historically mapped within 1:25,000 topographical mapping (SIXMaps 2019). Overland stormwater flows across the site in a predominantly south-easterly direction, away from a high point in the north-western extent of the subject land. Two (2) man-made dams are located in the northwest extent of the subject land (**Figure 10**).

### 2.3.1 Biodiversity Values Mapping

The Biodiversity Values (BV) Map identifies land with high biodiversity value that is particularly sensitive to impacts from development and clearing (OEH 2019b). Biodiversity values have been mapped in the south of the subject land adjoining a large area to the east (**Figure 8**)

**Table 2. Landscape features identified within the subject land and surrounding 1500m buffer.**

Landscape Feature	Identification of Landscape Feature on Site
<b>Native vegetation extent in 1500m buffer area</b>	The 1500m buffer zone covers an area of approximately 850 ha ( <b>Figure 4</b> ). Within this, native vegetation covers approximately 730 ha. This area of native vegetation represents 85% of the 1500m buffer zone. The native vegetation cover observed results in the assessment area being assigned to the >70% cover class.
<b>Cleared area within 1500m buffer</b>	The total of cleared land within the assessment area surrounding the subject land covers approximately 127 ha ( <b>Figure 4</b> ). This area of cleared land accounts for approximately 15% of the land within the 1500m buffer zone.
<b>Rivers and Streams (classified according to stream order)</b>	No mapped watercourses occur within the subject land ( <b>Figure 5</b> ). A number of mapped watercourses occur within the 1500m buffer of the subject land. The watercourses range from 1 <sup>st</sup> order streams to 3 <sup>rd</sup> order streams and are primarily tributaries that form part of the catchment of Shoalhaven.
<b>Wetlands (within, adjacent to and downstream of site)</b>	No mapped wetlands occur within the subject land.
<b>Connectivity features</b>	The primary connectivity feature identified within the subject land is the native vegetation within the south-eastern extent of the site that connects directly to a strip of remnant, native vegetation that extends in an easterly direction away from the subject land toward the coast.  The identified area of habitat connectivity between the subject land and native vegetation within the 1500m buffer zone has the potential to provide habitat for a number of threatened species, endangered populations and migratory species. The potential impacts of the proposed activity on such species is detailed further within <b>Section 4</b> .
<b>Areas of geological significance and soil hazard features</b>	No areas of geological significance (karsts, caves, crevices or cliffs) were identified within the subject land. This was determined as a result of a comprehensive site-based assessment.



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	No areas of soil hazards (acid sulphate soils, etc.) were identified within the subject land. This was determined as a result of a comprehensive desktop-based assessment.
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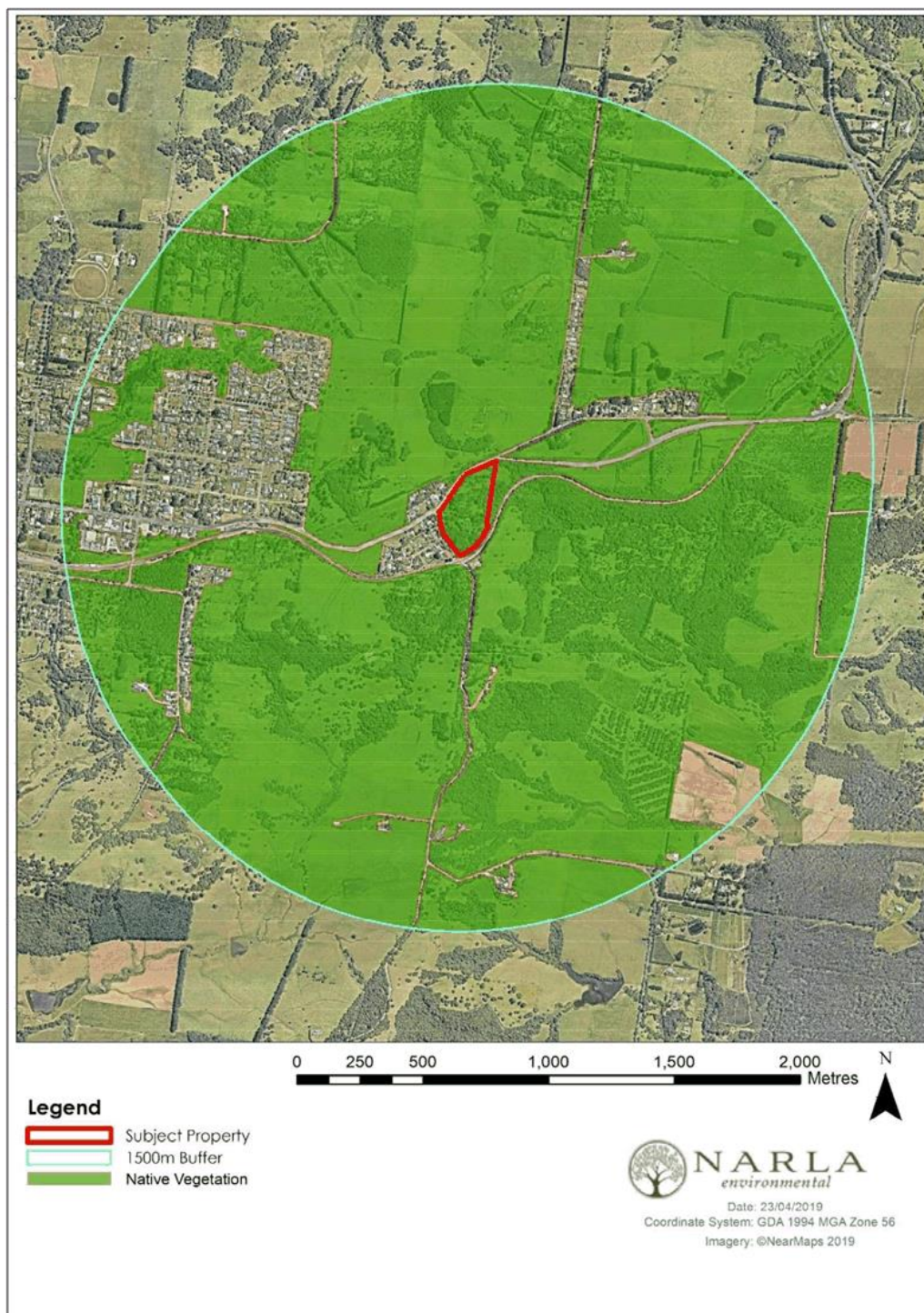


Figure 4. Location map identifying the extent of native vegetation occurring within the 1500m buffer surrounding the subject land.



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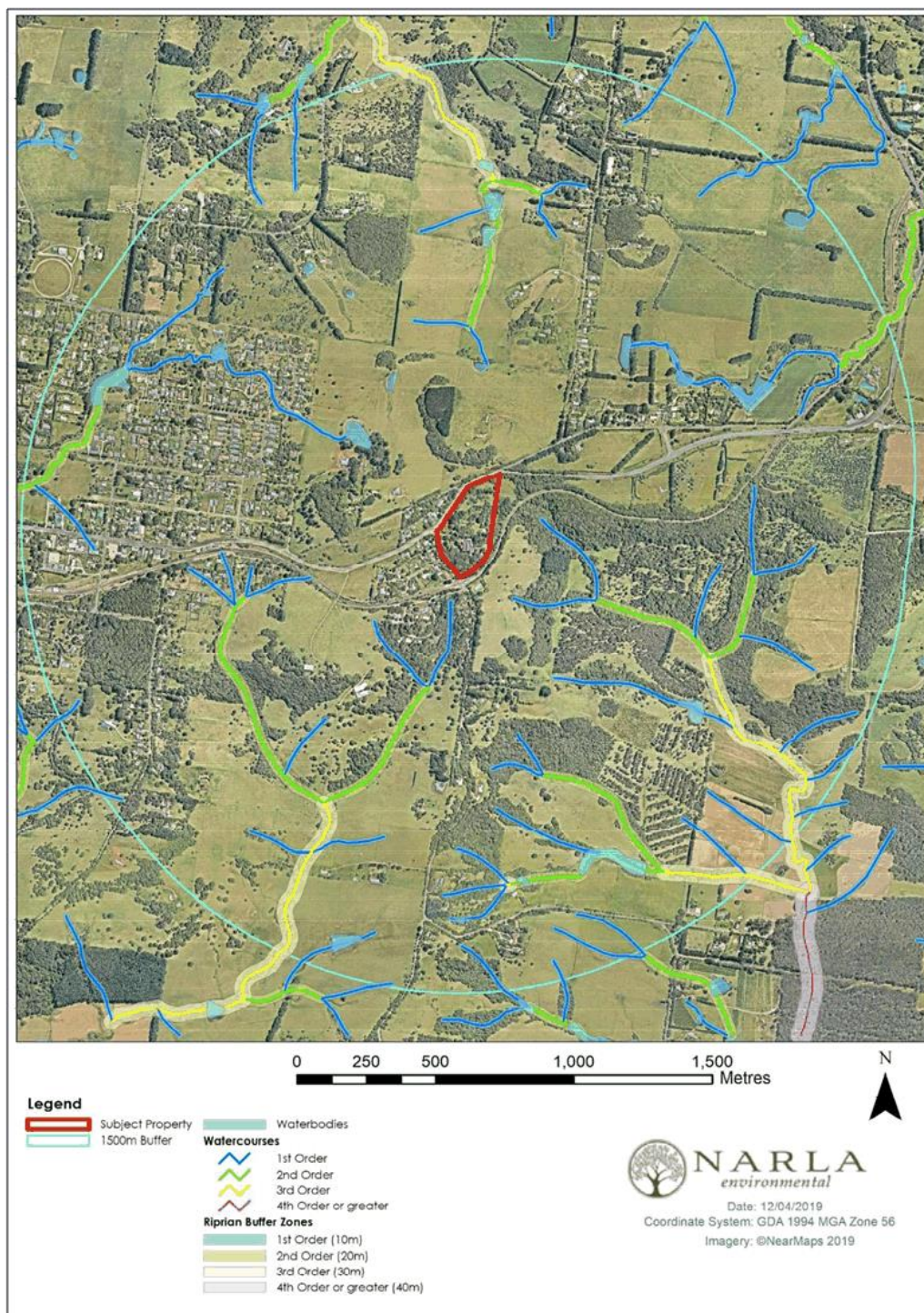


Figure 5. Location identifying rivers, streams, estuaries and riparian buffer zones occurring within the 1500m buffer.



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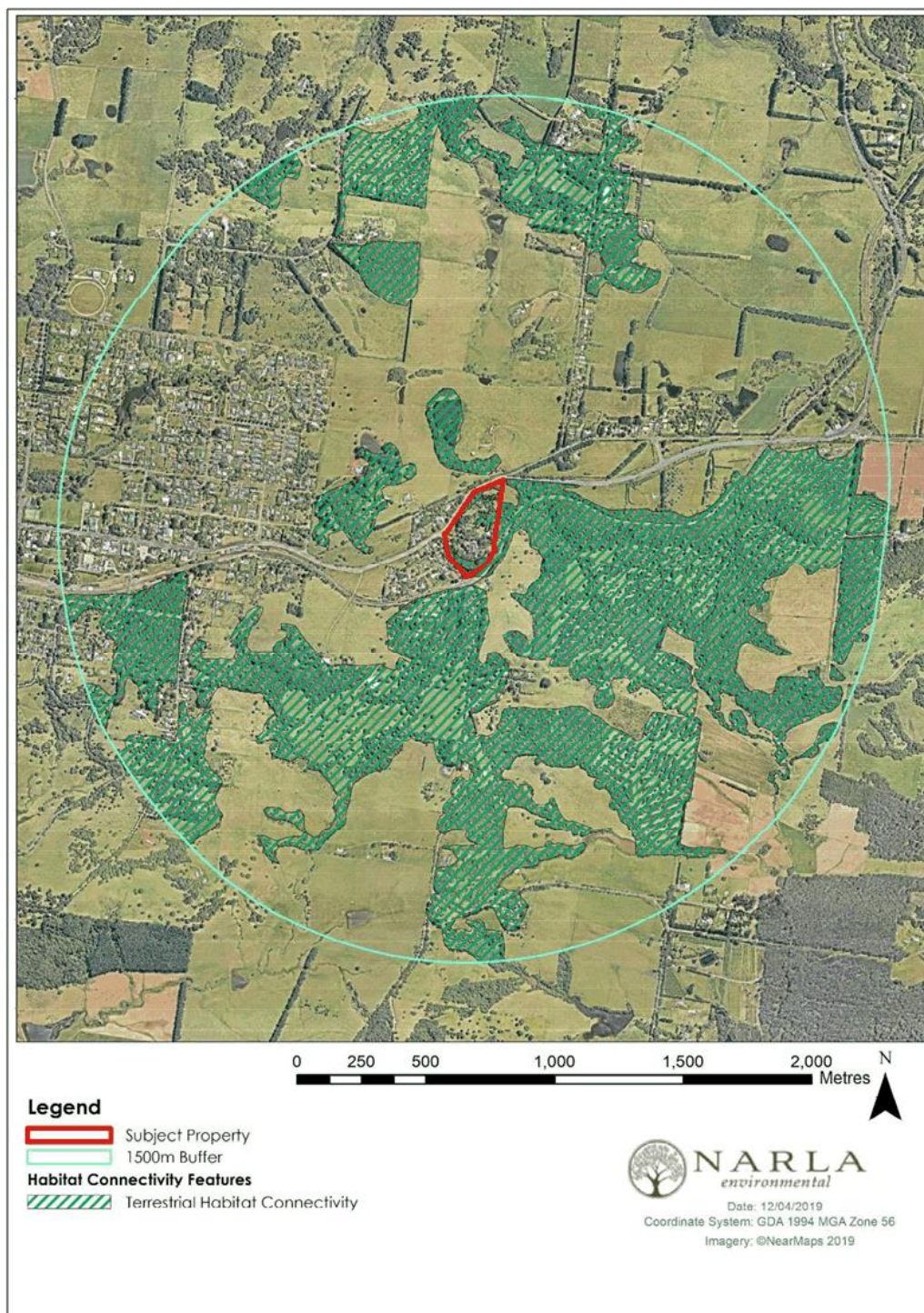


Figure 6. Location map identifying terrestrial habitat connectivity within the 1500m buffer.



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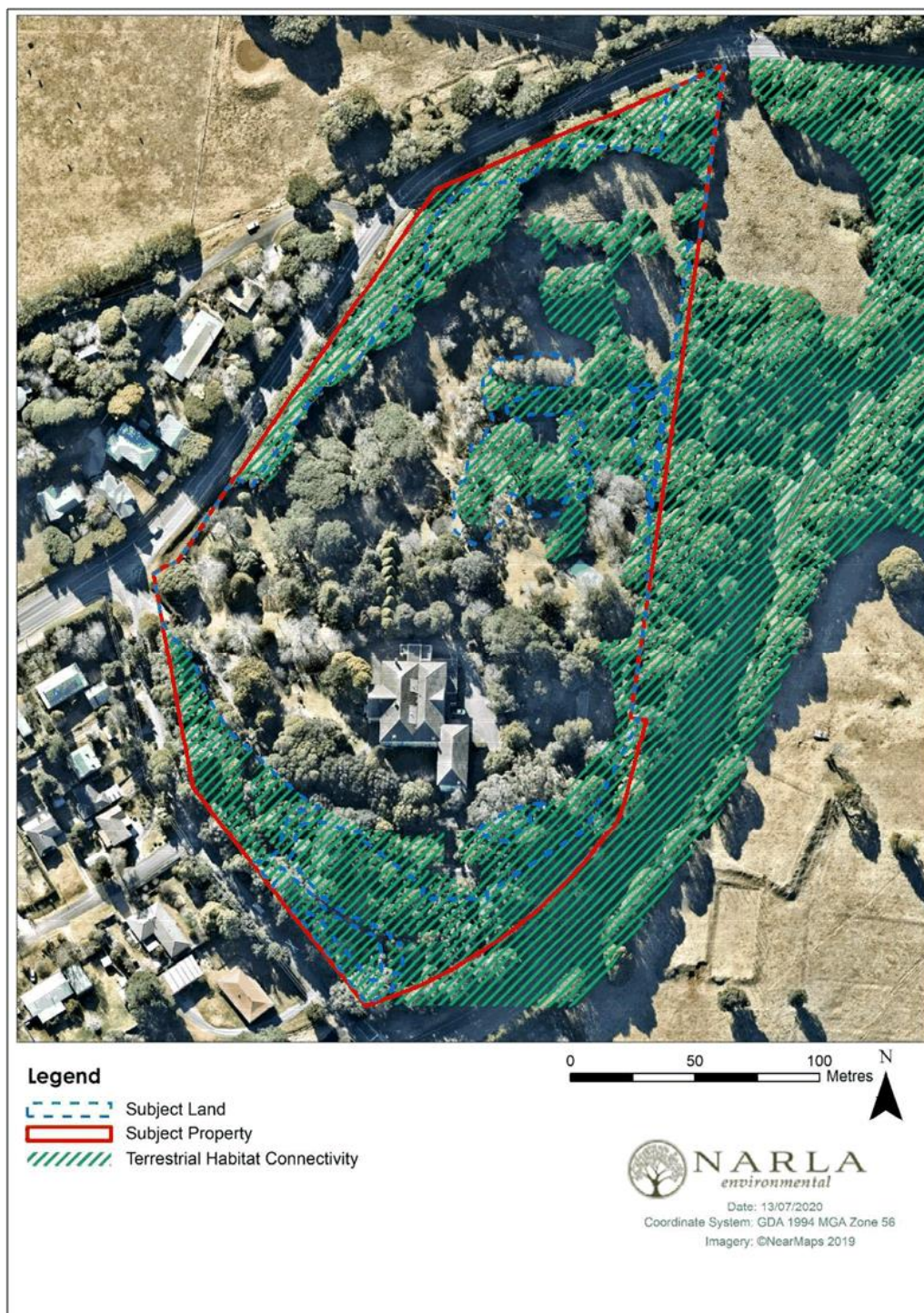


Figure 7. Site map identifying terrestrial habitat connectivity within the subject land.



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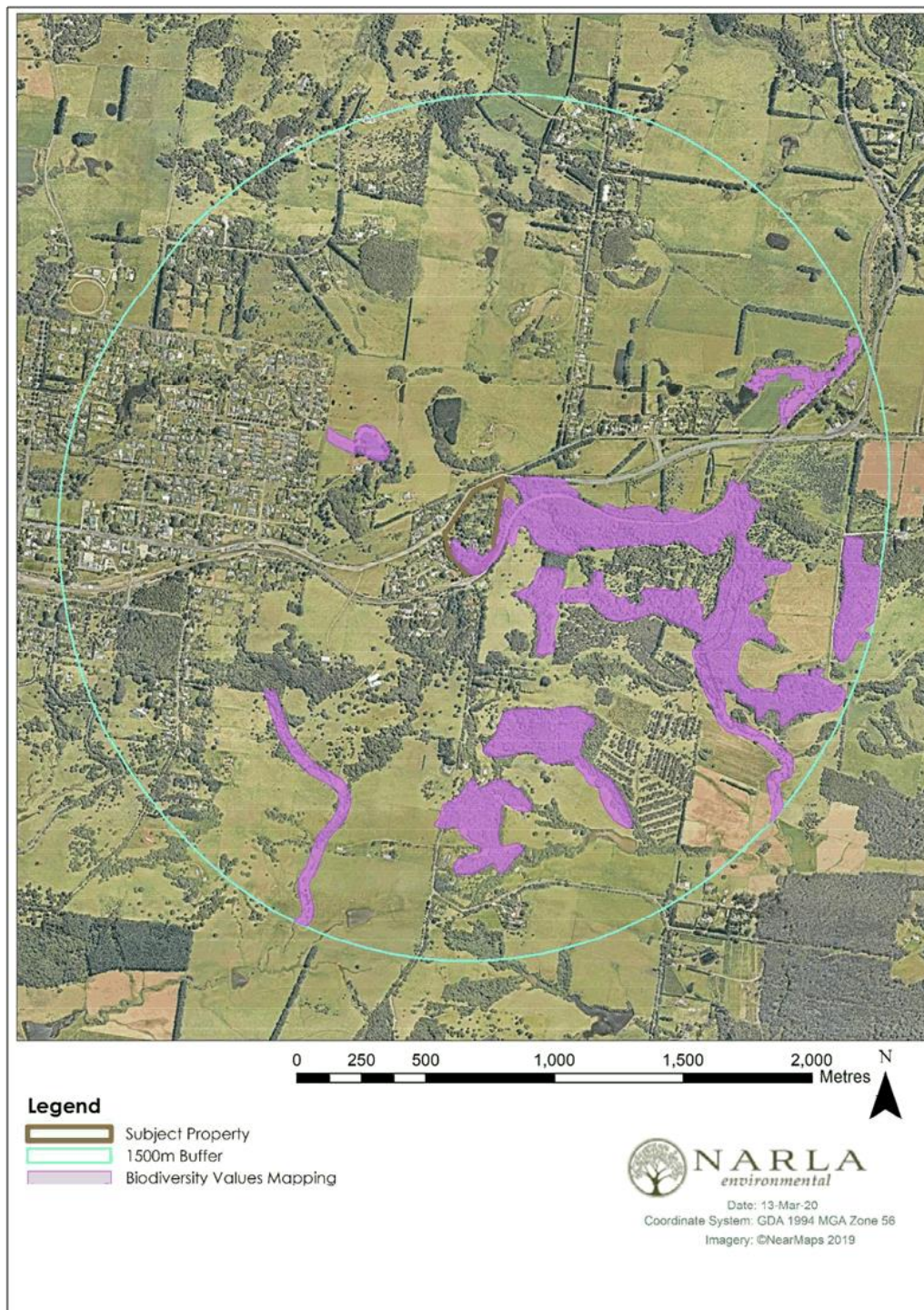


Figure 8. Biodiversity Values Mapping.



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### 3. Native Vegetation

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#### 3.1 Assessing Native Vegetation Cover

Native vegetation cover and patch size have been assessed in accordance with Section 4.3 of the BAM (OEH 2017a). Components of the site context will be used in order to assess the suitability of habitat for threatened species within the subject land.

A buffer area of 1500m surrounding the outside edge of the boundary of the subject land was prepared in order to determine the extent of native vegetation within the surrounding area. Native vegetation was considered to cover approximately 730ha within the buffer circle and was assigned the >70% cover class (**Figure 4**).

#### 3.2 Assessing Patch Size

Patch size as defined by the BAM as 'an area of native vegetation that:

- occurs on the development site or biodiversity stewardship site, and
- includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site' (OEH 2017a).

Patch size was calculated according to the above guidelines, and equated to >100 ha (**Figure 4**).

#### 3.3 Historically Mapped Vegetation Communities

Vegetation mapping (Ecological 2003) historically mapped the subject land as containing a single vegetation community (**Figure 9**):

- Robertson Basalt Rainforest.

See **Figure 9** for the historically mapped extent of this community within the subject land.

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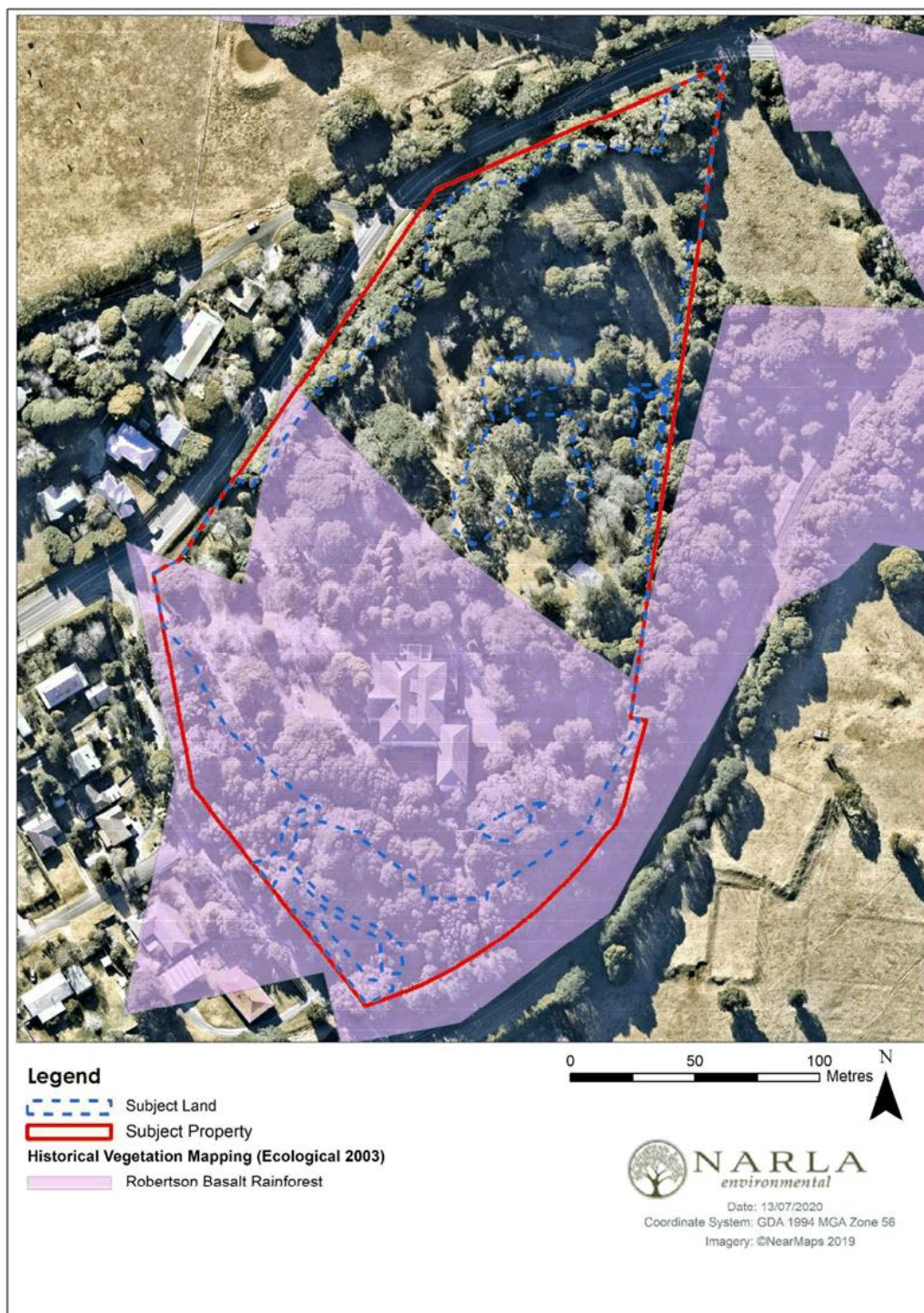


Figure 9. Historically mapped vegetation within the subject land (Eco Logical 2003).

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#### 3.4 Plant Community Types (PCT) Identified within the Subject Land

Site assessment conducted by Narla between 8<sup>th</sup> - 9<sup>th</sup> October 2018 and 20<sup>th</sup> - 21<sup>st</sup> March revealed the subject land was largely dominated by exotic, ornamental gardens, with significant patches of native vegetation occurring on the peripheries of the subject property.

The collection of structural and species composition vegetation surveys over transects and 20m x 20m quadrats informed the identification of one PCT within the subject land. The characteristic features that lead Narla to select the PCT is provided in the table below (**Table 3**; **Table 4**; **Table 5**):

- PCT 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion (detailed in **Table 5**).

In accordance with the BAM, five 20m x 50m Vegetation Integrity Survey (VIS) plots were undertaken within native vegetation on the subject land (**Figure 7**).

Additionally, the following PCT was identified directly adjacent to the subject land:

- PCT743 Brown barrel – Mountain Grey Gum tall moist forest on basalts of the Southern highlands Bioregion and Sydney Basin Bioregion (detailed in **Table 6**)

This PCT will not be directly impacted by the proposed development.

##### 3.4.1 Selection process for PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion

Our PCT selection was undertaken using information and databases provided in the BioNet Vegetation Classification System (OEH 2019). The steps taken to identify each PCT confirmed within the site is provided, along with evidence of selection in **Table 3** and **Table 4**.

**Table 3. PCT 1129 Selection Criteria.**

Selection Criteria	Search Tool
IBRA Bioregion	Sydney Basin
IBRA Subregion	Moss Vale
Dominant Upper and Mid Stratum Species	<i>Doryphora sassafras</i> , <i>Syzygium australe</i> , <i>Pittosporum undulatum</i> , <i>Alectryon subcinereus</i> , and <i>Hymenanthera dentata</i> .
Vegetation Formation	Rainforest
Reference	Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C., 2010 Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0

The selection process delivered three candidate PCTs for this vegetation type:

- 769 - Coachwood - Lilly Pilly warm temperate rainforest in moist sandstone gullies, Sydney Basin Bioregion
- 1128 - Sassafras - Blackwood - Lilly Pilly temperate rainforest of the Robertson area, Sydney Basin Bioregion
- 1129 - Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion



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Table 4. Justification for choosing PCT 1129. Dark border indicates the selected PCT.

Candidate PCT	Characteristic Canopy Tozer et al (2010)	Characteristic Shrub / Groundcover Tozer et al (2010)	Landscape Position/ Geology Tozer et al (2010)	Justification
769 - Coachwood - Lilly Pilly warm temperate rainforest in moist sandstone gullies, Sydney Basin Bioregion	A closed forest dominated by a canopy of <i>Ceratopetalum apetalum</i> , <i>Syzygium smithii</i> , <i>Doryphora sassafras</i> , <i>Acacia elata</i> ;	Shrubs include: <i>Backhousia myrtifolia</i> , <i>Callicoma serratifolia</i> , <i>Cyathia australis</i> , <i>Morinda jasminoides</i> , <i>Smilax australis</i> , <i>Tasmania insipida</i> and <i>Todea Barbara</i> . Groundcovers generally include <i>Blechnum cartilagineum</i> ;	Occurs in moist gully heads and sheltered slopes below sandstone cliffs between 400 and 800m altitude in the Blue Mountains and on Budderoo and Moreton Plateaux	This PCT does not fit with the vegetation community present within the subject land.  The landscape features characteristic of this PCT were not present within the subject land (e.g. occurs on elevations between 550 and 1000m, and the subject land is at 770m ASL).
1128 - Sassafras - Blackwood - Lilly Pilly temperate rainforest of the Robertson area, Sydney Basin Bioregion	A closed forest dominated by <i>Doryphora sassafras</i> , <i>Syzygium smithii</i> , <i>Acacia melanoxylon</i> , <i>Polysma cunninghamii</i> and <i>Quintinia sieberi</i> ;	Shrubs include: <i>Pittosporum undulatum</i> , <i>Alectryon subcinereus</i> , <i>Coprosma quadrijida</i> , <i>Dicksonia Antarctica</i> , <i>Eustrephus latifolius</i> , <i>Hedycarya angustifolia</i> , <i>Marsdenia rostrate</i> , <i>Microsorium scandens</i> , <i>Myrsine howittiana</i> , <i>Notelaea venosa</i> , <i>Pandorea pandorana</i> , <i>Pyrrhosia rupestris</i> and <i>Smilax australis</i> ; Groundcovers include: <i>Asplenium flabellifolium</i> , <i>Lastreopsis acuminata</i> , <i>Pellaea falcata</i> and <i>Urtica incisa</i> ;	Occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.	This PCT is identical to PCT 1129. PCT 1128 refers to the same Tozer et. al (2010) reference as PCT 1129 (RF p516).
1129 - Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	A closed forest dominated by <i>Doryphora sassafras</i> , <i>Syzygium smithii</i> , <i>Acacia melanoxylon</i> , <i>Polysma cunninghamii</i> and <i>Quintinia sieberi</i> ;	Shrubs include: <i>Pittosporum undulatum</i> , <i>Alectryon subcinereus</i> , <i>Coprosma quadrijida</i> , <i>Dicksonia Antarctica</i> , <i>Eustrephus latifolius</i> , <i>Hedycarya angustifolia</i> , <i>Marsdenia rostrate</i> , <i>Microsorium scandens</i> , <i>Myrsine howittiana</i> , <i>Notelaea venosa</i> , <i>Pandorea pandorana</i> ,	Occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.	This PCT fits with the vegetation community present within the subject land.  This PCT was chosen as characteristic species were present within the subject land, with the position in the

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		<i>Pyrrosia rupestris</i> and <i>Smilax australis</i> . Groundcovers include: <i>Asplenium flabellifolium</i> , <i>Lastreopsis acuminata</i> , <i>Pellaea falcata</i> and <i>Urtica incisa</i> ;	landscape (moist soil derived from Robertson basalt at 700m) and geography (southern Sydney Basin) matched the description by Tozer et al. (2010).
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Table 5. PCT 1129 – Summary of vegetation condition within the subject land.

PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion					
					
Vegetation formation / Keith Class	KF_CH1 Rainforests / Southern Warm Temperate Rainforests				
Condition classes on Subject Land	Condition 1 (Remnant Canopy)	Condition 2 (Regrowth)	Condition 3 (Modified)	Condition 4 (Grassland)	Condition 5 (Manicured Gardens)
Extent within Subject Land (approximate)	0.63 ha	0.65 ha	0.036 ha	0.62 ha	1.36 ha
Description of PCT on Subject Land					
<p>The community was represented primarily by codominance of <i>Syzygium australe</i> (Brush Cherry) and <i>Doryphora sassafras</i> (Sassafras) supported by occasional representations of <i>Acacia melanoxylon</i> (Blackwood) where the community ecotones were evident. As a result of historical land practices, the mid-stratum was largely absent within community, however, scattered <i>Coprosma quadrifida</i> (Prickly Currant Bush) and <i>Alectryon subcinereus</i> (Wild Quince). The ground layer stratum was dominated by <i>Tradescantia fluminensis</i> (Trad), with scattered native ferns, climbers and sedges characteristic of the Sassafras – Blackwood – Lilly Pilly vegetation community, including <i>Gymnostachys anceps</i> (Settlers' Twine) and <i>Pyrrosia rupestris</i> (Rock Felt Fern).</p>					
Description of PCT in VIS					



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PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion			
Other Diagnostics Features: Closed forest with lianas and ferny groundcover. Landscape Position: Occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.			
Survey effort	Five BAM plots were established: <ul style="list-style-type: none"> <li>One in Condition 1 (Remnant Canopy)</li> <li>One in Condition 2 (Regrowth)</li> <li>One in Condition 3 (Modified)</li> <li>One in Condition 4 (Grassland)</li> <li>One in Condition 5 (Manicured Gardens)</li> </ul>		
	Characteristic Flora Species	Geology/Landscape	Geography and Other
Justification of PCT Assignment	This PCT was co-dominated by <i>Doryphora sassafras</i> and <i>Syzygium</i> spp. which is characteristic of PCT 1129. The following characteristic species were also present; <i>Pittosporum undulatum</i> , <i>Alectryon subcinereus</i> , and <i>Melicytus dentatus</i> .	This PCT occurs on moist soils derived from basalt on the Robertson Plateau between 650 and 800m.	This PCT is likely confined to Moss Vale sub-region, possibly extending into Illawarra sub-region.
Scientific Reference from VIS (OEI 2019)	Sub alliance 40 (Floyd 1990); RF p516 (Tozer et al. 2006)		
TEC Status (Biodiversity Conservation Act 2016)	Robertson Rainforest in the Sydney Basin Bioregion - Endangered Ecological Community		
Estimate of % of PCT Percent Cleared	85%		
SAII Candidate Entry	This TEC is identified as SAI in NSW as it aligns with the EPBC Act critically endangered Robertson Rainforest in the Sydney Basin Bioregion TEC. The BAM-C will display the SAI addition in early 2020.		

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Table 6. PCT 743 - Summary of vegetation within subject property (adjacent to subject land).

PCT: 743 Brown Barrel – Mountain Grey Gum tall moist forest on basalts of the Southern Highlands Bioregion and Sydney Basin Bioregion



<b>Vegetation formation / Keith Class</b>	Wet Sclerophyll Forest (Shrubby sub-formation)
<b>Condition classes on Subject Land</b>	Moderate (under scrubbed and grazed)
<b>Extent within Subject Property (approximate)</b>	0.14 ha (not present within subject land)
<b>Description on Subject Land</b>	
<p>The community was represented primarily by <i>Eucalyptus fastigata</i> (Brown Barrel), <i>Eucalyptus viminalis</i> (Ribbon Gum) <i>Eucalyptus elata</i> (River Peppermint), with scattered planted ornamental trees, including <i>Eucalyptus cinerea</i> (Argyle Apple), <i>Pinus radiata</i> (Radiata Pine) and <i>Eucalyptus scoparia</i> (Wallangarra White Gum). As a result of historical land practices, the mid-stratum was largely absent within community, however, scattered <i>Melicactus dentatus</i> (Prickly Currant Bush), <i>Pittosporum undulatum</i> (Native Daphne) and <i>Solanum aviculare</i> (Kangaroo Apple) were present. The ground layer stratum was dominated by <i>Carex appressa</i>, <i>Microlaena stipoides</i> and <i>Entolasia marginata</i> with scattered native ferns, climbers and sedges.</p>	
<b>Description in VIS</b>	
<p>Other Diagnostics Features: Open forest with a sparse shrub layer and dense groundcover of herbs and grass; Landscape Position: Occurs on undulating basalt tablelands between 600 and 1200m, mainly between Oberon and Moss Vale.</p>	

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<b>PCT: 743 Brown Barrel – Mountain Grey Gum tall moist forest on basalts of the Southern Highlands Bioregion and Sydney Basin Bioregion</b>			
<b>Survey effort</b>	No BAM plots were required. This PCT was located outside of the subject land.		
<b>Justification of PCT Assignment</b>	<b>Characteristic Flora Species</b>	<b>Geology/Landscape</b>	<b>Geography and Other</b>
	This vegetation comprised <i>Acacia melanoxylon</i> and <i>Eucalyptus fastigata</i> , which are characteristic species of PCT743. The following characteristic species were also present; <i>Melicytus dentatus</i> , <i>Clematis aristida</i> , <i>Dichondra repens</i> , <i>Hibbertia scandens</i> and <i>Microlaena stipoides</i> .	Occurs on moist elevated areas on fertile soils in the Robertson and Sassafras areas.	This PCT occurs in Bungonia, Kanangra, Burragorang, Sydney Cataract, Moss Vale, Illawarra and Ettrema sub-regions, as confirmed by site data.
<b>Scientific Reference from VIS (OEH 2019)</b>	WSF p266 (Tozer et al. 2006); possibly Vegetation Group 57 (Gellie 2005);		
<b>TEC Status (Biodiversity Conservation Act 2016)</b>	Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions		
<b>Estimate of % of PCT Percent Cleared</b>	95%		
<b>SAIL Candidate Entry</b>	Yes		



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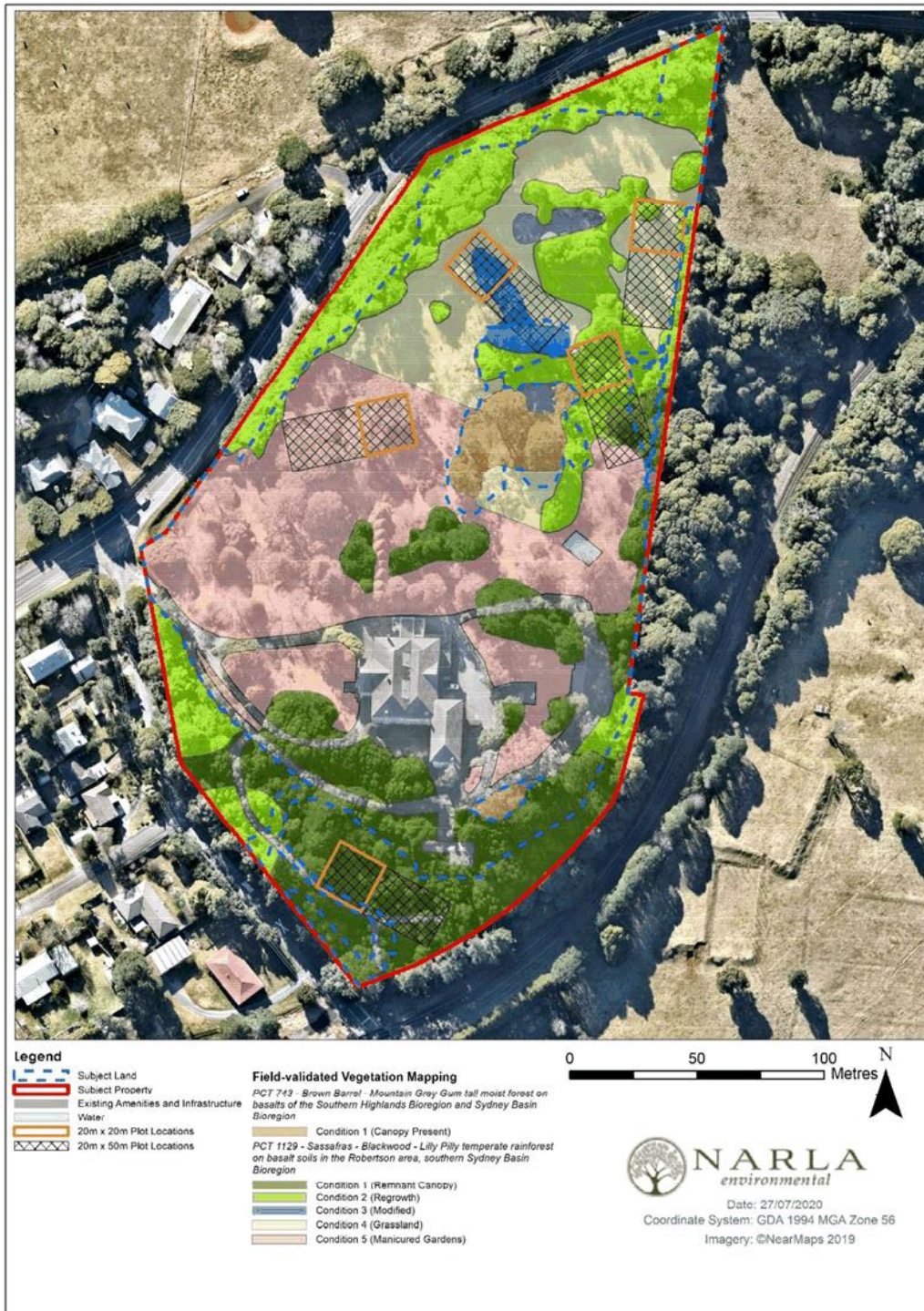


Figure 10. Site map identifying the extent of native vegetation and condition classes of PCT1129, and VIS plot locations within the subject land. Map also includes location of PCT 743, which occurs directly adjacent to the subject land.



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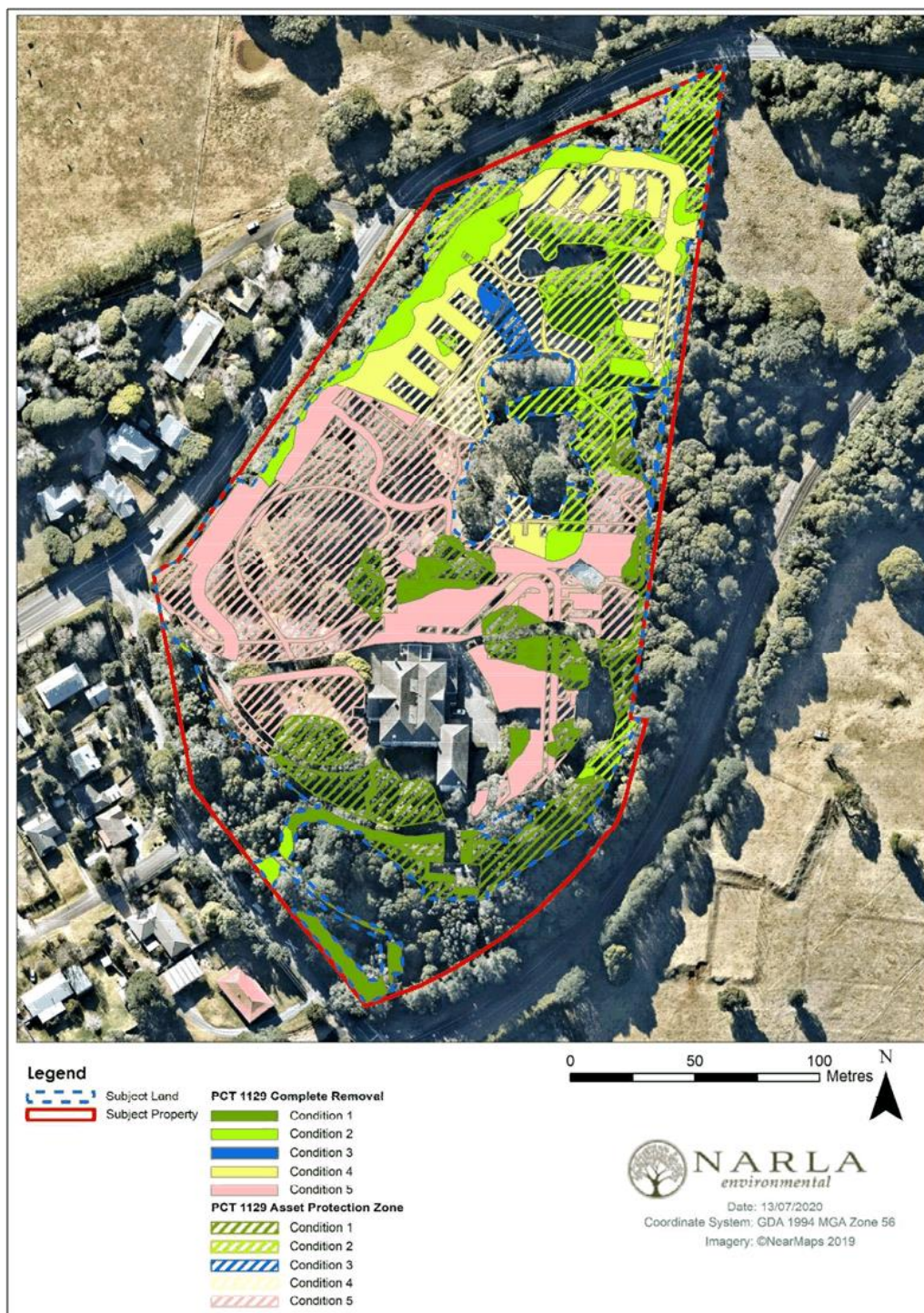


Figure 11. Subject map identifying the management zones of PCT1129 within the subject land.

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#### 3.4.2 Vegetation Integrity Survey (VIS) plots

Five (5) BAM Vegetation Integrity Survey (VIS) Plots were undertaken within the subject land. Plot data gathered for each attribute used to assess the function of the subject land vegetation is detailed in **Appendix D**.

Vegetation Integrity Scores represented by existing vegetation within each vegetation zone is detailed in **Table 7**.

**Table 7. Vegetation Zones and Vegetation Integrity Scores within the subject land**

Vegetation Zone	Plant Community Type	Patch Size (Patch Size Class)	Impact Area (ha)	Survey Effort	Vegetation Integrity Score (VIS)		Future VIS	Hollow Bearing-Trees	Change in total VIS
Condition 1 (Remnant Canopy)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.21 IPA: 0.42	One 1000m <sup>2</sup> (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 59.5	VIS Score = 57.1	Cleared: 0 IPA: 2.5	Yes	-57.1
					Structure Score: 59.6				
					Function Score: 52.7				
Condition 2 (Regrowth)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.21 IPA: 0.43	One 1000m <sup>2</sup> (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 81.3	VIS Score = 58.2	Cleared: 0 IPA: 2.8	Yes	-57.8
					Structure Score: 53.2				
					Function Score: 45.5				
Condition 3 (Modified)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.01 IPA: 0.025	One 1000m <sup>2</sup> (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 52.7	VIS Score = 31.4	Cleared: 0 IPA: 2.5	No	-31.4
					Structure Score: 17.5				
					Function Score: 33.6				



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Vegetation Zone	Plant Community Type	Patch Size (Patch Size Class)	Impact Area (ha)	Survey Effort	Vegetation Integrity Score (VIS)		Future VIS	Hollow Bearing-Trees	Change in total VIS
Condition 4 (Grassland)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.28 IPA: 0.34	One 1000m <sup>2</sup> (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 22.4	VIS Score = 1.8	Cleared: 0 IPA: 0	No	-1.8
					Structure Score: 0.1				
					Function Score: 2.2				
Condition 5 (Manicured Gardens)	PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	>100ha	Cleared: 0.48 IPA: 0.89	One 1000m <sup>2</sup> (20m x 50m) Vegetation Integrity Survey Plot	Composition Score: 57.4	VIS Score = 11.4	Cleared: 0 IPA: 0.9	No	-11.4
					Structure Score: 1.1				
					Function Score: 23.7				

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**3.4.2.1 Determining future vegetation integrity scores**

Most projects will result in complete clearing of vegetation and threatened species habitat within the development footprint. In this scenario, the assessor must assess the proposed future value of each of the VI attributes as zero in the BAMC. However, in circumstances where partial clearing of vegetation is proposed and remaining vegetation will be maintained (i.e. not degraded further over time), the assessor may determine that the future value of the relevant VI attributes are greater than zero (DPIE 2019c).

The subject land will be exposed to varying degrees of clearing due to the location of the proposed dwelling and the requirement for an APZ. Subsequently, each vegetation zone within the subject land has been divided into two (2) management zones to account for the varying clearing levels (IPA and Cleared).

The attributes influencing future vegetation scores are detailed in **Table 8** and rely on details provided in Peterson Bushfire (2019) and NSW Rural Fire Service (2019).

**Table 8. Management Zones within the subject land, and the relevant vegetation attributes (composition, structure and function) affecting future VI scores (as per Peterson Bushfire 2020).**

Management Zone	Changes in current vegetation attributes	Vegetation attributes not changed
<b>Condition 1 IPA (Inner Protection Zone)</b>	Reduction in canopy cover to 15% and removal of shrubs Removal of all leaf litter and coarse woody debris. Groundcovers such as grasses regularly mowed or slashed to minimal height.	Nil
<b>Condition 1 Cleared</b>	All vegetation will be removed	Nil
<b>Condition 2 IPA (Inner Protection Zone)</b>	Reduction in canopy cover to 15% and removal of shrubs Removal of all leaf litter Groundcovers such as grasses regularly mowed or slashed to minimal height.	Nil
<b>Condition 2 Cleared</b>	All vegetation will be removed	Nil
<b>Condition 3 IPA (Inner Protection Zone)</b>	Reduction in canopy cover to 15% and removal of shrubs Removal of all leaf litter and coarse woody debris. Groundcovers such as grasses regularly mowed or slashed to minimal height.	Nil
<b>Condition 3 Cleared</b>	All vegetation will be removed	Nil
<b>Condition 4 IPA (Inner Protection Zone)</b>	Removal of all leaf litter Groundcovers such as grasses regularly mowed or slashed to minimal height.	Nil

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Management Zone	Changes in current vegetation attributes	Vegetation attributes not changed
Condition 4 Cleared	All vegetation will be removed	Nil
Condition 5 IPA (Inner Protection Zone)	Removal of all leaf litter and coarse woody debris. Reduction in shrub composition. Groundcovers such as grasses regularly mowed or slashed to minimal height.	Shrub structure. Canopy structure and composition.
Condition 5 Cleared	All vegetation will be removed	Nil



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## 4. Threatened Species

### 4.1 Habitat Features for Species and Ecosystem Credit Fauna Species

The Narla Ecologists compiled a detailed summary of potential habitat for threatened fauna species, including both species credit and ecosystem credit threatened fauna species (Table 9).

**Table 9. Fauna Habitat Values.**

Habitat component	Site values
Coarse woody debris	Logs, debris piles and other waste material present, but these offer low value sheltering habitat, likely to be used only by common species.
Rock outcrops and bush rock	Absent.
Caves, crevices and overhangs	Absent.
Culverts, bridges, mine shafts, or abandoned structures	Absent.
Nectar/lerp-bearing Trees	Canopy trees, particularly <i>Eucalyptus cinerea</i> , <i>Eucalyptus elata</i> , <i>Eucalyptus scorparia</i> and <i>Eucalyptus fastigata</i> provide intermittent nectar and/or lerp sources for nomadic nectivores, such as Grey-headed Flying-fox, Regent Honeyeater, Swift Parrot and Little Lorikeet. Such food sources may also be used by Squirrel Glider and Eastern Pygmy Possum. These trees may also attract non-threatened fauna which form prey for threatened predatory fauna, such as Powerful Owl, Barking Owl, Masked Owl, Little Eagle, Square-tailed Kite, and White-bellied Sea-eagle.
Nectar-bearing shrubs	Scattered <i>Banksia</i> spp. provide foraging habitat provide intermittent nectar and/or lerp sources for nomadic nectivores, such as Grey-headed Flying-fox, Regent Honeyeater, Swift Parrot and Little Lorikeet. Such food sources may also be used by Eastern Pygmy Possum.
Koala and Greater Glider browse	All of the <i>Eucalyptus</i> spp. may provide forage for Koala and/or Greater Glider.
Large stick nests	No large stick nests suitable for threatened raptorial birds of prey were observed on the subject land.
Sap and gum sources	All of the <i>Eucalyptus</i> spp. may provide sap source for species that use it as foraging habitat. The understorey contains a few regrowth wattles which could provide gum for some species and are also an insect attractant for birds and bats. However, their low number and small size means foraging value is low. No evidence of gum excisions was noted.
She-oak fruit (Glossy Black Cockatoo feed)	<i>Casuarina glauca</i> and <i>C. cumminghamiana</i> subsp. <i>cumminghamiana</i> is present within the subject land.
Seed-bearing trees and shrubs	Fruit-bearing trees such as <i>Eucalyptus cinerea</i> , <i>Eucalyptus elata</i> , <i>Eucalyptus scorparia</i> and <i>Eucalyptus fastigata</i> , and fruit-bearing shrubs such as <i>Acacia baileyana</i> , <i>Acacia melanoxylon</i> may provide foraging habitat for Gang-gang Cockatoo.
Soft-fruit-bearing trees	Generally scattered native and ornamental trees which may provide fruit that could be consumed by Grey-headed Flying-fox, Superb, Rose-crowned, and Wompoo Fruit-doves.
Dense shrubbery and leaf litter	Some areas of dense shrubbery occur that may provide forage, shelter and/or breeding habitat for threatened mammals, such as Southern Brown Bandicoot.
Tree hollows	Twelve (12) hollow bearing trees were recorded in the subject land including large, medium and small hollows. No extra-large hollows (>15cm diameter) were found.
Decorticating bark	Absent

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Habitat component	Site values
Wetlands, soaks and streams	Soaks and ponds were recorded in the subject land
Open water bodies	Absent.
Estuarine, beach, mudflats, and rocky foreshores	Absent.

*Large hollow: 10-15cm; \*Medium hollow: 5-9cm; Small 2-4cm*

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#### 4.2 Candidate Ecosystem Credit Species

Ecosystem credit species associated with PCT 1129 are listed below in **Table 10**. No species predicted by the BAMC as potential ecosystem credits were excluded from the results displayed.

**Table 10. Candidate Ecosystem Credits predicted to occur within the subject land**

Ecosystem Species	BC Act Status	Excluded from Assessment?
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	Vulnerable	No
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Foraging)	Vulnerable	No
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	Vulnerable	No
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Foraging)	Vulnerable	No
<i>Ninox strenua</i> Powerful Owl (Foraging)	Vulnerable	No
<i>Pachycephala olivacea</i> Olive Whistler	Vulnerable	No
<i>Phoniscus papuensis</i> Golden-tipped Bat	Vulnerable	No
<i>Potorous tridactylus</i> Long-nosed Potoroo	Vulnerable	No
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)	Vulnerable	No
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	Vulnerable	No
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	Vulnerable	No
<i>Tyto tenebricosa</i> Sooty Owl (Foraging)	Vulnerable	No



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#### 4.3 Candidate Species Credit Species

Species credit species are predicted by the BAMC following an assessment of geographic and habitat features in the credit calculator, such as site location (e.g. IBRA subregion), PCTs and condition, patch size and the area of surrounding vegetation within the 1,500 m buffer of the study area. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as candidate species for assessment. The list of fauna credit species predicted to occur within the subject land at any stage during their life-cycle is presented (**Table 11**). No flora species credit species were predicted by the BAMC to occur within the subject land.

**Table 11. Candidate fauna species credits predicted to occur within the subject land.**

Species	BC Act Listing	Included in Assessment?	Targeted Survey/ Export Report Required/ Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Breeding)	Vulnerable	Yes	Yes, targeted surveys undertaken during October 2018 and the species was not detected.	High - 2	Yes
<i>Cercartetus nanus</i> Eastern Pygmy-possum	Vulnerable	Yes	Yes, targeted survey undertaken by Ecologists using motion-activated cameras and nocturnal spotlighting during autumn (March) 2019 and the species was not detected.	High - 2	No
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	Vulnerable	No, the subject land does not contain any caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding. This confirmation was informed by assessment of species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	N/A	N/A	No
<i>Mixophyes balbus</i> Stuttering Frog	Endangered	Yes.	Yes, targeted survey	Very High - 3	No

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Species	BC Act Listing	Included in Assessment?	Targeted Survey/ Export Report Required/ Conducted?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
			undertaken by Ecologists using call playback and nocturnal spotlighting during autumn (March) 2019 and the species was not detected.		
<i>Myotis macropus</i> Southern Myotis	Vulnerable	Yes	Yes, targeted survey undertaken by Ecologists using harp traps and ultrasonic acoustic detectors during autumn (March) 2019 and the species was not detected.	High - 2	No
<i>Ninox strenua</i> Powerful Owl (Breeding)	Vulnerable	No, the subject land does not contain any living or dead trees with hollows greater than 20cm in diameter	N/A	High - 2	Yes
<i>Pteropus poliocephalus</i> Grey-headed Flying-Fox (Breeding)	Vulnerable	No, the subject land does not contain any known former or active roost camps for this species. No active camps occur within the immediate vicinity of the subject land.	N/A	High - 2	No
<i>Tyto tenebricosa</i> Sooty Owl (Breeding)	Vulnerable	No, the subject land does not contain any living or dead trees with hollows greater than 20cm in diameter or caves, cliff lines or ledges	N/A	Very High - 3	No

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#### 4.4 Targeted Species Credit Surveys

Targeted surveys were carried out within the approved survey period for the species targeted as identified within the BAMC (**Table 12**; **Table 13**) and were implemented in accordance with within section 6.5 of the BAM and all relevant OEH threatened species survey guidelines.

Targeted surveys for candidate species credit species were undertaken at two separate time points in 2018 and 2019, the weather conditions observed during these survey periods are outlined in **Table 12** below.

**Table 12. Weather conditions taken from the nearest weather station (Moss Vale) in the lead up and during the field survey (BOM 2019a) (Survey dates in bold).**

Timing/ Activities	Personnel	Date	Day	Temperature		Rain (mm)	Max wind gust		Relative Humidity at 9 am (%)
				Min (°C)	Max (°C)		Dir	Spd km	
Lead up to the survey	-	1-Oct-18	Mo	2.2	19.7	0	NNE	37	51
		2-Oct-18	Tu	2.4	23.0	0.2	ENE	41	32
		3-Oct-18	We	11.2	20.6	0	WSW	59	29
		4-Oct-18	Th	10.8	11.3	3.4	SSE	54	n.d
		5-Oct-18	Fri	7.9	12.5	9.4	SE	57	n.d
		6-Oct-18	Sa	5.7	14.0	0.6	SSE	37	98
		7-Oct-18	Su	6.3	12.9	0.4	SE	52	n.d
Site Assessment (Vegetation Mapping) & Targeted Fauna Survey	Alexander Graham & Nathan Banks	<b>8-Oct-18</b>	<b>Mo</b>	<b>8.5</b>	<b>17.6</b>	<b>7.6</b>	<b>S</b>	<b>39</b>	<b>n.d</b>
Site Assessment (Vegetation Mapping) & Targeted Fauna Survey	Alexander Graham & Nathan Banks	<b>9-Oct-18</b>	<b>Tu</b>	<b>8.1</b>	<b>22.5</b>	<b>0</b>	<b>SE</b>	<b>41</b>	<b>n.d</b>
Lead up to the survey	-	13-Mar-19	We	12.0	17.6	0	SSE	<b>35</b>	<b>88</b>
		14-Mar-19	Th	12.5	22.1	2.2	NE	<b>44</b>	<b>95</b>



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Timing/ Activities	Personnel	Date	Day	Temperature		Rain (mm)	Max wind gust		Relative Humidity at 9 am (%)
				Min (°C)	Max (°C)		Dir	Spd km	
		15-Mar-19	Fr	13.3	18.6	16.8	S	44	95
		16-Mar-19	Sa	13.1	19.6	5.0	SSE	43	96
		17-Mar-19	Su	14.6	16.2	5.2	SSW	46	91
		18-Mar-19	Mo	12.4	18.6	50.0	WNW	41	97
		19-Mar-19	Tu	14.2	19.9	10.6	SSE	35	97
Site Assessment (Vegetation Mapping, BAM Plots, Targeted Fauna Survey)	Alexander Graham & David Hancock	20-Mar-19	We	15.8	23.1	14.6	SE	30	94
Site Assessment (Vegetation Mapping, BAM Plots, Targeted Fauna Survey)	Alexander Graham & David Hancock	21-Mar-19	Th	16.1	22.4	0.6	SE	28	96
Targeted Fauna Survey	Stefan Giessler	22-Mar-19	Fr	14.2	22.7	0.2	WNW	46	97
Targeted Fauna Survey	Stefan Giessler	23-Mar-19	Sa	15.7	26.9	1.0	NE	31	88
Targeted Fauna Survey	Stefan Giessler	24-Mar-19	Su	16.3	24.5	0.2	N	31	92
Targeted Fauna Survey	Stefan Giessler	25-Mar-19	Mo	17.6	20.9	0.2	WNW	72	69
Targeted Fauna Survey	Stefan Giessler	26-Mar-19	Tu	9.5	18.9	0.4	WSW	57	56
Targeted Fauna Survey	Stefan Giessler	27-Mar-19	We	4.8	17.8	0	ENE	30	95
Targeted Fauna Survey	Stefan Giessler	28-Mar-19	Th	9.3	22.7	0	N	39	83
Targeted Fauna Survey	Stefan Giessler	29-Mar-19	Fr	13.4	24.2	0	NNE	44	73

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#### 4.4.1 Fauna Species Credit Survey

A total of four (4) threatened fauna species were identified with potential to occur within the subject land (**Table 13**). Details of each targeted fauna survey technique are outlined below.

**Table 13. Threatened Fauna species identified with potential to occur within the subject land**

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo										✓		
<i>Cercartetus nanus</i> Eastern Pygmy-possum			✓									
<i>Mixophyes balbus</i> Stuttering Frog			✓									
<i>Myotis Macropus</i> Southern Myotis			✓									
Key	✓ = Surveyed					= Optimum Survey Period						

#### 4.4.1.1 Targeted Microbat Survey

One threatened microbat species, *Myotis macropus* (Southern Myotis), was identified by the BAMC. The species had potential to occur within the subject land and therefore required targeted survey to determine its presence. In order to determine the presence of Southern Myotis within the subject land, targeted surveys in accordance with the NSW survey guide for threatened bats and their habitats were undertaken (OEH 2018c).

Two harp traps were established within flyways in the subject land (**Figure 12**), and two acoustic detection units (Wildlife Acoustics SongMeter SM4BAT) were deployed within suitable areas identified within the subject land within close proximity to waterbodies and flyways (**Figure 12**). The targeted survey effort undertaken for this species is detailed in **Table 14** below.

**Table 14. Microbat targeted survey effort undertaken within the subject land**

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Myotis macropus</i> (Southern Myotis)	Harp Trap	2 traps over 8 nights between approximately 8:00pm and 6:00am	No, refer to <b>Appendix B</b> for the full list of species identified within the site.
	Acoustic Detection Device	2 devices over 9 nights between approximately 6:30pm and 7:30am	No, refer to <b>Appendix B</b> for the full list of species identified within the site.

Southern Myotis were not detected within the subject land during the optimal survey period (Knock 2019). The proponent is not required to purchase and retire Biodiversity Offset Credits for these species.

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##### 4.4.1.2 Targeted Small Mammal Survey

One threatened small mammal species, *Cercartetus nanus* (Eastern Pygmy Possum), was identified by the BAMC as being likely to occur within the subject land and therefore required targeted survey to determine their presence. In order to determine the presence of these species within the subject land, targeted surveys in accordance with the NSW 'Threatened Species Survey and Assessment: Guidelines for developments and activities' were undertaken (DEC 2004). The targeted survey effort undertaken for these species is detailed in **Table 15** below.

**Table 15. Small mammal targeted survey effort undertaken within the subject land.**

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	Motion Sensing Arboreal Camera Trapping	5 devices over 8 days + nights running continuously	No, refer to <b>Appendix B</b> for the full list of species identified within the site.
	Nocturnal Spotlighting Transects	1 session per night for 7 nights between 8:00pm and 10:00pm	No, refer to <b>Appendix B</b> for the full list of species identified within the site.

As no evidence of either threatened small mammal species was identified as occurring within the subject land within the optimal survey period, the applicant is not required to purchase and retire any Biodiversity Offset Credits for these species.

##### 4.4.1.3 Targeted Amphibian Survey

One threatened amphibian species, *Mixophyes balbus* (Stuttering Frog), was identified by the BAMC as being likely to occur within the subject land and therefore required targeted survey to determine their presence. In order to determine the presence of these species within the subject land, targeted surveys in accordance with the NSW 'Threatened Species Survey and Assessment: Guidelines for developments and activities' were undertaken (DEC 2004). The targeted survey effort undertaken for these species is detailed in **Table 16** below.

**Table 16. Amphibian targeted survey effort undertaken within the subject land**

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Mixophyes balbus</i> (Stuttering Frog)	Nocturnal Call Playback	2 call playback points were established undertaken twice per night for 7 nights between approximately 8:00pm and 10:00pm	No, refer to <b>Appendix B</b> for the full list of species identified within the site.
	Nocturnal Spotlighting and Targeted Micro- habitat Searches	1 session per night for 7 nights between 8:00pm and 10:00pm	No, refer to <b>Appendix B</b> for the full list of species identified within the site.

As no evidence of Stuttering Frog was identified as occurring within the subject land within the optimal survey period, the applicant is not required to purchase and retire any Biodiversity Offset Credits for this species.

##### 4.4.1.4 Targeted Avian Survey

One threatened avian species, *Callocephalon fimbriatum* (Gang-gang Cockatoo), was identified by the BAMC as being likely to occur within the subject land and therefore required targeted survey to determine their absence. Targeted surveys were carried-out in accordance with the NSW 'Threatened Species Survey and Assessment: Guidelines for developments and activities' were undertaken (DEC 2004). The targeted survey effort undertaken for these species is detailed in **Table 17** below.



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Table 17. Avian targeted survey undertaken within the subject land

Target Species	Survey Technique	Survey Effort & Timing	Target Species Identified?
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Diurnal Habitat Surveys (Area Search)	2 days in October for Gang-gang Cockatoo between 5:30am and 6:30am	No, refer to <b>Appendix B</b> for the full list of species identified within the site.
	Dawn Chorus Bird Call Recording	1 session per day for 2 days in October for Gang-gang Cockatoo	No, refer to <b>Appendix B</b> for the full list of species identified within the site.

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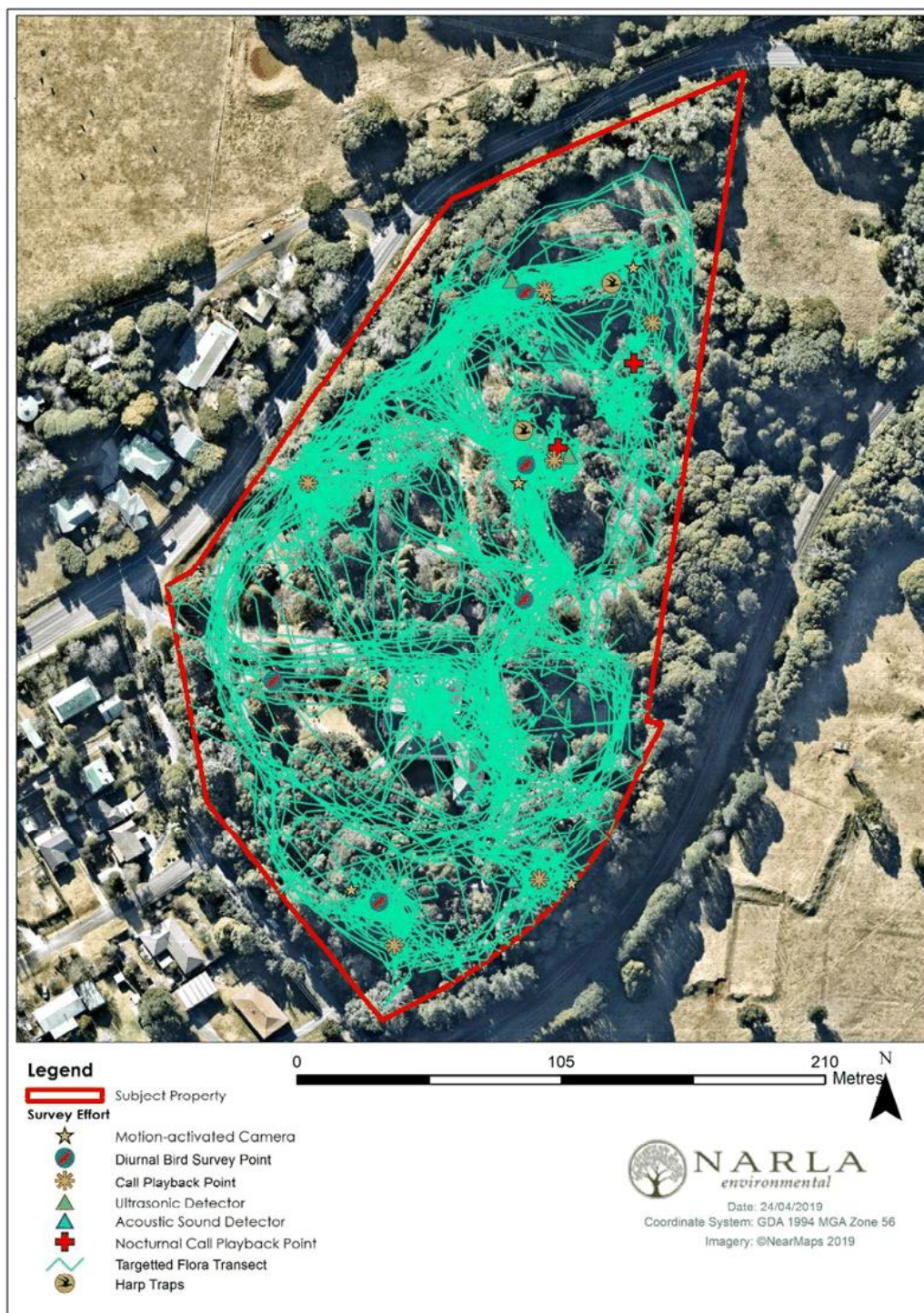


Figure 12. Fauna and flora species credit targeted survey effort undertaken by Narla within the subject land over the course of the study.

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## 5. Avoid and Minimise Impacts

### 5.1 Impact Mitigation and Minimisation Measures

This section of the report details recommended efforts to avoid and minimise impact on biodiversity values associated with the proposed activity. Measures to be implemented before, during and post construction to avoid and minimise the impacts of the project are detailed in **Table 18**. The final project footprint including construction and operation is presented in **Figure 1**.

Considering the nature and scale of the proposed activity, the character of the study area, the historic disturbance and ongoing vegetation maintenance within the site as well as the proposed impact mitigation measures, there are unlikely to be any appreciable indirect impacts on biodiversity values arising from the proposal that have not been addressed in **Table 18** below. Only the direct impacts associated with vegetation clearing and construction of the proposal will require biodiversity offsets according to the BAM. The Biodiversity Offset Credit obligations required for the proposed activity are detailed in **Section 6.3** below.

**Table 18. Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the project.**

Action	Outcome/Measure	Timing	Responsibility
<b>Project Location</b>	The project location (1 Fountaindale Road, Robertson) is a highly modified site, which has been extensively built up and landscaped with ornamental plants. It contains extensive existing infrastructure and amenities. It occurs on the periphery of the suburb of Robertson.  Owing to the project location, the proposal is unlikely exacerbate the fragmentation of native vegetation, or impact on any preferential fauna habitat (owing to its location in a high-traffic area).	Pre-construction phase	<ul style="list-style-type: none"> <li>Proponent</li> <li>Contractor</li> </ul>
<b>Project Design</b>	Wherever possible, the proposed development has been positioned in order to avoid and minimise the potential resulting impacts on biodiversity values (in cleared land, away from high-quality native vegetation) within the subject land: <ul style="list-style-type: none"> <li>The applicant has designed the proposal, so as to not impact on PCT 743 'Brown barrel – Mountain Grey Gum tall moist forest on basalts of the Southern highlands Bioregion and Sydney Basin Bioregion' which is a Candidate SAIL.</li> <li>Important amphibian breeding habitat will be retained in the dams.</li> </ul>	Pre-construction phase	<ul style="list-style-type: none"> <li>Proponent</li> </ul>



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Action	Outcome/Measure	Timing	Responsibility
	<ul style="list-style-type: none"> <li>Where possible, fragmentation of native vegetation within the site, has mostly been avoided. Connective corridors will remain between rainforest patches along the southern, eastern and western boundaries, and throughout the broader landscape.</li> </ul> <p>Asset Protection Zones have been modelled, so as to completely avoid impacts on the Candidate SAIL (PCT 743) and where possible, avoid impacts on high-quality rainforest (PCT1129) which has been identified as SAIL in NSW as it aligns with the EPBC Act critically endangered Robertson Rainforest in the Sydney Basin Bioregion TEC.</p> <p>The proposed development has been designed to avoid and minimise impacts on native vegetation and habitat where possible within the subject land (Figure 13). Where vegetation/habitat avoidance is not possible, mitigation measures have been designed and recommended to reduce impacts e.g. Nest Boxes.</p> <p>An options report detailing the measures implemented to avoid impacts to vegetation over the course of the project can be found in <b>Appendix E</b></p>		
<b>Assigning a Project Ecologist</b>	<p>Prior to construction, the applicant should commission the services of a qualified and experienced Ecologist Consultant (minimum 3 years' experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management.</p> <p>The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act.</p> <p>The Ecologist will be commissioned to:</p> <ul style="list-style-type: none"> <li>Assist the applicant in identifying and assigning an appropriate skilled Bushland Restoration Professional to implement vegetation restoration;</li> <li>Help the applicant undertake any threatened species habitat augmentation or translocation;</li> <li>Undertake any required targeted searches for threatened flora prior to vegetation clearing;</li> <li>Undertake an extensive pre-clearing survey; delineating habitat-bearing trees and shrubs to be retained/removed; and</li> <li>Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat and/or relocate any displaced fauna.</li> </ul>	<p>Prior to vegetation clearance works</p>	<ul style="list-style-type: none"> <li>Proponent</li> </ul>
<b>Appointment of Qualified Bushland Restoration Professionals</b>	<p>Qualified bush regenerators should be contracted to undertake removal of weeds and replacement planting of locally indigenous native species.</p> <p>The Bushland Restoration Practitioner company selected to complete the project works must:</p> <ul style="list-style-type: none"> <li>provide a statutory declaration stating their compliance with provisions of the national Gardening &amp; Landscape Services Award 2010;</li> </ul>	<p>Prior to vegetation clearance works</p> <p>On-going post construction</p>	<ul style="list-style-type: none"> <li>Proponent</li> <li>Project Ecologist</li> </ul>

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Action	Outcome/Measure	Timing	Responsibility
	<ul style="list-style-type: none"> <li>provide completed and signed Subcontractor Statement regarding payment of worker's compensation, payroll tax and remuneration;</li> <li>provide established Workplace Health &amp; Safety and Environmental Management Systems. Preferably the company has third-party accredited systems in place;</li> <li>demonstrate implementation of safe workplace and appropriate environmental management practices and procedures (e.g. appropriate transport and management of herbicides);</li> <li>provide Public Liability (min. \$10M) and Workers Compensation Insurance;</li> <li>have previous experience undertaking bushland restoration works within the Wingecarribee LGA. Contractor references are to be contacted;</li> <li>provide supervisor with minimum qualifications and experience including Certificate III Conservation &amp; Land Management and two years full-time equivalent experience as a trained bush regenerator;</li> <li>provide a minimum of one trained bush regenerator per team of four (minimum qualifications and experience including Certificate III Conservation &amp; Land Management and one-year full-time equivalent experience as a bush regenerator);</li> <li>provide a minimum of two trained bush regenerators per team of five/six (minimum qualifications and experience including Certificate III Conservation &amp; Land Management and one-year full-time equivalent experience as a trained bush regenerator);</li> <li>schedule appropriately resourced regular site visits for the duration of contract period;</li> <li>have experience 'soft-felling' vegetation as a part of APZ management works; and</li> <li>all herbicide usage, including storage and transport, to be in accordance with WorkCover NSW (2006) and all relevant legislation.</li> </ul>		
<b>Preparation of a Construction Environmental Management Plan (CEMP)</b>	A Construction Environmental Management Plan (CEMP) would be required for the construction phase of the project, and would be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties and nearby waterways in accordance with relevant policy documentation and Government guidelines. In order to address the potential impacts of the proposal on biodiversity as discussed in the BDAR, the mitigation and management measures outlined within this table ( <b>Table 18</b> ) would be implemented as part of the CEMP for the site.	Pre-construction phase	<ul style="list-style-type: none"> <li>Proponent</li> <li>Project Ecologist</li> <li>Construction Contractor</li> </ul>

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Action	Outcome/Measure	Timing	Responsibility
<b>Preparation of a Vegetation Management Plan (VMP)</b>	<p>Owing to the presence of TECs within the subject land, a site-specific Vegetation Management Plan (VMP) has been developed that details the management of the biodiversity (particularly TEC and potential threatened species) prior, during and post demolition and construction into the future is to be commissioned and adhered to for a period of at least five (5) years post construction.</p> <p>The implementation of the corresponding VMP will ensure responsible stewardship and a minimised biodiversity impact of all future works that occur on the subject land.</p> <p>The VMP should be reviewed by a suitably qualified Ecologist, every five years from the date of inception.</p> <p>Most importantly, the VMP details:</p> <ol style="list-style-type: none"> <li>1. the on-going management of Robertson Rainforest (PCT1129) EEC and Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion (PCT743) CEEC within the subject land and broader subject property</li> <li>2. the protection and enhancement of fauna habitat, including the replacement, of any hollows using equivalent sized nest boxes.</li> <li>3. Replanting of native vegetation, where bushfire APZ requirements allow.</li> </ol>	Pre-construction phase	<ul style="list-style-type: none"> <li>• Project Ecologist on behalf of Proponent</li> </ul>
<b>Tree Protections</b>	<p>Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ.</p> <p>A Minor Encroachment is less than 10% of the TPZ and is outside the SRZ. A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ.</p> <p>A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods.</p>	Pre-construction phase	<ul style="list-style-type: none"> <li>• Proponent</li> <li>• Arborist and fence contractor under guidance of Arboriculturalist.</li> </ul>
<b>Clearing of vegetation/ fauna habitat</b>	<p>In preparation for the authorised clearing of native vegetation, the following conditions should be adhered to in order to minimise all potential impacts to native biodiversity values within the subject land:</p> <ul style="list-style-type: none"> <li>• before any vegetation is damaged or removed, a qualified Ecologist with flora identification experience should be assigned to undertake a pre-clearing survey to delineate areas permitted to be cleared, from areas that must be retained. Brightly coloured bunting or strong flagging tape should be used.</li> </ul>	Construction phase	<ul style="list-style-type: none"> <li>• Bush regeneration contractor</li> <li>• Project Ecologist</li> <li>• Proponent</li> </ul>



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Action	Outcome/Measure	Timing	Responsibility
	<ul style="list-style-type: none"> <li>prior to vegetation being damaged or removed, a qualified Ecologist with fauna identification experience should determine the presence of any suitable habitat for roosting microbats, nesting birds or other fauna in the area of the subject land due to be cleared.</li> <li>all trees (including dead trees) should be felled by qualified Arborists using chainsaw and pulleys only. No heavy machinery is permitted for removal of any tree.</li> <li>a qualified Project Ecologist with experience in handling wildlife should be present on the Project Site during all vegetation clearing in order to supervise clearing and capture and relocate any displaced, healthy animals, or care for / rehabilitate any injured or orphaned animals.</li> </ul>		<ul style="list-style-type: none"> <li>Arboricultural Professional</li> </ul>
<b>Relocation of woody debris</b>	Where possible; all woody debris (fallen trees and logs), within the subject land is to be retained. Woody debris within the development footprint or prescribed APZ should be relocated, as directed by the Project Ecologist to an area of native vegetation planned for protection within the southern extent of the subject land.	Construction phase	<ul style="list-style-type: none"> <li>Bush regeneration contractor</li> <li>Project Ecologist</li> <li>Proponent</li> </ul>
<b>Avoidance of hollow-bearing Trees</b>	All hollow-bearing trees (including dead trees) should be retained where possible.	Construction phase	<ul style="list-style-type: none"> <li>Bush regeneration contractor</li> <li>Project Ecologist</li> <li>Proponent</li> </ul>
<b>Salvage and relocation of hollows</b>  <b>and/or</b>  <b>Installation of Artificial Hollows</b>	<p>In the event hollow-bearing trees require removal, retention and relocation of the hollow is recommended.</p> <p>The process to be undertaken should involve the soft felling of the tree at the base of the trunk so that the body of the tree remains in one single piece. The hollow bearing section of the tree can then be relocated and attached to a suitable tree in the non-APZ area of the subject property. The successful relocation of the identified habitat tree will ameliorate the loss of any hollow dwelling threatened fauna habitat features from within the proposed area of development. In the event that any existing tree hollows are damaged in the relocation process, the damaged habitat features are to be replaced with a habitat box at the compensatory ratio of 1:2.</p> <p>During any relocation or removal of habitat trees identified within the site, a Project Ecologist is to be supervising at all times.</p>	Construction phase	<ul style="list-style-type: none"> <li>Bush regeneration contractor</li> <li>Suitably qualified Arboriculturalist</li> <li>Project Ecologist</li> <li>Proponent</li> </ul>

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Action	Outcome/Measure	Timing	Responsibility
	If relocation of the section of habitat tree cannot be achieved because of its size or structure, the applicant could explore the suitability of importing a smaller or more suitable felled hollow tree from another site and erecting that, or replacing with habitat boxes at the compensatory ratio of 1:2. All replacement hollows and nest boxes are to be annually monitored for structural integrity, and pest removal conducted where required.		
<b>APZ</b>	The APZ within the Subject Land must be maintained and managed to meet the vegetation attributes as outlined in <b>Table 8</b> to uphold future vegetation integrity scores. All hollow bearing trees within the APZ should be targeted for retention where possible.	Construction phase and post-construction phase	<ul style="list-style-type: none"> <li>Proponent</li> <li>Bush regeneration contractor</li> <li>Arborist</li> </ul>
<b>Erosion and Sedimentation</b>	Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As minimum such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Construction phase	<ul style="list-style-type: none"> <li>Proponent</li> <li>Construction Contractor</li> </ul>
<b>Erection of temporary fencing</b>	Temporary fencing should be erected around the extent of native vegetation to be retained in order to avoid the potential of incurring indirect impacts on biodiversity values resulting from the proposed construction works.	Construction phase	<ul style="list-style-type: none"> <li>Proponent</li> <li>Construction Contractor</li> </ul>
<b>Storage and Stockpiling (Soil and Materials)</b>	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	<ul style="list-style-type: none"> <li>Construction Contractors</li> </ul>
<b>Implementation of VMP</b>	Vegetation will be managed in accordance with the VMP (Narla 2020) in 3 zones: <ul style="list-style-type: none"> <li>Management Zone 1: Retained PCT 1129;</li> <li>Management Zone 2: Retained PCT 743; and</li> <li>Management Zone 3: APZ Managed PCT 1129.</li> </ul> Management will include the protecting remnant vegetation, controlling weed species and revegetation of native species.	Construction phase and Post construction phase	<ul style="list-style-type: none"> <li>Project Ecologist</li> </ul>

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Action	Outcome/Measure	Timing	Responsibility
<b>Weed suppression</b>	Weeds should be continually suppressed and prevented from re-establishing across the subject property in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase and Post-construction phase	<ul style="list-style-type: none"> <li>Project Ecologist</li> <li>Bush Regeneration Contractor</li> </ul>
<b>Stormwater</b>	The proposed development is unlikely to result in significant changes to storm-water runoff so it is expected there will be no exacerbated impact on native species of flora and fauna. Stormwater flow from the proposed dwellings and hard surfaces will be directed to existing paths of stormwater runoff.	Post-construction phase	<ul style="list-style-type: none"> <li>Proponent</li> <li>Construction Architect</li> </ul>



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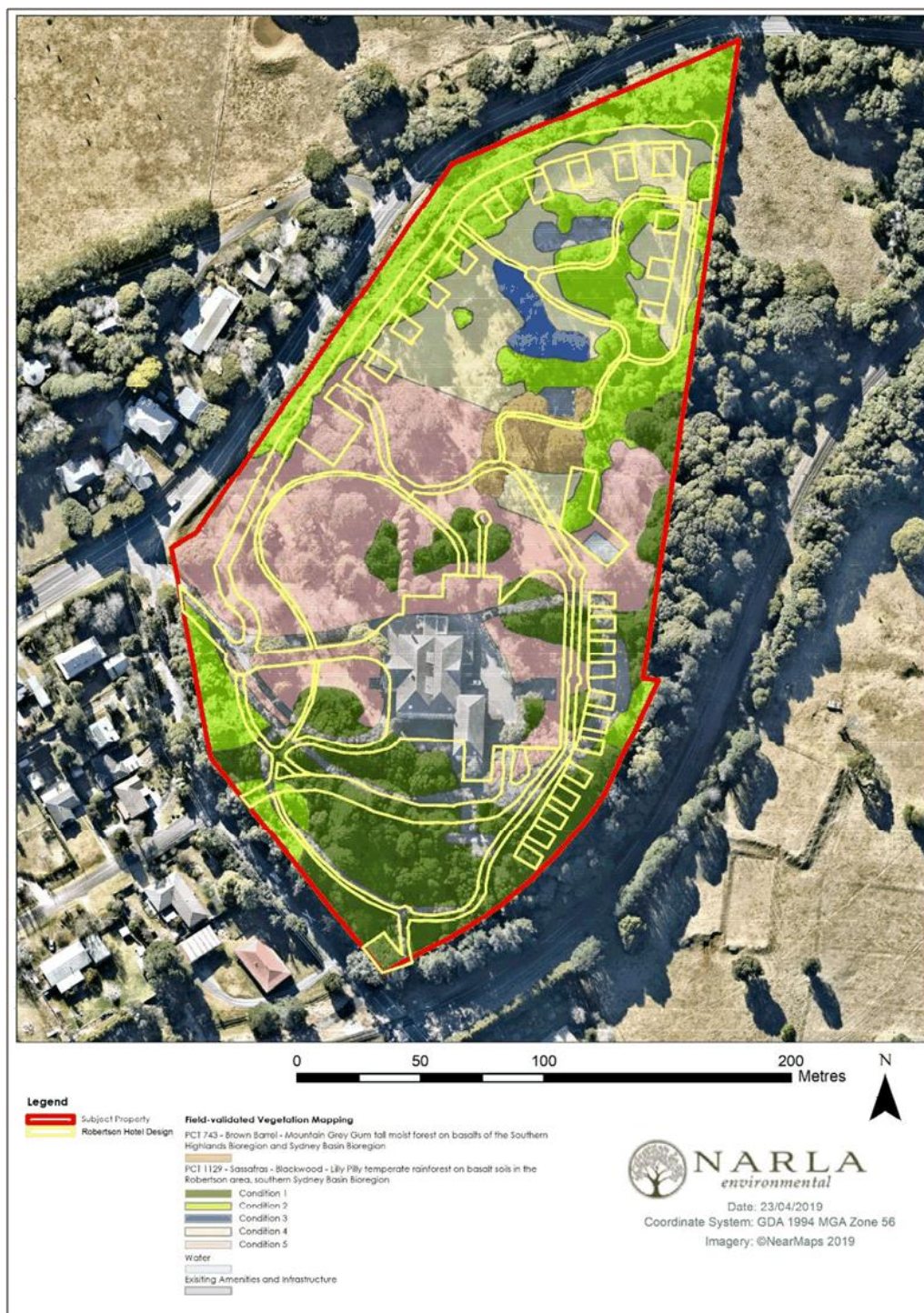


Figure 13. Previous Design (redesigned to avoid impacts on TEC and SAIL).

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## 6. Impact Summary

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### 6.1 Impacts on Biodiversity Values

#### 6.1.1 Native Vegetation Clearance Requiring Offsetting

The following native vegetation within the subject land is proposed to be impacted as a result of the proposed development and will require the purchase and retirement of Biodiversity Offset Credits:

- 3.3 ha of native vegetation representative of PCT 1129 - Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion

#### 6.1.2 Hollow Bearing Tree Removal

Approximately six (6) hollow-bearing trees occur within the new proposed APZ and development footprint. In the event these trees require removal, the installation of augmented tree hollows (nest boxes) is to be implemented within suitable remaining vegetation at the compensatory ratio of 1:2 (two nest boxes installed for each tree hollow removed).

#### 6.1.3 Serious and Irreversible Impacts (SAIL)

In accordance with section 7.16 of the BC Act, a proposed development or activity that has serious and irreversible impacts (SAIL) on biodiversity values is defined as any serious and irreversible impacts on biodiversity values as determined under section 6.5 of the BC Act that would remain after the measures proposed to be taken to avoid or minimise the impact on biodiversity values of the proposed development or activity.

The consent authority must refuse to grant consent under Part 4 of the Environmental Planning and Assessment Act 1979, in the case of an application for development consent to which this Division applies (other than for State significant development), if it is of the opinion that the proposed development is likely to have serious and irreversible impacts on biodiversity values.

If the Minister for Planning is of the opinion that proposed State significant development or State significant infrastructure that is the subject of an application to which this Division applies is likely to have serious and irreversible impacts on biodiversity values, the Minister:

- a) is required to take those impacts into consideration, and
- b) is required to determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.

If the determining authority is of the opinion that the proposed activity to which this Division applies is likely to have serious and irreversible impacts on biodiversity values, the determining authority:

- a) is required to take those impacts into consideration, and
- b) is required to determine whether there are any additional and appropriate measures that will minimise those impacts if the activity is to be carried out or approved.

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##### 6.1.3.1 Threatened Ecological Community SAI's

Two (2) Critically Endangered Ecological Communities (BC Act) present within the subject property have been identified as 'SAI entities':

- Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions; and
- Robertson Rainforest in the Sydney Basin Bioregion

The threshold for consideration of these TEC's is not yet defined. This means that any impact on the potential habitat for these threatened ecological communities could be considered 'serious and irreversible'. Due to the potential sensitivity of these TEC's to any impact, a determination of whether or not the proposed impacts are serious and irreversible are to be undertaken in accordance with Section 10.2.2 of the BAM (OEH 2017a): 'Additional impact assessment provisions for ecological communities.' This is outlined in **Table 20** and **Table 21**. Note that although Robertson Basalt Tall Open will not be directly impacted by the proposed development (it is located outside the subject land), the indirect impacts have been assessed in the SAI impact assessment.

**Table 19. Identification and justification for Threatened Ecological Communities considered to be at risk of Serious and Irreversible Impacts (OEH 2017c).**

Threatened Ecological Community	Criteria for identifying potential entities	Justification for listing	Threshold for consideration of SAI	Present on the subject land
Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions	Principle 1 – reduction in geographic extent.  Principle 2 – environmental degradation or disruption of biotic processes.  Principle 3 – restricted geographic distribution.	Biodiversity Conservation Act listing status (Critically Endangered)	Not defined	No – occurs directly adjacent to subject land.
Robertson Rainforest in the Sydney Basin Bioregion	NA	Biodiversity Conservation Act listing status (Endangered)	Not defined	Yes



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**Table 20. Additional impact assessment provisions for ecological communities that are associated with a serious and irreversible impact (Robertson Basalt Tall Open-forest).**

<b>Serious and Irreversible Impact (SAII)</b>	
<b>Impact assessment provisions for ecological communities:</b>	
<b>Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions</b>	
<b>BC Act Status: Critically Endangered</b>	
<b>a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SAII</b>	The proposed development has taken all possible measures to avoid the direct and indirect impact on Robertson Basalt Tall Open-forest. No part of the proposed development will directly affect this CEEC. Indirect impacts will be restricted to the impacts of a path bordering part of the community on site.
<b>b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone</b>	No areas of Robertson Basalt Tall Open-forest occur within the subject land. There is the potential that the proposed development may indirectly impact approximately 0.03ha of Robertson Basalt Tall Open-forest directly adjacent to the subject land through increased surface run-off and edge effects which may in turn lead to increased weed infestations. The Robertson Basalt Tall Open-forest adjacent to the subject land was analysed using a rapid BAM Vegetation Integrity Survey (VIS), which was calculated as having a vegetation integrity score of 45.6. This area was considered to be slightly degraded, which is consistent with its position in a weed infested area with significant historic local fragmentation. Edge effects of this community are already apparent, with high levels of weed infestations occurring within the area.
<b>c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SAII</b>	The impact thresholds for this community are currently under development.
<b>d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint</b>	Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010) indicates the presence of 1.62 ha of Robertson Basalt Tall Open-forest within an area of 1000ha and 136.8ha within an area of 10,000ha surrounding the development footprint. Overall conditions cannot be determined for such an area without ground truthing.
<b>e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration</b>	Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010) mapping indicates the presence of 766.17ha of Robertson Basalt Tall-Open Forest within the 'Moss Vale' IBRA subregion. Taking into account the impact of the development on this community is 0.0ha, the remaining vegetation within the 'Moss Vale' IBRA Subregion after the proposed development will remain at 766.17ha. Overall conditions cannot be determined for such an area without ground truthing.

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Serious and Irreversible Impact (SAII)		
Impact assessment provisions for ecological communities:		
Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions		
BC Act Status: Critically Endangered		
f) an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion	Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010) mapping indicates the presence of 174.43ha of the community within the NPWS reserve system in the 'Moss Vale' IBRA Subregion and 6182.74ha in Sydney Basin IBRA Region.	
g) the development, clearing or biodiversity certification proposal's impact on:	i. abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns	The proposed development may result in a slight increase in water runoff and nutrients into adjacent areas of Robertson Basalt Open-Tall Forest. However, it is unlikely that the proposed development will exacerbate abiotic factors given the location of the community in a weed infested fragmented area.
	ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants	The area of Robertson Basalt Tall- Open forest within the subject land is semi-intact as it contains a sparse mid storey mixed with a weedy ground layer. The current and future fire regime for the site is beneficial to its existence as being surrounded by buildings will ensure its future protection from fire likely resulting in a more appropriate fire regime (25 years). Flood regimes have also been largely altered due to past land management practices and the surrounding residential development. It is therefore highly unlikely that the proposed development will exacerbate impacts on characteristic and functionally important species as the area is already highly altered and degraded.
	iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC	The proposed development may enhance weed infiltration into adjacent habitat by an increase in edge effects. However, the abundance of invasive species within the subject land is already apparent, and the current vegetation is of low abundance. Also given the location is in a highly urbanised and fragmented area, it is highly unlikely the proposed development will significantly impact on the quality and integrity of the community within and adjacent to the subject land.
h) direct or indirect fragmentation and	The current network of Robertson Basalt Tall- Open forest within and adjacent to the subject property is located in a highly fragmented area, and is not considered	

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<b>Serious and Irreversible Impact (SII)</b> <b>Impact assessment provisions for ecological communities:</b> <b>Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions</b>	
BC Act Status: Critically Endangered	
isolation of an important area of the potential TEC	a priority management site by the NSW Government Saving our Species (2019). No patch connectivity occurs out of the subject property of Robertson Basalt Tall-Open forest. It is therefore highly unlikely that the indirect impacts associated with this development will increase the fragmentation of this community on the subject land and surrounding areas.
i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.	<p>NSW Government Saving our Species (2019) has identified one priority management site of Robertson Basalt Tall- Open forest within NSW.</p> <p>Various impact mitigation measures are also to be implemented before, during and post construction to avoid and minimise the impacts of the project on Robertson Basalt Tall- Open forest (Table 18). No ecosystem credits are required to offset the biodiversity impacts of the proposed development.</p>

**Table 21. Additional impact assessment provisions for ecological communities that are associated with a serious and irreversible impact (Robertson Rainforest).**

<b>Serious and Irreversible Impact (SII)</b> <b>Impact assessment provisions for ecological communities:</b> <b>Robertson Rainforest in the Sydney Basin Bioregion</b>	
BC Act Status: Endangered	
a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SII	The proposed development has taken all possible measures to avoid the direct and indirect impact on Robertson Rainforest. The proposed development will require the removal and management of semi-degraded Robertson Rainforest that has been exposed to various historical and present disturbances. Due to the vegetated nature of the subject property, there are minimal alternatives for the location of the proposed development. Furthermore, the majority of vegetation removal is required for an APZ, which cannot be avoided. However, the APZ has been modelled to avoid impacts on Robertson Rainforest wherever possible.
b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone	<p>A total of 3.3ha of Robertson Rainforest of varying conditions is present within the subject land. For instance, areas that contained a number of species that were representative of this EEC include Condition 1 (Remnant Canopy) and Condition 2 (Regrowth). These areas were in moderate condition, comprising a VI score of 57.1 and 58.2 respectively. The majority of these areas are to be managed as an APZ.</p> <p>The vegetation within Condition 3 (Modified) was of lower condition than the aforementioned zones, with a VI score of 31.4. This area had a highly modified canopy, comprising a stand of <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>, a species that is not known to occur within this EEC. However, the groundlayer contained some groundcovers that are characteristic of this EEC. The majority of this vegetation zone is to be managed as an APZ.</p>



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<b>Serious and Irreversible Impact (SAII)</b> <b>Impact assessment provisions for ecological communities:</b> <b>Robertson Rainforest in the Sydney Basin Bioregion</b>	
BC Act Status: Endangered	
	<p>Two (2) condition classes within the subject land were highly degraded and altered: Condition 4 (Grassland) and Condition 5 (Manicured Gardens). These areas contained minimal species representative of this EEC. Very low VI scores were recorded within these zones, including 1.8 within Condition 4 (Grassland) and 11.4 within Condition 5 (Manicured Gardens). The majority of these areas are to be managed as an APZ.</p> <p>In summary, the following impacts are expected within the subject land:</p> <ul style="list-style-type: none"> <li>Condition 1 (Remnant Canopy): 0.21ha cleared and 0.42ha managed as an IPA.</li> <li>Condition 2 (Regrowth): 0.21ha cleared and 0.43ha managed as an IPA.</li> <li>Condition 3 (Modified): 0.01ha cleared and 0.025ha managed as an IPA.</li> <li>Condition 4 (Grassland): 0.28ha cleared and 0.34ha managed as an IPA.</li> <li>Condition 5 (Manicured Gardens): 0.48 cleared and 0.89ha managed as an IPA.</li> </ul>
c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SAI	The impact thresholds for this community are currently under development.
d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint	Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010) indicates the presence of 126.5ha of Robertson Rainforest within an area of 1000ha and 471ha within an area of 10,000ha surrounding the development footprint. Overall conditions cannot be determined for such an area without ground truthing.
e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration	Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010) mapping indicates the presence of 703.9 of Robertson Rainforest within the 'Moss Vale' IBRA subregion. Taking into account the impact of the development on this community is 3.3ha, the remaining vegetation within the 'Moss Vale' IBRA Subregion after the proposed development will be 700.6ha. Overall conditions cannot be determined for such an area without ground truthing.
f) an estimate of the area of the candidate TEC that is in the	Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010) mapping indicates the presence

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Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Robertson Rainforest in the Sydney Basin Bioregion		
BC Act Status: Endangered		
reserve system within the IBRA region and the IBRA subregion	of 31.88ha of the community within the NPWS reserve system in both the 'Moss Vale' IBRA Subregion and Sydney Basin IBRA Region.	
g) the development, clearing or biodiversity certification proposal's impact on:	i. abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns	The proposed development has the potential to alter the natural hydrology occurring within and surrounding the Subject Land due to excavation works during construction and an increase in hard surfaces. This may alter water runoff levels and increase nutrients into adjacent areas of Robertson Rainforest, causing an increase in weed infestations. However, it is unlikely that the proposed development will significantly exacerbate such factors given that weed infestations already occur within the Robertson Rainforest surrounding the subject land.
	ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants	<p>The proposed development is expected to impact on characteristic and functionally important species within Condition 1 and Condition 2. This will involve the removal of all vegetation across 0.42ha, as well as the modification of 0.85ha for an APZ. The modification for an APZ is expected to result in a large reduction in canopy species, which may in turn change the structure of the rainforest canopy to a more open-forest. This will result in an increase in light infiltration which may have implications for shrub and groundlayer species within the zones that are adapted to a closed canopy environment.</p> <p>A lack of characteristic and functionally important species were present within Condition 3, 4 and 5. As such, it is not expected that the proposed development will exacerbate impacts within these zones, as these areas were already highly altered.</p> <p>It is not expected that the proposed development will impact any characteristic and functionally important species beyond the subject land.</p>

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Serious and Irreversible Impact (SAII) Impact assessment provisions for ecological communities: Robertson Rainforest in the Sydney Basin Bioregion		
BC Act Status: Endangered		
	<b>iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC</b>	The proposed development may enhance weed infiltration into adjacent habitat by an increase in edge effects. However, the abundance of invasive species within the subject land and adjacent properties is already apparent. It is therefore not expected that the quality and integrity of adjacent Robertson Rainforest will be significantly altered by the proposed development.
<b>iv. direct or indirect fragmentation and isolation of an important area of the potential TEC</b>	The current network of Robertson Rainforest within and adjacent to the subject land occurs within a 'Priority Management Area' as defined under the 'Saving our Species Program' (OEH 2020). The removal of vegetation within the subject land is not expected to fragment a patch of Robertson Rainforest. The Robertson Rainforest within the Subject Land comprises a smaller patch on the edge of a larger extent of to the east. Although this is expected to reduce the extent of this patch, it will not fragment it into two or more patches. Other areas of Robertson Rainforest within the vicinity are largely disconnected and fragmented.	
<b>v. the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.</b>	The NSW Government 'Saving our Species Program' (OEH 2020) has identified one (1) Priority Management Areas for Robertson Rainforest. The subject land and immediate surrounds fall into this Priority Management Areas. Various measures have been proposed to manage key threats to conserve this ecological community, including: <ul style="list-style-type: none"> <li>• Restore and reconnect patches of the TEC and include buffers.</li> <li>• Control invasive species using best practise bush regeneration techniques by qualified bush regenerators.</li> <li>• Construct wildlife friendly fences to exclude cattle and incorporate a buffer that protects rainforest remnants and allows for recruitment and enhanced connectivity.</li> <li>• Work with relevant authorities to suppress deer numbers, in-line with the regional pest management strategy.</li> <li>• Consult with landholders to protect patches through long term private land conservation mechanisms.</li> </ul> Various impact mitigation measures are also to be implemented before, during and post construction to avoid and minimise the impacts of the project on Robertson Rainforest where possible ( <b>Table 18</b> ).	

## 6.2 Other Impacts



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**6.2.1 Indirect Impacts**

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the subject land. Impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat.

**Table 22. Indirect Impacts.**

Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(a) inadvertent impacts on adjacent habitat or vegetation	The proposed construction may lead to enhanced weed infiltration, into adjacent habitat. This impact is likely to be restricted to the immediate area surrounding the construction footprint to a few metres.	Robertson Rainforest	Weed intensity may reduce vegetation integrity.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction may lead to enhanced weed infiltration into adjacent habitat by enhanced edge effects. This impact is likely to be restricted to the immediate area surrounding the construction footprint to a couple of metres.	Robertson Rainforest	Edge effects may increase weed intensity and reduce vegetation integrity.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	The proposed works are unlikely to significantly exacerbate any of these issues which are all currently in effect.	NA	NA
(d) transport of weeds and pathogens from the site to adjacent vegetation	The proposed construction may lead to enhanced weed infiltration into adjacent habitat by enhanced edge effects. This impact is likely to be restricted the immediate area surrounding the development to a couple of metres.  Active weed control efforts will be undertaken.	Robertson Rainforest	Edge effects may increase weed intensity and reduce vegetation integrity.
(e) increased risk of starvation,	It is unlikely that any threatened fauna relies on habitat within the	NA	NA

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Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
exposure and loss of shade or shelter	subject land, such that the proposed impacts will lead to increased risks from starvation, exposure, shade and shelter. All habitat resources removed will be replaced at a higher ratio.		
(f) loss of breeding habitats	The proposed development may require the removal of a small number of hollow-bearing trees.  All hollows removed to facilitate the development, will be replaced at a ratio of 1:2 elsewhere within the subject property.	NA	The implementation of recommendations and mitigation measures within this document ( <b>Section 5</b> ) will result in no net loss of breeding habitat for the threatened species assumed to be present within the subject land.
(g) trampling of threatened flora species	No threatened flora species were identified within the subject land. It is not expected that any would occur that would be impacted by trampling.	NA	NA
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely that these issues affect the subject land.	NA	NA
(i) fertiliser drift	This issue currently exists on the subject land. It is unlikely that the proposal would significantly increase this impact.	Robertson Rainforest & Robertson Basalt Tall Open-forest	It is not expected that fertiliser application will cause significant impacts such that the bioregional persistence of threatened species, ecological communities or their habitats could be impacted.

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Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(j) rubbish dumping	This issue was not observed within the subject land and is not expected to be exacerbated as a result of the proposed development.	NA	NA
(k) wood collection	This issue is not likely to affect the subject land.	NA	NA
(l) bush rock removal and disturbance	This issue is not relevant to the subject land as there is no bush rock.	NA	NA
(m) increase in predatory species populations	It is unlikely that the proposed works will influence or alter predatory species populations.	NA	NA
(n) increase in pest animal populations	It is unlikely that the proposed works will influence or alter pest species populations. Pest animals are already present within the subject land.	NA	NA
(o) increased risk of fire	The proposed development is situated in bushfire prone land and has been assessed as being High risk.  Implementation of recommendations from the corresponding bushfire report (Peterson Bushfire 2019) will mitigate any increased risk of fire.	NA	NA
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	The proposed development is likely to require the removal of several hollow-bearing trees.  The development will result in the removal of one man-made waterbody in the north of the site, which provides breeding habitat for	NA	The implementation of recommendations and mitigation measures within this document (Section 5) will result in no net loss of breeding habitat for threatened species.



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Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	amphibians, and foraging habitat for a suite of native fauna i.e. microbats		

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### 6.2.2 Prescribed and Uncertain Impacts

This list of impacts includes all of those impacts on biodiversity values not caused by direct vegetation clearing or development that have been prescribed by the Biodiversity Conservation Regulation 2017.

Prescribed biodiversity impacts require an assessment of the impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance.

**Table 23. Prescribed and Uncertain Impacts**

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance	No	There are no karst, caves, crevices, cliffs and other features of geological significance on or near the subject land.
Habitat of threatened species or ecological communities associated with rocks	No	There are no rocks important to threatened species or ecological communities on the subject land.
Habitat of threatened species or ecological communities associated with human made structures	No	There are no threatened species or ecological communities located within the subject land that are associated with human made structures.
Habitat of threatened species or ecological communities associated with non-native vegetation	No	Ornamental gardens within the Subject Site may provide, intermittent, temporary foraging habitat for Grey-heralded Flying-fox when trees flower or fruit, however, this habitat is not important for the survival of this mobile species.
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Yes	Habitat connectivity continues to exist along the peripheries of the subject property, which connects to a significant patch of forest to the east of the subject property.  It is unlikely that the small area of impact will interrupt connectivity for any threatened fauna or flora species.
Movement of threatened species that maintains their life cycle	Yes	Habitat connectivity continues to exist along the peripheries of the subject property, which connects to a significant patch of forest to the east of the subject property.  It is unlikely that the small area of impact will interrupt connectivity for any threatened fauna or flora species.

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Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development)	No	Considering the surrounding environment, hard-surface runoff from residential development and roads would already have a large impact on the water quality of any watercourses. It is therefore unlikely that water quality will be further impacted beyond its current condition by the proposed development.
Wind turbine strikes on protected animals	No	There are no wind turbines proposed on the subject land.
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	No	It is unlikely that vehicle strikes will be an issue given the proposed development consists of a designated, slow speed limit.

### 6.3 Biodiversity Offset Credit Requirements

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate Species Credits from registered Biodiversity Stewardship Sites that comply with the trading rules of the NSW Biodiversity Offsets Scheme (BOS) in accordance with the 'like for like' report generated by the BAM calculator. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the Biodiversity Conservation Trust would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

#### 6.3.1 Offset Requirement for Ecosystem Credits

A total of thirty-six (36) ecosystem credits are required to offset the biodiversity impacts of the proposed development. Estimated costs to purchase these credits, or alternatively, to allocate offset funds directly into the NSW Biodiversity Conservation Trust (BCT) are available in the NSW Biodiversity Offsets Payment Calculator (OEI 2019c). These values are presented here (**Table 24; Appendix C**).

**Table 24. Ecosystem credits required to offset the proposed development.**

Plant Community Type (PCT)	Total Area	Threatened Ecological Community	BC Act Status	Ecosystem Credits Required
1129 - <i>Sassafras - Blackwood - Lilly Pilly</i> temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	3.3 ha	Robertson Rainforest in the Sydney Basin Bioregion	Endangered	36

#### 6.3.2 Offset Requirement for Species Credits

No candidate species credit species will require offsetting through the retiring of biodiversity offset species credits under the BOS as a result of the proposed development.



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## 7. Other Relevant Legislation and Planning Policies

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### 7.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

#### Robertson Rainforest in the Sydney Basin Bioregion

The native vegetation within the subject land in Condition 1 and Condition 2 conforms to the EPBC listed Robertson Rainforest in the Sydney Basin Bioregion, as it meets the key diagnostic characteristics (**Table 25**) and the minimum condition thresholds (**Table 26**) as outlined in the Conservation Advice (incorporating listing advice) for Robertson Rainforest in the Sydney Basin Bioregion (DoEE 2019). An EPBC Act Assessment of Significant Impact was conducted for this vegetation within the subject land (see **Appendices**).

The native vegetation within Condition 3, Condition 4 and Condition 5 do not meet the EPBC listed Robertson Rainforest in the Sydney Basin Bioregion, as they do not meet the key diagnostic characteristics as listed in **Table 25**.

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Table 25. Key diagnostic characteristics required to meet the EPBC listed Robertson Rainforest in the Sydney Basin Bioregion.

Key Diagnostic Characteristic	Condition 1 (Remnant Canopy)	Condition 2 (Regrowth)	Condition 3 (Modified)	Condition 4 (Grassland)	Condition 5 (Manicured Gardens)
Distribution limited to the southern portion of the Sydney Basin Bioregion in New South Wales. Known occurrences are mostly on the Robertson Plateau in the Wingecarribee and Kiama local government areas (as designated in December 2018). The ecological community is also likely to occur further south in the higher parts of the Cambewarra Range and on, and near to, the Sassafras Plateau in the Shoalhaven local government area (as designated in December 2018).	Yes – occurs within the southern extent of the Sydney Basin Bioregion within the Wingecarribee LGA. The subject property is located on the Robertson Plateau.				
Landscape associations include: presence on relatively high nutrient soils, generally derived from Tertiary basalts (typically Robertson Basalt or Kangaroo Valley Basanite). The ecological community typically does not occur on Wianamatta Shale, though may occur in transition zones between shale and basalt soils, typically present at higher altitude (500 to 800 metres above sea level) sites.	Yes – located on the Robertson soil landscape which is derived from Robertson Basalt. The subject property is situated at an elevation ranging between 757m and 771m.				
Vegetation is classified as a cool to warm temperate rainforest type that has these features: a tree canopy consisting of one or more of: <i>Quintinia sieberi</i> (Possumwood), <i>Polyosma cunninghamii</i> (Featherwood), <i>Doryphora sassafras</i> (Sassafras), <i>Acacia melanoxylon</i> (Blackwood) and <i>Syzygium smithii</i> (syn. <i>Acmena smithii</i> ) (Lilly Pilly); <i>Ceratopetalum apetalum</i> (Coachwood), <i>Pennantia cunninghamii</i> (Brown Beech), <i>Dendrocnide excelsa</i> (Giant Stinging Tree) and <i>Citronella moorei</i> (Silky Beech) may also be prominent in some patches, such as on the Cambewarra Range. a mid-storey with small trees and shrubs, sometimes with lianas and epiphytes. Typical species present may include <i>Melicytus dentatus</i> (Tree Violet), <i>Coprosma quadrifida</i>	Yes – canopy layer included <i>Doryphora sassafras</i> , <i>Acmena smithii</i> and <i>Acacia melanoxylon</i> .  Shrub layer included small trees and shrubs including <i>Melicytus dentatus</i> , <i>Pittosporum undulatum</i> , <i>Pittosporum</i>	Yes - canopy layer included <i>Doryphora sassafras</i> , <i>Acmena smithii</i> , <i>Acacia melanoxylon</i> and <i>Dendrocnide excelsa</i> .  Shrub layer included small trees and shrubs including <i>Melicytus</i>	No – canopy layer contains <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> and <i>Eucalyptus</i> spp.  Shrub layer contains small occurrences of <i>Melicytus dentatus</i> .	No – no native canopy was present within the zone.  Shrub layer contained a low cover of <i>Myrsine howittiana</i> .  Groundlayer was dominated by native grasses, but	No – no native canopy was present within the zone, although the zone did contain regenerating <i>Doryphora sassafras</i> .  Shrub layer contained a low cover of <i>Melicytus dentatus</i> ,

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Key Diagnostic Characteristic	Condition 1 (Remnant Canopy)	Condition 2 (Regrowth)	Condition 3 (Modified)	Condition 4 (Grassland)	Condition 5 (Manicured Gardens)
(Prickly Coprosma), <i>Tasmannia insipida</i> (Brush Pepperbush), <i>Olearia argophylla</i> (Musk Daisy Bush), <i>Hedycarya angustifolia</i> (Native Mulberry), <i>Dicksonia antarctica</i> (Soft Tree-fern) and <i>Parsonsia brownii</i> (Mountain Silkpod). a ground layer that is typically dense with a high cover of ferns.	<i>multiflorum</i> , <i>Syzygium australe</i> and <i>Alectryon subcinereus</i> .  Groundlayer was dominated by exotic species but contained small occurrences of <i>Pyrrosia rupestris</i> , as well as native forbs and vines.	<i>dentatus</i> , <i>Coprosma quadrifida</i> <i>Pittosporum undulatum</i> , <i>Pittosporum multiflorum</i> , <i>Alectryon subcinereus</i> and <i>Wilkiea huegeliana</i>  Groundlayer was dominated by exotic species but contained small occurrences of <i>Pyrrosia rupestris</i> , as well as native forbs, vines and grasses.	Groundlayer contained both native and exotic species, contained small occurrences of <i>Pyrrosia rupestris</i> , <i>Calochlaena dubia</i> and <i>Adiantum aethiopicum</i> , as well as native forbs, vines and grasses.	also contained small occurrences of <i>Pteridium esculentum</i> .	<i>Pittosporum undulatum</i> <i>Solanum aviculare</i> and <i>Bursaria spinosa</i> . Groundlayer mostly comprised exotic species, although contained small occurrences of <i>Asplenium flabellifolium</i> and <i>Pyrrosia rupestris</i> , as well as native forbs, grasses and vines.
	<b>Meets the key diagnostic characteristics</b>		<b>Does not meet the key diagnostic characteristics</b>		



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**Table 26. Minimal condition threshold for the EPBC listed Robertson Rainforest in the Sydney Basin Bioregion.**

Condition Threshold	Status within subject property
a patch size of at least 0.1 ha (1000m <sup>2</sup> ); AND	Yes - the patch size within the subject property (encompassing both Condition 1 and Condition 2) is 1.28ha. This patch is part of a larger patch that extends much further to the east, as indicated by Tozer et al. (2010).
at least 30% canopy cover; AND	Yes - the patch has an average canopy cover of approximately 83%.
a minimum of 5 native plant species from Table A1 (DoEE 2019) per 0.04 ha sample plot on average for the patch OR an understorey comprising at least 30% total vegetation cover of native plant species.	Yes – an average of twenty-one (21) native plant species from Table A1 (DoEE 2019) were present within the BAM plots of Condition 1 and Condition 2. This included eighteen (18) species within Condition 1 and twenty-four (24) species within Condition 2.
	<b>Meets the minimum condition threshold</b>

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#### Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion

The native vegetation adjacent to the subject land that conforms to PCT 743 does not meet the criteria for listing under the EPBC Act. In order to be considered part of the EPBC listed Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion, areas of the ecological community must meet both the key diagnostic characteristics (**Table 27**) and condition thresholds (**Table 28**) as outlined in the Listing Advice for Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (TSSC 2011). Although the vegetation met all key diagnostic characteristics as listed in **Table 27**, the vegetation did not meet either of the condition thresholds as listed in **Table 28**.

**Table 27. Key diagnostic characteristics requested to meet EPBC listed Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion.**

Key Diagnostic Characteristics	Status within subject property
Generally confined to the Sydney Basin IBRA Bioregion although some occurrences may extend outside the Sydney Basin Bioregion boundary, e.g. the southern extent at Sassafras, east of Nerriga NSW, and patches on the Boyd Plateau and Mt Werong.	Yes – occurs within the southern extent of the Sydney Basin Bioregion
Confined to soils derived from basalt and basalt-like substrates.	Yes – located on the Robertson soil landscape which is derived from Roberson Basalt.
Typically occurs at elevations between 650–1050 m above sea level (a.s.l.), with certain outlying occurrences at lower (to 350 m a.s.l.) or higher (above 1200 m a.s.l.) elevations.	Yes - the subject property is situated at an elevation ranging between 757m and 771m.
Occurs in areas with a high mean annual rainfall, typically 950–1600 mm/year.	Yes – high annual rainfall averaging approximately 1440mm per year (BOM 2020b).
The tree canopy layer is present and is dominated by eucalypt trees (as per Appendix A of TSSC 2011), and has a minimum canopy cover of 30%.	Yes – tree canopy layer was dominated by <i>Eucalyptus elata</i> with a canopy cover of 40%.
A shrub layer is usually present but varies from sparse to dense.	Yes – sparse shrub layer present including <i>Melicytus dentatus</i> and <i>Myrsine howittiana</i> .
The ground layer is generally a diverse mix of grasses, forbs and ferns; vines and scramblers also can be present.	The groundlayer was dominated by native grasses, although ferns, forbs and vines were also present.
<b>Meets the key diagnostic characteristics</b>	

**Table 28. Minimal condition threshold for the EPBC listed Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion.**

Condition Threshold	Status within subject property
<b>Core Thresholds</b>	
A minimum patch size at least 0.5 ha AND	No – two isolated patches occur within the subject property, with a total area of 0.14ha.
A total foliage cover of native trees greater than 50% in the patch (not including saplings and smaller regenerating trees to 5 m in height) AND	No – total foliage cover is 40%.
At least 20 native species are present in the understorey (mid and ground layers) of the patch AND	Yes – 29 native species are present within the mid and ground layers.
Non-native perennial weeds account for no more than 40% of the foliage cover of the understorey (mid and ground layers) in the patch.	Yes – non-native perennial weeds account for approximately 1% of foliage cover of the understorey.

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Condition Threshold	Status within subject property
	<b><i>Does not meet the Core Thresholds</i></b>
<b>Variations to Core Thresholds:</b>	
A lower tree canopy cover with percent foliage cover of native trees in the patch 30% or more; and a lower native species richness of at least 10 native species in the understorey of the patch are acceptable; AND	Yes – total foliage cover is 40% and 29 native species are present within the mid and ground layers.
The patch of the ecological community is larger (2 ha or more) OR The patch of the ecological community is part of a larger native vegetation remnant that has a total area of 2 ha or more. Note that: 1) the patch of the ecological community proper should be at least 0.5 ha or more in size; and 2) the total area of the native vegetation remnant refers to the patch of the ecological community plus the area of other native vegetation types that is connected to that patch.	No – two isolated patches occur within the subject property, with a total area of 0.14ha.
	<b><i>Does not meet the Variation to Core Thresholds</i></b>

### 7.2 State Environmental Planning Policy (Koala Habitat Protection) 2019

This SEPP seeks to address the declining status of koalas in NSW through better conservation and management of koala habitat as part of the planning and assessment process. The overarching aim of the SEPP is to "... encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline" (DPIE 2020c).

This SEPP applies to local government areas that are listed in Schedule 1 'Local government areas' of the SEPP. As Wingecarribee LGA is included in Schedule 1, this SEPP applies to the Subject Land. As such, the development control provisions of the SEPP apply to development applications relating to the land:

1. Where there is an approved Koala Plan of Management (KPOM) for the land
  - a) The development application must be consistent with the approved Koala Plan of Management that applies to the land.
2. Where there is no approved Koala Plan of Management for the land, if the land
  - a) Is identified on the Koala Development Application Map; and
  - b) Has an area of more than 1 hectare; or
  - c) Has, together with any adjoining land in the same ownership, an area of more than 1 hectare, whether or not the development application applies to the whole, or only part, of the land.

The development control provisions of the SEPP do not relate to the Subject Land as:

- There is no approved KPOM for the land; and



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- The Subject Property is not identified on the Koala Development Application Map.

#### 7.3 Groundwater Dependent Ecosystems

The Commonwealth Groundwater Dependent Ecosystem (GDE) Policy defines GDEs as ecosystems, which have their species composition, and their natural ecological processes determined by groundwater (DLWC 2002). The Policy defines groundwater as the water beneath the earth's surface that has filtered down to the zone where the earth or rocks are fully saturated (DLWC 2002). Ecosystems vary dramatically in the degree of dependency of groundwater, from having no apparent dependence through to being entirely dependent on it (DLWC 2002). The Australian Government Atlas of Groundwater Dependent Ecosystems was used to identify any previously mapped GDEs that occur in or near the subject land. This atlas identifies GDEs reliant on surface groundwater (rivers, springs and wetlands) and subsurface groundwater (vegetation). The Atlas was reviewed and it was identified that the subject land may contain land with a low potential of containing a GDE (Figure 14).

#### 7.4 Wingecarribee Local Environmental Plan (WLEP) 2010

The subject property is zoned 'E3: Environmental Management'. The WLEP requires that the development satisfies the zone objectives which are:

- To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.
- To provide for a limited range of development that does not have an adverse effect on those values.
- To encourage the retention of the remaining evidence of significant historic and social values expressed in existing landscape and land use patterns.
- To minimise the proliferation of buildings and other structures in these sensitive landscape areas.
- To provide for a restricted range of development and land use activities that provide for rural settlement, sustainable agriculture, other types of economic and employment development, recreation and community amenity in identified drinking water catchment areas.
- To protect significant agricultural resources (soil, water and vegetation) in recognition of their value to Wingecarribee's longer term economic sustainability.

The proposed development satisfies the objectives of the zone because:

- Although the proposed development requires the removal and alteration of native vegetation, a series of impact mitigation measures will be implemented to reduce the impact native vegetation within and surrounding the subject land. In addition, a VMP will accompany this development application. This will outline ongoing management of vegetation within the subject land and broader subject property, and detail the protection and enhancement of fauna habitat and native vegetation.
- It is not expected that the proposed development will have a significant impact on native vegetation communities beyond the subject land.

The subject property is not mapped on the Natural Resources Sensitivity Map (WLEP 2010). Therefore, Clause 7.4 of the WLEP (2010) does not apply to the proposed development.

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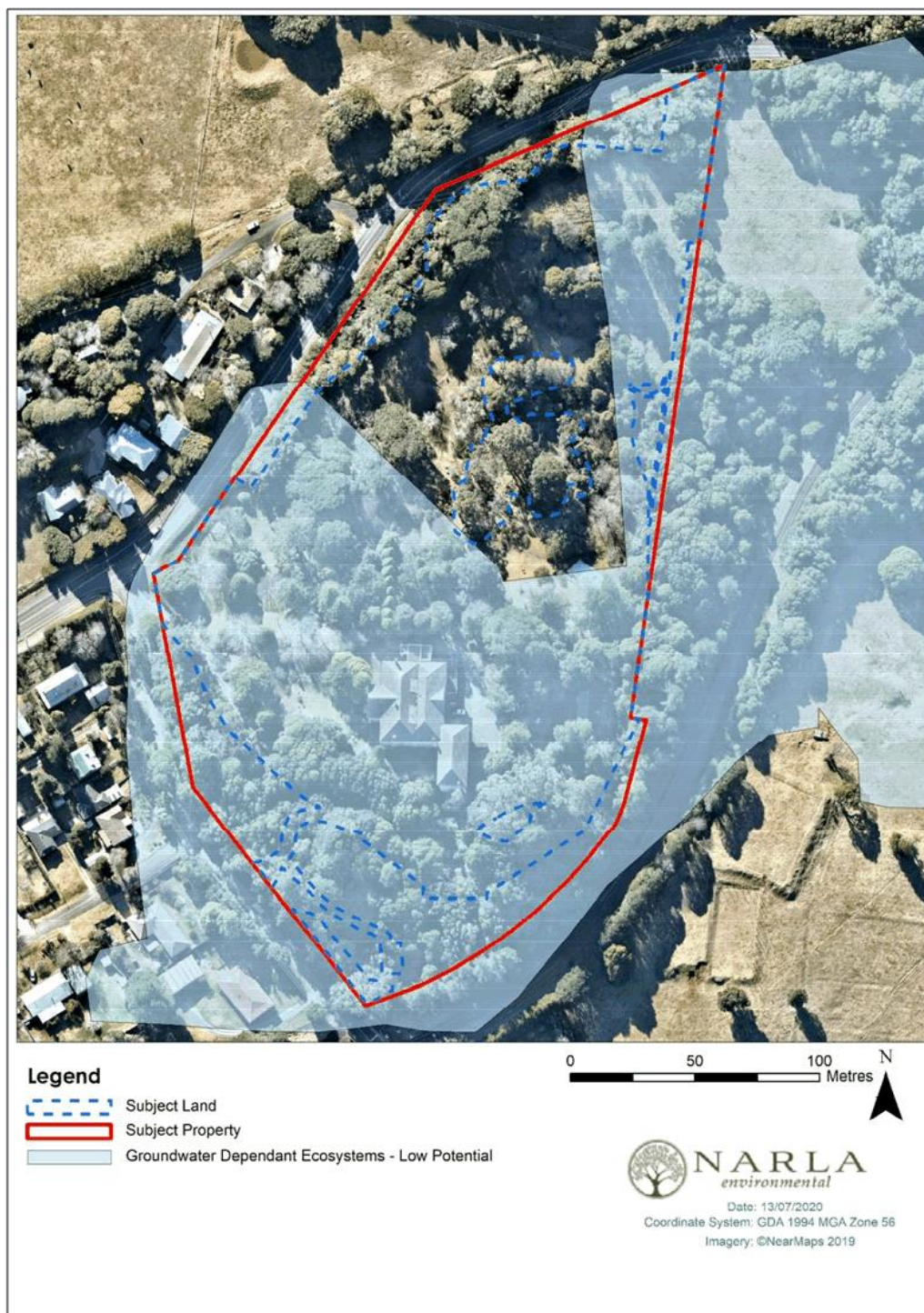


Figure 14. Groundwater Dependant Ecosystem Mapping (BoM 2020).

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## 8. Conclusion

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Con Kotis c/- XPACE Design Group propose to renovate the heritage hotel, construct a new eastern hotel wing, thirteen (13) eco-cabins and seven (7), three-storey villas, leisure facilities and associated network of footpaths and roads at The Robertson Hotel, 1 Fountaindale Road, Robertson, NSW, 2577 (Lot 2, DP610676). This BDAR was prepared by Narla to identify the potential impacts of the proposal on biodiversity values within the subject land.

The proposed development is located within a bushland landscape in land zoned *E3-Environmental Management*. The proposal has been purposefully designed to minimise impacts on biodiversity values. The proposed development is expected to result in impacts to one PCT comprising removal or APZ management of 3.3 ha of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion.

The biodiversity assessment and credit calculations have been performed in accordance with the BAM (OEH 2017a) and using credit calculator version 1.2.7.2. The following credits are required to be purchased retired to offset the biodiversity impacts of the proposal:

- 36 ecosystem credits to offset impacts to 3.3 ha of PCT 1129: Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion.

Due to the potential sensitivity of species to any impact, a determination of whether or not the proposed impacts are serious and irreversible has been undertaken in accordance with Section 10.2.3 of the BAM (OEH 2017a): 'Additional impact assessment provisions for threatened species or populations.'

Mitigation measures are to be implemented to minimise potential operational impacts. These would include:

- Ongoing management of priority weeds according to statutory requirements; and
- Measures to reduce the increased risk of fire.

Considering the nature of the proposal, and the proposed impact mitigation measures proposed, there are unlikely to be any notable indirect impacts on biodiversity values arising from the proposed development. Only the direct impacts associated with vegetation clearing and construction of the dwelling will require biodiversity offsets as per the BAM.

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate credits from stewardship sites that comply with the trading rules of the NSW BOS in accordance with the 'like for like' report generated by the BAMC (**Appendix C**). If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the BCT would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.



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## 10. Appendices

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Appendix A. Flora species identified with the subject land

Appendix B. Fauna species identified with the subject land

Appendix C. BAMC Generated Biodiversity Credit Report

Appendix D. BAM Site - Field Survey Proforma (copied directly from Electronic Data Sheet)

Appendix E. Robertson Hotel Options Report (GSA 2020)

Appendix F. EPBC Act Assessment of Significant Impact



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**Appendix A. Flora species identified with the subject land**

Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Acacia baileyana</i>		x		
<i>Acacia melanoxylon</i>	x			
<i>Acaena novae-zelandiae</i>			x	
<i>Acer negundo</i> *		x		
<i>Acer palmatum</i> *	x			
<i>Acetosella vulgaris</i> *			x	
<i>Acmena smithii</i>			x	
<i>Adiantum aethiopicum</i>			x	
<i>Agapanthus praecox</i> *			x	
<i>Anagallis arvensis</i> *			x	
<i>Araujia sericifera</i> *			x	
<i>Asplenium flabellifolium</i>			x	
<i>Austrostipa</i> spp.			x	
<i>Backhousia myrtifolia</i>	x			
<i>Banksia ericifolia</i>		x		
<i>Banksia integrifolia</i>		x		
<i>Banksia marginata</i>		x		
<i>Betula pendula</i> *		x		
<i>Bidens pilosa</i> *			x	
<i>Blechnum cartilagineum</i>			x	
<i>Bolboschoenus</i> spp.			x	
<i>Brachychiton populneus</i>		x		
<i>Brassicaceae</i> spp.*			x	
<i>Bursaria spinosa</i>		x		
<i>Callistemon</i> spp.				
<i>Calochlaena dubia</i>			x	
<i>Carex appressa</i>			x	
<i>Carex inversa</i>			x	
<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>	x			

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Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Casuarina glauca</i>		x		
<i>Catalpa bigonioides</i> *		x		
<i>Cedrus deodara</i> *		x		
<i>Cenchrus clandestinus</i> *			x	
<i>Centella asiatica</i> *			x	
<i>Cirsium vulgare</i> *			x	
<i>Clematis aristata</i>			x	
<i>Cononeaster coriaceus</i> *		x		
<i>Conyza bonariensis</i> *			x	
<i>Coprosma quadrifida</i>				
<i>Cryptocarya glaucescens</i>		x		
<i>Cupressus sempervirens</i> *		x		
<i>Cupressus cashmeriana</i> *		x		
<i>Cyathea australis</i>		x		
<i>Cyclospermum leptophyllum</i> *			x	
<i>Cynodon dactylon</i>			x	
<i>Cypress spp.</i> *		x		
<i>Dactylis glometata</i> *			x	
<i>Delairea odorata</i> *			x	
<i>Dendrocnide excelsa</i>	x			
<i>Desmodium rhytidophyllum</i>			x	
<i>Dichondra repens</i>			x	
<i>Dietes spp.</i>			x	
<i>Digitaria ciliaris</i> *			x	
<i>Doryphora sassafras</i>		x		
<i>Ehrharta erecta</i> *			x	
<i>Einadia nutans</i>			x	
<i>Eleocharis sphacelata</i>			x	
<i>Entolasia marginata</i>			x	
<i>Eragrostis curvula</i> *			x	

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Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Eragrostis leptostachya</i>			x	
<i>Eucalyptus cinerea</i>	x			
<i>Eucalyptus elata</i>	x			
<i>Eucalyptus fastigata</i>	x			
<i>Eucalyptus scoparia</i>	x			BC Act: Endangered EPBC Act: Vulnerable
<i>Euphorbia peplus*</i>			x	
<i>Eustrephus latifolius</i>			x	
<i>Fragaria spp*</i>			x	
<i>Freesia sp.</i>			x	
<i>Fumaria officinalis*</i>			x	
<i>Gamochaeta calviceps*</i>			x	
<i>Geitonoplesium cymosum*</i>			x	
<i>Genista monspessulana*</i>			x	Priority Weed & WoNS
<i>Geranium molle*</i>			x	
<i>Geranium solanderi</i>			x	
<i>Geranium spp*</i>			x	
<i>Guioa semiglauca</i>		x		
<i>Gymnostachys anceps</i>			x	
<i>Hedera helix*</i>			x	
<i>Hedychium gardnerianum*</i>			x	
<i>Hibbertia scandens</i>			x	
<i>Histiopteris incisa</i>			x	
<i>Hydrangea spp.*</i>			x	
<i>Hymenanthera dentata</i>		x		
<i>Hypericum tetrapterum*</i>			x	
<i>Hypochaeris radicata*</i>			x	
<i>Ilex aquifolium*</i>			x	
<i>Juncus acutus*</i>			x	
<i>Juncus continuus</i>			x	
<i>Juncus usitatus</i>			x	



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Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Lagenophora stipitata</i>			x	
<i>Ligustrum lucidum</i> *		x		Priority
<i>Ligustrum sinense</i> *		x		Priority
<i>Liquidamber styraciflua</i> *		x		
<i>Liriodendron tulipifera</i> *		x		
<i>Lycopodiella lateralis</i>			x	
<i>Lysimachia arvensis</i> *			x	
<i>Magnolia × soulangeana</i> *		x		
<i>Marsdenia rostrata</i>			x	
<i>Medicago sativa</i> *			x	
<i>Melaleuca linariifolia</i>		x		
<i>Melicytus dentatus</i>		x		
<i>Microlaena stipoides</i>			x	
<i>Modiola caroliniana</i> *			x	
<i>Myrsine howittiana</i>			x	
<i>Myrsine variabilis</i>		x		
<i>Narcissus spp.</i> *			x	
<i>Notelaea venosa</i>		x		
<i>Oplismenus spp.</i>			x	
<i>Oxalis perennans</i>			x	
<i>Pandorea pandorana</i>			x	
<i>Parsonsia spp.</i>			x	
<i>Parsonsia straminea</i>			x	
<i>Paspalum dilatatum</i> *			x	
<i>Passiflora edulis</i> *			x	
<i>Persicaria decipiens</i>			x	
<i>Photinia spp.</i> *			x	
<i>Phytolacca octandra</i> *			x	
<i>Picea sitchensis</i> *	x			
<i>Pieris japonica</i> *			x	

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Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Pinus radiata</i> *	x			
<i>Pittosporum eugenioides</i> *				
<i>Pittosporum multiflorum</i>		x		
<i>Pittosporum undulatum</i>		x		
<i>Plantago lanceolata</i> *			x	
<i>Platanus spp.</i> *	x			
<i>Poa annua</i> *			x	
<i>Poa sieberiana</i>			x	
<i>Potentilla indica</i> *			x	
<i>Prunella vulgaris</i> *			x	
<i>Prunus laurocerasus</i> *		x		
<i>Pteridium esculentum</i>			x	
<i>Pyrrosia rupestris</i>			x	
<i>Pyrus usseriensis</i> *		x		
<i>Rhododendron spp.</i> *			x	
<i>Ricinus communis</i> *			x	
<i>Rubus fruticosus</i> *			x	Priority Weed & WoNS
<i>Rumex spp.</i> *			x	
<i>Salix spp.</i> *	x			WoNS
<i>Senecio minimus</i>			x	
<i>Setaria parviflora</i> *			x	
<i>Smilax australis</i>			x	
<i>Solanum aviculare</i>			x	
<i>Solanum mauritianum</i> *			x	
<i>Solanum nigrum</i> *			x	
<i>Solanum prinophyllum</i>			x	
<i>Sonchus asper</i> *				
<i>Stellaria media</i> *			x	
<i>Streblus brunonianus</i>	x			
<i>Syzygium australe</i>		x		

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Scientific Name	Canopy	Mid-storey	Groundcover	Status
<i>Syzygium luehmannii</i>			x	
<i>Taraxacum officinale</i> *			X	
<i>Thuja plicata</i> *		x		
<i>Tradescantia fluminensis</i> *			x	
<i>Trifolium dubium</i> *			x	
<i>Trifolium repens</i> *			x	
<i>Tylophora barbata</i>			x	
<i>Ulmus glabra</i> *		x		
<i>Urtica dioica</i> *			x	
<i>Urtica incisa</i>			x	
<i>Veronica plebeia</i>			x	
<i>Viola hederacea</i>			x	
<i>Wahlenbergia gracilis</i>			x	
<i>Wilkia huegeliana</i>		x		
<i>Yucca spp.</i> *			x	
<i>Zantedeschia aethiopica</i> *			x	

\* Denotes exotic species

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**Appendix B. Fauna species identified with the subject land**

Class	Scientific Name	Common Name	Status
Amphibia	<i>Crinia signifera</i>	Common Eastern Froglet	Protected
Amphibia	<i>Limnodynastes peronii</i>	Striped Marsh Frog	Protected
Amphibia	<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	Protected
Amphibia	<i>Pseudophryne bibroni</i>	Bibron's Toadlet	Protected
Amphibia	<i>Litoria peronii</i>	Peron's Tree Frog	Protected
Amphibia	<i>Litoria verreauxii</i>	Whirring Tree Frog	Protected
Amphibia	<i>Uperoleia laevis</i>	Smooth Toadlet	Protected
Aves	<i>Acanthiza lineata</i>	Striated Thornbill	Protected
Aves	<i>Acanthiza pusilla</i>	Brown Thornbill	Protected
Aves	<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	Protected
Aves	<i>Anas platyrhynchos domesticus</i> *	Mallard (Domestic Duck)	Feral Pest
Aves	<i>Anthochaera chrysoptera</i>	Little Wattlebird	Protected
Aves	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	Protected
Aves	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo	Protected
Aves	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Protected
Aves	<i>Cracticus torquatus</i>	Grey Butcherbird	Protected
Aves	<i>Cracticus tibicen</i>	Australian Magpie	Protected
Aves	<i>Corvus coronoides</i>	Australian Raven	Protected
Aves	<i>Eopsaltria australis</i>	Eastern Yellow Robin	Protected
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Protected
Aves	<i>Gallus gallus</i> *	Domestic Chicken	Not Protected
Aves	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	Protected
Aves	<i>Leucosarcia melanoleuca</i>	Wonga Pigeon	Protected
Aves	<i>Macropygia phasianella</i>	Brown Cuckoo Dove	Protected
Aves	<i>Meliphaga lewinii</i>	Lewin's Honeyeater	Protected
Aves	<i>Microeca fascians</i>	Jacky Winter	Protected
Aves	<i>Neochmia temporalis</i>	Red-browed Finch	Protected
Aves	<i>Pachycephala pectoralis</i>	Australian Golden Whistler	Protected
Aves	<i>Pardalotus punctatus</i>	Spotted Pardalote	Protected
Aves	<i>Petroica rosea</i>	Rose Robin	Protected
Aves	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Protected
Aves	<i>Platycercus elegans</i>	Crimson Rosella	Protected
Aves	<i>Psophodes olivaceus</i>	Eastern Whipbird	Protected
Aves	<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird	Protected
Aves	<i>Rhipidura albiscapa</i>	Grey Fantail	Protected
Aves	<i>Rhipidura rufifrons</i>	Rufous Fantail	Migratory
Aves	<i>Sericornis frontalis</i>	White-browed Scrub-Wren	Protected
Aves	<i>Sericornis magnirostris</i>	Large-billed Scrubwren	Protected
Aves	<i>Strepera graculina</i>	Pied Currawong	Protected
Aves	<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	Protected
Aves	<i>Turdus merula</i> *	Common Blackbird	Feral Pest



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Class	Scientific Name	Common Name	Status
Aves	<i>Zoothera lunulata</i>	Bassian Thrush	Protected
Aves	<i>Zosterops lateralis</i>	Silvereye	Protected
Mammalia	<i>Austronomus australis</i>	White-striped freetail Bat	Protected
Mammalia	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	Protected
Mammalia	<i>Chalinolobus morio</i>	Chocolate Wattled Bat	Protected
<b>Mammalia</b>	<b><i>Falsistrellus tasmaniensis</i></b>	<b>Eastern False Pipistrelle (Possible)</b>	<b>Vulnerable</b>
<b>Mammalia</b>	<b><i>Miniopterus orianae oceanensis</i></b>	<b>Large Bent-winged Bat (Definite)</b>	<b>Vulnerable</b>
<b>Mammalia</b>	<b><i>Mormopterus norfolkensis</i></b>	<b>Eastcoast Freetail Bat (Possible)</b>	<b>Vulnerable</b>
Mammalia	<i>Nyctophilus spp.</i>	Long-eared Bat	Protected
Mammalia	<i>Oryctolagus cuniculus*</i>	European Rabbit	Feral Pest
Mammalia	<i>Ozimops ridei</i>	Eastern Freetail Bat	Protected
Mammalia	<i>Petaurus breviceps</i>	Sugar Glider	Protected
Mammalia	<i>Pseudocheirus peregrinus</i>	Ring-tailed Possum	Protected
Mammalia	<i>Rattus fuscipes</i>	Bush Rat	Protected
Mammalia	<i>Rattus rattus*</i>	Black Rat	Feral Pest
<b>Mammalia</b>	<b><i>Scoteanax rueppellii</i></b>	<b>Greater Broad-nosed Bat (Possible)</b>	<b>Vulnerable</b>
<b>Mammalia</b>	<b><i>Scotepens orion</i></b>	<b>Eastern Broad Nosed Bat (Possible)</b>	<b>Vulnerable</b>
Mammalia	<i>Trichosurus vulpecula</i>	Common Brushtail Possum	Protected
Mammalia	<i>Vespadelus darlingtoni</i>	Large Forest Bat	Protected
Mammalia	<i>Vombatus ursinus</i>	Common Wombat	Protected
Reptilia	<i>Austrelaps superbus</i>	Lowland Copperhead	Protected
Reptilia	<i>Ctenotus taeniolatus</i>	Copper-tailed Skink	Protected
Reptilia	<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	Protected
Reptilia	<i>Trachemys scripta elegans*</i>	Red-eared Slider Turtle	Feral Pest

\* Denotes exotic species

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### ATTACHMENT 1 Attachment 1 Updated Biodiversity Development Assessment Report



#### Appendix C. BAMC Generated Biodiversity Credit Report



### BAM Biodiversity Credit Report (Like for like)

#### Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00019576/BAAS19040/20/00019579	Robertson Hotel	26/11/2019
Assessor Name	Assessor Number	BAM Data version *
		22
Proponent Names	Report Created	BAM Case Status
Con Kotis	19/03/2020	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Part 4 Developments (General)	19/03/2020

#### Potential Serious and Irreversible Impacts

Nil

\* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Nil

#### Additional Information for Approval

PCTs With Customized Benchmarks  
No Changes

Assessment Id	Proposal Name	Page 1 of 3
00019576/BAAS19040/20/00019579	Robertson Hotel	



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#### ATTACHMENT 1 Attachment 1 Updated Biodiversity Development Assessment Report



### BAM Biodiversity Credit Report (Like for like)

Predicted Threatened Species Not On Site  
No Changes

#### Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
1129-Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	Robertson Rainforest in the Sydney Basin Bioregion	3.3	36.00

1129-Sassafras - Blackwood - Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion	Like-for-like credit retirement options			
	Name of offset trading group	Trading group	HBT	IBRA region
	Robertson Rainforest in the Sydney Basin Bioregion This includes PCT's: 1128, 1129	-	Yes	Moss Vale, Burrigorang, Ettrema, Illawarra and Sydney Cataract. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

#### Species Credit Summary

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No Species Credit Data

### BAM Biodiversity Credit Report (Like for like)

Assessment Id  
00019576/BAAS19040/20/00019579

Proposal Name  
Robertson Hotel

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**Appendix D. BAM Site - Field Survey Proforma (copied directly from Electronic Data Sheet)**

[illegible]

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BAM Site – Field Survey Form		
DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	2	11
30-49cm	present	0
20-29cm	present	0
10-19cm	present	0
5-9cm	present	0
<5cm	present	0
Length of Logs (m)	26	
BAM Attribute (1x1m)	Litter Cover (%)	
1 (5m)	0	
2 (15m)	0	
3 (25m)	0	
4 (35m)	0	
5 (45m)	50	
Average	10	
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	3	110
Shrub	7	3.8
Grass	0	0
Forb	1	0.3
Fern	1	0.2
Other	7	5.6
High Threat Exotics	4	110.2

\* Denotes Exotic Species

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BAM Site – Field Survey Form					
<b>Date:</b>	21-Mar-2019	<b>Plot ID:</b>	Condition 2 (Regrowth)	<b>Photo #:</b>	-
<b>Zone:</b>	56	<b>Plot Dimensions:</b>	20 x 50m	<b>Latitude:</b>	-34.58856800
<b>Datum:</b>	GDA94	<b>Middle bearing from 0m:</b>	139° SE	<b>Longitude:</b>	150.61141100
<b>PCT:</b>	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				
Growth Form	Scientific Name		Cover	Abundance	
Tree (TG)	<i>Cryptocarya glaucescens</i>		2.5	3	
Other (OG)	<i>Cyathea</i> spp.		5	N/A	
HTE	<i>Hedera helix</i>		42	N/A	
Tree (TG)	<i>Doryphora sassafras</i>		5	N/A	
Shrub (SG)	<i>Pittosporum undulatum</i>		10	N/A	
Tree (TG)	<i>Acmena smithii</i>		3	2	
Shrub (SG)	<i>Alectryon suncinereus</i>		0.5	1	
Shrub (SG)	<i>Melicytus dentatus</i>		0.5	14	
Tree (TG)	<i>Acacia melanoxylon</i>		40	N/A	
Shrub (SG)	<i>Wilkia huegeliana</i>		0.5	0	
Other (OG)	<i>Hibbertia scandens</i>		2	3	
#N/A	<i>Platanus</i> spp.		0.5	2	
#N/A	<i>Zantedeschia aethiopica</i>		0.1	1	
Fern (EG)	<i>Pyrrhosia rupestris</i>		0.1	14	
HTE	<i>Rubus fruticosus</i>		0.1	8	
Shrub (SG)	<i>Coprosma quadrifida</i>		0.1	2	
#N/A	<i>Geranium molle</i>		0.1	10	
Shrub (SG)	<i>Pittosporum multiflorum</i>		0.1	1	
HTE	<i>Ehrharta erecta</i>		0.1	15	
Grass & grasslike (GG)	<i>Microlaena stipoides</i>		2	150	
Grass & grasslike (GG)	<i>Entolasia marginata</i>		6.5	N/A	
Forb (FG)	<i>Senecio minimus</i>		0.5	6	
Other (OG)	<i>Pandorea pandorana</i>		30	N/A	
Grass & grasslike (GG)	<i>Carex appressa</i>		1	10	
HTE	<i>Tradescantia fluminensis</i>		25	N/A	
Other (OG)	<i>Marsdenia rostrata</i>		0.1	2	
#N/A	<i>Ilex aquifolium</i>		0.1	3	
Tree (TG)	<i>Dendrocnide excelsa</i>		5	1	
Other (OG)	<i>Smilax australis</i>		0.1	1	

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BAM Site – Field Survey Form			
Forb (FG)	<i>Solanum prinophyllum</i>	0.1	3
Forb (FG)	<i>Centella asiatica</i>	0.1	20
HTE	<i>Ligustrum sinense</i>	0.1	5
Other (OG)	<i>Geitonoplesium cymosum</i>	0.1	3
Forb (FG)	<i>Viola spp.</i>	0.1	20
Forb (FG)	<i>Acaena novae-zelandiae</i>	0.1	10
Grass & grasslike (GG)	<i>Juncus continuus</i>	0.1	1
Other (OG)	<i>Parsonsia straminea</i>	0.1	1
Shrub (SG)	<i>Myrsine howittiana</i>	0.1	2
#N/A	<i>Phytolacca octandra</i>	0.1	2
Shrub (SG)	<i>Solanum aviculare</i>	0.1	3
Other (OG)	<i>Tylophora barbata</i>	0.1	1
Forb (FG)	<i>Oxalis spp.</i>	0.1	15
<b>DBH</b>	<b># Tree Stems Count</b>	<b># Hollow Bearing Trees</b>	
<b>80+cm</b>	1	0	
<b>50-79cm</b>	absent	NA	
<b>30-49cm</b>	present	0	
<b>20-29cm</b>	present	0	
<b>10-19cm</b>	present	0	
<b>5-9cm</b>	present	0	
<b>&lt;5cm</b>	present	0	
<b>Length of Logs (m)</b>	0		
<b>BAM Attribute (1x1m)</b>	<b>Litter Cover (%)</b>		
<b>1 (5m)</b>	5		
<b>2 (15m)</b>	10		
<b>3 (25m)</b>	75		
<b>4 (35m)</b>	80		
<b>5 (45m)</b>	50		
<b>Average</b>	<b>44</b>		
<b>Growth Form</b>	<b>Composition Data (count of native cover)</b>	<b>Structure Data (sum of cover)</b>	
<b>Tree</b>	5	55.5	
<b>Shrub</b>	8	11.9	
<b>Grass</b>	4	9.6	
<b>Forb</b>	6	1	
<b>Fern</b>	1	0.1	



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BAM Site – Field Survey Form		
Other	8	37.5
Hight Threat Exotics	5	67.3

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BAM Site – Field Survey Form					
<b>Date:</b>	21-Mar-2019	<b>Plot ID:</b>	Condition 3 (Modified)	<b>Photo #:</b>	-
<b>Zone:</b>	56	<b>Plot Dimensions:</b>	20 x 50m	<b>Latitude:</b>	-34.58822600
<b>Datum:</b>	GDA94	<b>Middle bearing from 0m:</b>	125° SE	<b>Longitude:</b>	150.61089600
<b>PCT:</b>	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				
Growth Form	Scientific Name		Cover	Abundance	
Tree (TG)	<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>		40	N/A	
Tree (TG)	<i>Eucalyptus cinerea</i>		0.5	1	
#N/A	<i>Platanus</i> spp.		0.2	21	
#N/A	<i>Melaleuca linearifolius</i>		1	1	
Forb (FG)	<i>Persicaria decipiens</i>		0.1	5	
#N/A	<i>Geranium molle</i>		35	N/A	
HTE	<i>Rubus fruticosus</i>		0.5	3	
Forb (FG)	<i>Acaena novae-zelandiae</i>		0.5	30	
Tree (TG)	<i>Eucalyptus</i> spp.		0.5	1	
#N/A	<i>Conyza bonariensis</i>		0.1	16	
#N/A	<i>Phytolacca octandra</i>		0.1	7	
Shrub (SG)	<i>Solanum aviculare</i>		0.5	7	
#N/A	<i>Potentilla indica</i>		0.1	4	
Shrub (SG)	<i>Melicytus dentatus</i>		0.1	7	
#N/A	<i>Hypericum tetrapterum</i>		0.1	2	
#N/A	<i>Cirsium vulgare</i>		0.1	2	
Other (OG)	<i>Hibbertia scandens</i>		0.1	5	
Fern (EG)	<i>Adiantum aethiopicum</i>		0.1	30	
Forb (FG)	<i>Senecio minimus</i>		0.5	25	
Forb (FG)	<i>Oxalis</i> spp.		18	N/A	
Grass & grasslike (GG)	<i>Microlaena stipoides</i>		10	N/A	
Other (OG)	<i>Calochlaena dubia</i>		0.1	2	
Forb (FG)	<i>Centella asiatica</i>		0.1	50	
Forb (FG)	<i>Veronica plebeia</i>		0.1	5	
#N/A	<i>Gamochaeta calviceps</i>		0.1	1	
#N/A	<i>Bidens pilosa</i>		0.1	1	
Forb (FG)	<i>Solanum prinophyllum</i>		0.1	5	
#N/A	<i>Modiola caroliniana</i>		0.3	25	
Fern (EG)	<i>Pyrrosia rupestris</i>		0.1	1	

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BAM Site – Field Survey Form			
Grass & grasslike (GG)	Carex appressa	0.1	1
#N/A	Hypochaeris radicata	0.1	1
#N/A	Lysimachia arvensis	0.1	5
Forb (FG)	Einadia nutans	0.1	4
#N/A	Trifolium dubium	0.1	1
HTE	Ehrharta erecta	5	N/A
#N/A	Poa annua	0.1	2
Other (OG)	Clematis aristata	0.1	1
Other (OG)	Geitonoplesium cymosum	0.1	1
Other (OG)	Parsonsia straminea	0.1	1
#N/A	Trifolium repens	0.1	1
#N/A	Brassicaceae spp.	0.2	30
HTE	Acetosella vulgaris	0.1	10
Shrub (SG)	Callistemon spp.	0.1	0
#N/A	Solanum nigrum	0.1	1
#N/A	Euphorbia peplus	0.1	5
Grass & grasslike (GG)	Entolasia spp.	0.1	5
Grass & grasslike (GG)	Eragrostis leptostachya	0.1	3
#N/A	Taraxacum officinale	0.1	1
#N/A	Prunella vulgaris	0.1	3
#N/A	Stellaria media	0.1	1
#N/A	Sonchus asper	0.1	1
DBH		# Tree Stems Count	
80+cm		absent	
50-79cm		absent	
30-49cm		present	
20-29cm		present	
10-19cm		present	
5-9cm		present	
<5cm		present	
Length of Logs (m)		5	
BAM Attribute (1x1m)		Litter Cover (%)	
1 (5m)		5	
2 (15m)		75	
3 (25m)		0	

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BAM Site – Field Survey Form		
4 (35m)		0
5 (45m)		10
Average		18
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	3	41
Shrub	3	0.7
Grass	4	10.3
Forb	8	19.5
Fern	2	0.2
Other	5	0.5
High Threat Exotics	3	5.6



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BAM Site – Field Survey Form					
<b>Date:</b>	22-Mar-2019	<b>Plot ID:</b>	Condition 4 (Grassland)	<b>Photo #:</b>	-
<b>Zone:</b>	56	<b>Plot Dimensions:</b>	20 x 50m	<b>Latitude:</b>	-34.58807200
<b>Datum:</b>	GDA94	<b>Middle bearing from 0m:</b>	173° S	<b>Longitude:</b>	150.61173000
<b>PCT:</b>	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				
Growth Form	Scientific Name		Cover	Abundance	
HTE	<i>Pinus radiata</i>		2	2	
Grass & grasslike (GG)	<i>Entolasia marginata</i>		28	N/A	
#N/A	<i>Geranium molle</i>		0.1	50	
#N/A	<i>Hypochaeris radicata</i>		0.2	30	
#N/A	<i>Plantago lanceolata</i>		0.2	30	
Fern (EG)	<i>Pteridium esculentum</i>		1	25	
HTE	<i>Eragrostis curvula</i>		0.1	4	
#N/A	<i>Brassicaceae spp.</i>		0.1	4	
HTE	<i>Acetosella vulgaris</i>		0.1	20	
Forb (FG)	<i>Oxalis spp.</i>		0.1	10	
Fern (EG)	<i>Lycopodiella lateralis</i>		0.1	200	
#N/A	<i>Prunella vulgaris</i>		0.1	10	
#N/A	<i>Dactylis glomerata</i>		0.1	20	
#N/A	<i>Taraxacum officinale</i>		0.1	2	
HTE	<i>Paspalum dilatatum</i>		0.1	30	
#N/A	<i>Freesia spp.</i>		0.5	30	
Other (OG)	<i>Smilax australis</i>		0.1	1	
Grass & grasslike (GG)	<i>Austrostipa spp.</i>		0.1	40	
#N/A	<i>Medicago sativa</i>		0.1	40	
Other (OG)	<i>Pandorea pandorana</i>		0.1	3	
Forb (FG)	<i>Acaena novae-zelandiae</i>		0.1	6	
Shrub (SG)	<i>Myrsine howittiana</i>		0.1	2	
Grass & grasslike (GG)	<i>Poa sieberiana</i>		0.5	40	
Grass & grasslike (GG)	<i>Microlaena stipoides</i>		28	N/A	
Forb (FG)	<i>Desmodium rhytidophyllum</i>		0.1	50	
HTE	<i>Rubus fruticosus</i>		0.2	6	

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BAM Site – Field Survey Form		
DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	absent	NA
50-79cm	absent	NA
30-49cm	absent	NA
20-29cm	absent	NA
10-19cm	present	0
5-9cm	absent	NA
<5cm	absent	NA
Length of Logs (m)		
0		
BAM Attribute (1x1m)	Litter Cover (%)	
1 (5m)	0	
2 (15m)	0	
3 (25m)	0	
4 (35m)	0	
5 (45m)	5	
Average	1	
Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	0	0
Shrub	1	0.1
Grass	4	56.6
Forb	3	0.3
Fern	2	1.1
Other	2	0.2
Hight Threat Exotics	5	2.5

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BAM Site – Field Survey Form					
<b>Date:</b>	29-Mar-2019	<b>Plot ID:</b>	Condition 5 (Manicured Gardens)	<b>Photo #:</b>	-
<b>Zone:</b>	56	<b>Plot Dimensions:</b>	20 x 50m	<b>Latitude:</b>	-34.588925
<b>Datum:</b>	GDA94	<b>Middle bearing from 0m:</b>	66° NE	<b>Longitude:</b>	150.61013
<b>PCT:</b>	PCT: 1129 Sassafras – Blackwood – Lilly Pilly temperate rainforest on basalt soils in the Robertson area, southern Sydney Basin Bioregion				
Growth Form	Scientific Name		Cover	Abundance	
#N/A	<i>Betula pendula</i>		3	1	
HTE	<i>Pinus radiata</i>		40	N/A	
#N/A	<i>Picea sitchensis</i>		5	N/A	
#N/A	<i>Acer spp.</i>		20	N/A	
#N/A	<i>Cononeaster coriaceus</i>		5	N/A	
Shrub (SG)	<i>Pittosporum spp.</i>		1	1	
Other (OG)	<i>Parsonsia straminea</i>		0.1	10	
Grass & grasslike (GG)	<i>Microlaena stipoides</i>		2	400	
Forb (FG)	<i>Centella asiatica</i>		0.01	250	
HTE	<i>Ehrharta erecta</i>		3	250	
Forb (FG)	<i>Viola hederacea</i>		0.1	250	
Fern (EG)	<i>Asplenium flabellifolium</i>		0.1	15	
HTE	<i>Ligustrum sinense</i>		0.1	20	
#N/A	<i>Geranium molle</i>		3	200	
#N/A	<i>Sonchus asper</i>		0.15	50	
Shrub (SG)	<i>Solanum aviculare</i>		1	5	
Other (OG)	<i>Pandorea pandorana</i>		1	5	
Other (OG)	<i>Eustrephus latifolius</i>		0.1	20	
Tree (TG)	<i>Doryphora sassafras</i>		0.1	1	
HTE	<i>Araujia sericifera</i>		1	5	
HTE	<i>Rubus fruticosus</i>		0.15	15	
Forb (FG)	<i>Dichondra repens</i>		2	300	
HTE	<i>Tradescantia fluminensis</i>		5	N/A	
Forb (FG)	<i>Oxalis spp.</i>		1	200	
HTE	<i>Paspalum dilatatum</i>		3	200	
#N/A	<i>Hypochaeris radicata</i>		0.1	10	
#N/A	<i>Geranium spp.</i>		0.01	10	
Shrub (SG)	<i>Bursaria spinosa</i>		1	15	
Shrub (SG)	<i>Acacia spp.</i>		0.01	1	
Other (OG)	<i>Parsonsia straminea</i>		0.1	10	

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BAM Site – Field Survey Form			
HTE	<i>Hedera helix</i>	0.1	10
Fern (EG)	<i>Pyrrosia rupestris</i>	0.05	10
Other (OG)	<i>Cyathea spp.</i>	0.12	4
Grass & grasslike (GG)	<i>Cynodon dactylon</i>	1	300
#N/A	<i>Setaria parviflora</i>	0.01	50
Grass & grasslike (GG)	<i>Entolasia marginata</i>	0.1	50
#N/A	<i>Digitaria ciliaris</i>	0.05	50
Grass & grasslike (GG)	<i>Eragrostis leptostachya</i>	2	400
#N/A	<i>Hydrangea spp.</i>	15	N/A
#N/A	<i>Medicago spp.</i>	0.01	10
Forb (FG)	<i>Rumex spp.</i>	0.01	10
Forb (FG)	<i>Einadia nutans</i>	0.01	10
Forb (FG)	<i>Solanum prinophyllum</i>	0.01	1
Grass & grasslike (GG)	<i>Carex appressa</i>	0.5	150
#N/A	<i>Phytolacca octandra</i>	0.5	3
Shrub (SG)	<i>Pittosporum undulatum</i>	0.02	1
Shrub (SG)	<i>Melicytus dentatus</i>	0.2	5
#N/A	<i>Catalpa bigoniodes</i>	15	N/A
DBH		# Tree Stems Count	# Hollow Bearing Trees
80+cm		0	0
50-79cm		0	0
30-49cm		absent	0
20-29cm		absent	0
10-19cm		absent	0
5-9cm		absent	0
<5cm		present	0
Length of Logs (m)		1	
BAM Attribute (1x1m)		Litter Cover (%)	
1 (5m)		20	
2 (15m)		60	
3 (25m)		3	
4 (35m)		60	
5 (45m)		5	
Average		29.6	
Growth Form		Composition Data (count of native cover)	Structure Data (sum of cover)



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BAM Site – Field Survey Form		
Tree	1	0.1
Shrub	6	3.23
Grass	5	5.6
Forb	7	3.14
Fern	2	0.15
Other	5	1.42
Hight Threat Exotics	8	52.35

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Appendix E. Robertson Hotel Options Report (GSA 2020)

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## DESIGN OPTIONS REPORT

Proposed Redevelopment of The Robertson Hotel

**No. 1 Fountaindale Road,  
Robertson**

Prepared for:

**Mr Con Kotis**

C/- X.Pace Design

201/50 Marshall Street

Surry Hills 2010

Prepared by:

**GSA PLANNING**

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JOB NO. 18274

January 2020

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This report has been prepared and reviewed in accordance with our quality control system. The report is a preliminary draft unless it is signed below.

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Job No: 18274

Revision No: 1

Report prepared by: **H Rubenstein**  
Senior Planner

Report reviewed by:

**George Karavanas**  
Director

Date: January 2020

For and on behalf of: **GSA Planning**  
95 Paddington Street  
PADDINGTON NSW 2021

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gsa planning

## 1.0 INTRODUCTION

This Design Options Report has been prepared for Mr Con Kotis by Gary Shiels & Associates Pty Ltd – (hereafter referred to as GSA Planning), in consultation with X.Pace Design. GSA Planning has expertise in Urban Design, Environmental & Traffic Planning.

This report is to accompany a development application to Wingecarribee Council for the redevelopment of The Robertson Hotel at No. 1 Fountaindale Road, Robertson. This report is also supplementary to the Statement of Environmental Effects prepared by GSA, which forms part of the development application submission.

The purpose of this report is to outline the design options that were considered at the design development stage. It also details how the preferred masterplan design option evolved, as it was informed by the various environmental constraints that are particular to the subject site.

The site is zoned E3 Environmental Management under the Wingecarribee Local Environmental Plan (LEP) and contains numerous heritage, bushfire, environmental and ecological constraints. The proposed design has been undertaken in consultation with specialists in these fields. Accordingly, bushfire, ecological/environmental, traffic, and heritage reports have been prepared and accompany the development application submission.

This document is divided into four sections. Section 2 includes a brief background and design objectives for redevelopment; Section 3 provides an overall outline of the proposal and includes a discussion on the design options; and Section 4 concludes the report.

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## **2.0 BACKGROUND AND DESIGN OBJECTIVES FOR REDEVELOPMENT**

This section provides a brief background to the existing site and operational constraints, and includes a project brief and design objectives.

### **2.1 Background**

The site has operated under various owners since construction of the hotel was completed in 1924. While well-known in the local and wider area, the hotel has not been able to function to its full potential due to a number of financial and operational constraints. The current owner of the site has made the following observations which have had an adverse effect on the success of the hotel:

- Deterioration of the facilities due to age and little work being undertaken by previous owners, resulting in parts of the hotel being in a state of disrepair;
- The hotel has limited amenities to meet the expectations of a more diverse market in the 21<sup>st</sup> Century. For example, ensuites in each hotel room, in addition to other services such as TV, internet and heating/cooling are now expected by visitors as standard features, which the hotel does not fully provide;
- The hotel offers limited accommodation options which do not cater to larger family groups who may prefer self-contained accommodation;
- The hotel is popular on weekends, but severely underutilised during the week. The hotel is therefore closed between Sunday and Thursday as it is not financially viable to provide support staff when occupancy is low or zero.
- Public access to the gardens and areas of significant heritage and ecological value is limited due to these areas being fenced off.

### **2.2 Project Brief/Design Objectives**

To ensure long term financial success while maintaining the historic significance of the hotel, the current owner approached X.Pace Design with a view to redevelop the site to make the hotel more attractive and relevant to a wider market as well as meet current visitor expectations. As works to the existing hotel would require its closure for an extended period, construction of the new facilities would enable the hotel to continue operating. The project included the following design objectives:

- An upgrade of the existing hotel facility, including an increase in hotel rooms, improved internal access, recreational spaces and conference facilities;
- Provision of a broader range of accommodation types that are flexible in design so they can be reconfigured for a multitude of groups (ranging from corporate visitors, singles to large families);
- Provision of more outdoor recreation facilities to be managed by the hotel;
- Opening up outdoor facilities for public use, by arrangement with the hotel;
- Promotion of local art and culture;
- Creation of new pathways to activate the unbuilt heritage environment and provide greater access to the landscaped areas of high heritage and ecological value;
- Consider the various environmental and ecological constraints of the site in any future design.

The intended design concept is one that is to resemble a village centre containing multiple hotel and function services and facilities that will attract a broader range of local and international visitors, provide employment opportunities and positively contribute to the economy of Robertson.

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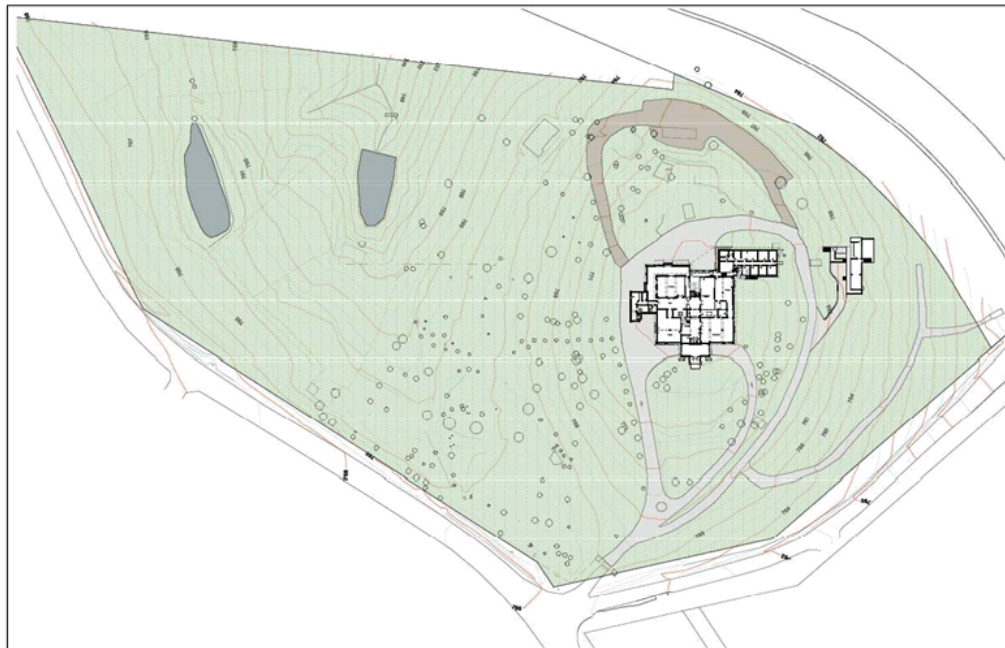
## 3.0 PROPOSAL AND DESIGN OPTIONS

The following sections outline the existing site, the proposal and the evolution of design options, which were informed by the various environmental/ecological site constraints.

### 3.1 The Subject Site

The site is occupied by a part three and part four storey hotel containing 49 rooms. A single storey worker's cottage is located adjacent to the hotel, with both structures located within the southern portion of the site and set back from the site boundaries. The site is accessed from a driveway located at the corner of Fountaindale Road and Illawarra Highway. Pedestrian and vehicular pathways within the southern portion of the site lead to the hotel entrance and cottage, and extend around the hotel to the rear of the building where on-grade parking is provided.

A swimming pool is located on the eastern side of the site. A pond and dam are located within the northern portion of the site and there is substantial vegetation throughout, which is largely fenced off from the hotel (see Figure 1).



Source: X.Pace Design

**Figure 1: Existing Site Plan**

### 3.2 The Proposal

The proposed works, designed by X.Pace Design include the refurbishment of the existing hotel, a three storey addition to the rear of the hotel and function centre to accommodate new rooms, and new basement car parking. The proposal also includes new eco-tourist facilities in the form of cabins and villas with car parking, all to be managed by the hotel. In addition, the proposal will include recreational facilities in the form of a new swimming pool and leisure centre, refurbishment of the worker's cottage into an artist studio, a new reception, as well as new internal roads and pedestrian pathways.



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### **3.3 Design Options**

A number of options were considered by the owner and architect as part of the design stage for the hotel redevelopment.

Given the historic significance of the site and the level of public interest in the locality, demolition of the existing building and reconstruction of a new hotel was rejected outright. However earlier options involving renovation and/or extension to the existing hotel were considered and are discussed below.

#### **Option 1: Refurbishment of the Existing Hotel**

A refurbishment of the hotel only was considered as Option 1. While an upgrade of the existing hotel room facilities is required in order to meet current market expectations, the client considered that this options would not be suitable for a number of reasons. Firstly, the hotel would need to close for an extended period of time for works to be completed, thereby losing the weekend income it currently generates. Even if staged works were considered, it would not be ideal as refurbishment works would interfere with visitor comfort and would not be economically viable.

Secondly, refurbishment of the existing hotel is limited to rooms with fixed sizes and orientations. This would not accommodate broader range of accommodation options the client wants to offer, which was a key factor in the project brief. Thirdly, it did not provide the opportunity to open up the grounds within the northern part of the site to promote the landscaping heritage of the area, which is currently fenced off from the public. Accordingly, Option 1 was not pursued.

#### **Option 2: Extension of the Existing Hotel**

A contemporary extension of the existing building to a height of six storeys was considered as Option 2. This option would have enabled the owner to provide the desired number of beds and wider range of accommodation types close to the existing hotel. However, this option was dismissed, as a six storey structure would be an inappropriate built form for the locality and would have negative impacts from a heritage perspective. In addition, a single additional structure would not provide visitors with the opportunity to enjoy the environmental qualities of the site. Accordingly, Option 2 was not pursued.

#### **Option 3: New Hotel Adjacent to the Existing Hotel**

Option 3 included the provision of a new contemporary hotel to the north, which would include a broad range of accommodation types within proximity of the existing building. This option was not pursued as there were concerns about it intruding into the Tall Rainforest areas identified on the site.

#### **Option 4: Extension of the Existing Hotel and Provision of Eco-Cabins, Eco-Villas and Ancillary Services**

The owner wished to pursue Option 4, which allowed for refurbishment and sensitive extension of the existing hotel as well as the provision of modest sized eco-cabins and villas that are spread throughout the site. This design approach enabled the heritage significance of the existing hotel to remain the primary element on the site, with new built forms designed to be subservient. It also provided the range of accommodation types within a landscaped setting, as envisaged by the owner. In addition, the hotel could continue operating independently while the cabins and villas are constructed, and once completed, these structures could operate and provide revenue while the hotel itself is being refurbished/extended. An outline of how this design option evolved will be discussed in Section 3.4.

### **3.4 Preferred Design (Option 4) and Evolution of the Proposal**

This section outlines the preferred design option for the hotel redevelopment and how it evolved into the proposal that forms the basis of the current development application.

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#### 3.4.1 Masterplan Option A

Option A was presented as the preliminary design scheme to the client, prior to any formal or informal discussions with Council (see Figure 2). This option included the following elements:

- Alterations and additions to the existing hotel and an increase in the number of rooms from 49 to 60;
- Refurbishment of the existing worker's cottage into a new artist studio;
- A new three storey hotel wing with 46 rooms, to the rear of the existing hotel;
- Construction of 12 eco tourist cabins on the eastern side of the site;
- Construction of 12 eco villas on the eastern, northern and western sides of the site;
- Basement car parking below the hotel;
- New helipad;
- A new spa and pool area that is ancillary to the hotel, but can be made available to local organisations by arrangement;
- New internal roads and pathways to access the new accommodation as well as the existing landscape features that are currently fenced off from the public



Source: X.Pace Design

**Figure 2: Design Option A**

#### Comment

There are numerous advantages to this option. Firstly, the new additions to the hotel, eco-cabins, villas and other improvements are located away from the heritage listed hotel, which will enable the heritage listed hotel to visually remain the most significant element on the site, and this was supported in a pre-DA Heritage Impact Assessment. Secondly, the provision of the cabins and villas will improve the variety of accommodation available on the site without having an adverse effect on the operation of the hotel. Thirdly, the provision of more formalised parking will be an improvement when compared to the existing situation, where during peak periods such as weddings and conferences, overflow parking may occur on an 'ad-hoc' basis. Fourthly, the proposed swimming pool and spa will improve on the existing site facilities and are more centrally located and easily accessed from the various accommodation types.

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Finally, the new vehicular and pedestrian pathways will allow for a greater level of access through the site and enable visitors to appreciate the ecological values that were previously not made available.

The site is constrained by the location of Robertson Rainforest. While the majority of new work to the hotel and the villas are located outside the identified rainforest areas, portions of the villas, cabins and roads intrude into this area (see Figure 3).



Source: X.Pace Design

 Intrusion into Rainforest Area

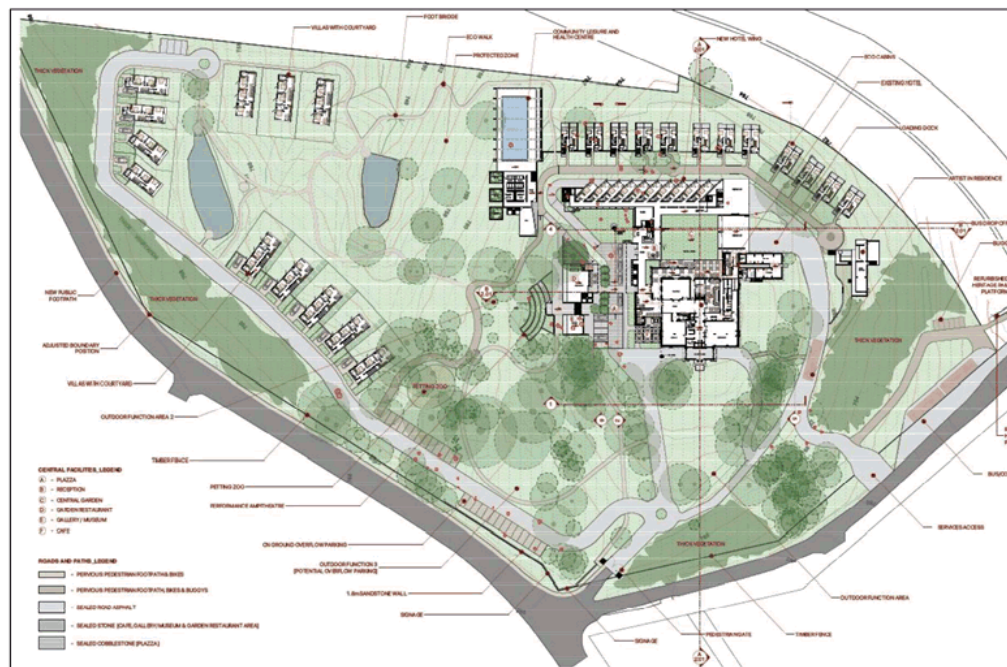
**Figure 3: Design Constraints of Option A in the  
Context of the Site's Ecological Conditions**  
(note: some smaller internal pathways are located within the rainforest area  
but are not identified on this plan)



### 3.4.2 Masterplan Option B

Following consideration of the site's ecological conditions, the design was refined and presented to the site's owner as Option B (see Figure 4). The majority of the proposed works remained the same as Option A, with some further modifications and refinements as follows:

- Relocation and reorientation of the pool and spa areas;
- Relocation of the western and northern internal roads parallel to the Illawarra Highway further into the site and subsequent relocation of the villas;
- Removal of the helipad;
- Provision of a petting zoo;
- Provision of additional on-ground overflow parking as well as new bus/coach parking; and
- Refurbishment of the heritage listed railway platform to the south of the site



Source: X.Pace Design

**Figure 4: Design Option B**

### Comment

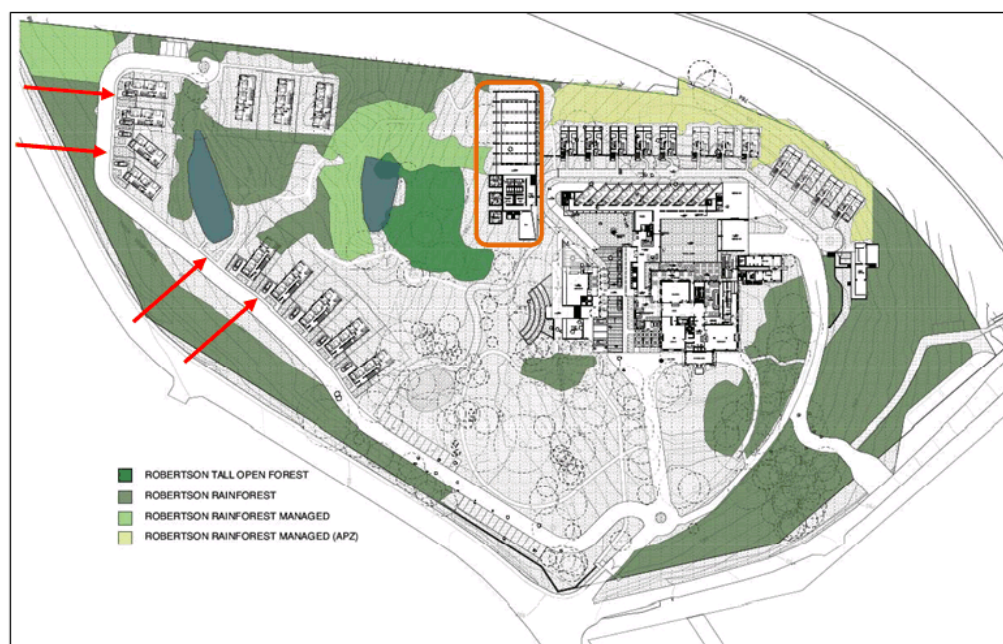
This design is an improvement on Option A, as a number of design elements were relocated to avoid conflicts with the rainforest. Most notable are the increased setbacks of the internal roads and villas on the western and north western side of the site. This will enable the rainforest along the western and north western edge to flourish, maintain its existing appearance from the public domain and provide natural screening for the villas (see Figure 5 on the following page). Similarly, pool and spa were relocated to avoid conflict with the Robertson Tall Open Forest near the centre of the site and the helipad was removed given its location adjacent to the rainforest on the western side. General refinements to the internal pathways continue to provide access through to areas of the site that were not previously available.

While Option B provides improvements in the design, the cabins on the eastern side of the site intrude into the rainforest area to varying degrees.





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Source: X.Pace Design

 Rotation and relocation of pool and spa to avoid forest

 Increased setbacks on western and north western side to avoid conflict with rainforest

**Figure 5:** Design Constraints of Option B in the Context of the Site's Ecological Conditions

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#### 3.4.3 Masterplan Option C

The design of the proposal was further refined in Option C (see Figure 6). The majority of the proposed works remain the same as Option B, with the following modifications:

- Deletion of four eco-cabins on the eastern side;
- Replacement of five villas on the western side with five eco-cabins and provision of new reception and fire refuge; and
- Adjustment of the western and north western internal road to follow the outer line of the rainforest.



Source: X.Pace Design

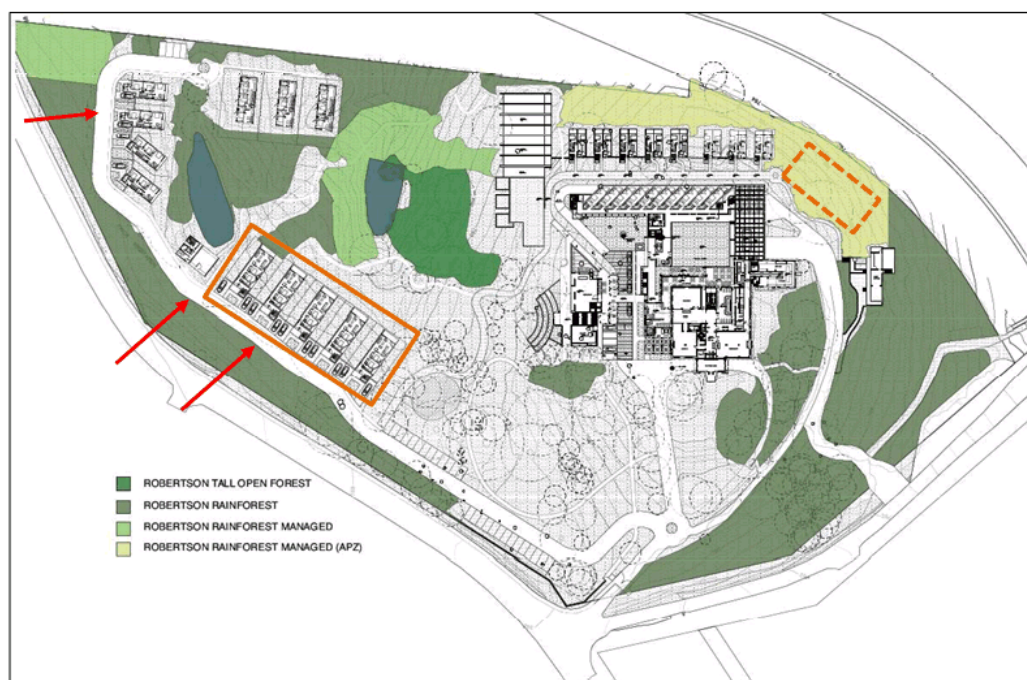
**Figure 6: Design Option C**

#### Comment

This design is an improvement on Option B, and the preferred option for submission to Council. The new works continue to avoid conflict with the rainforests within the central, northern and western portion of the site, with the current width of the rainforest on the western side being restricted to 20m in width to avoid the requirement of a larger Asset Protection Zone (APZ) on advice by the Bushfire Consultant. While eco-cabins are still located within a rainforest area on the eastern side, the four cabins to be removed will reduce the intrusion and this is supported by specialist environmental consultant reports (see Figure 7 on the following page).

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Source: X.Pace Design

- Conversion of Villas into Eco Cabins to improve rainforest management
- Removal of Eco-Cabins to reduce effects on rainforest
- Alignment of internal road with edge of identified rainforest

**Figure 7: Design Constraints of Option C in the Context of the Site's Ecological Conditions**

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## **4.0 CONCLUSION**

This report has outlined the masterplan design options that were investigated as part of the design stage for the proposed redevelopment of The Robertson Hotel at No. 1 Fountaindale Road, Robertson.

The proposed design has been developed in consultation with a number of specialist consultants in order to avoid or minimise adverse impacts on the built and natural environment.

Option 4 was selected as the most preferred design scheme and was further developed to more thoroughly consider the site's environmental and ecological constraints while maintaining the owner's project brief.

This report is to be read in conjunction with the Statement of Environmental Effects prepared by GSA Planning and other specialist consultant reports that form part of the development application submission for this site. These reports will confirm the proposal is suitable in the locality and will maintain the built/natural environmental and ecological significance of the site. As important, the improved facilities on the site will positively contribute to the tourism industry and economy in the region.



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**Appendix F. EPBC Act Assessment of Significant Impact**

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for Robertson Rainforest in the Sydney Basin Bioregion	
EPBC Act Status: Critically Endangered	
<b>Significant impact criteria</b> An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	
<ul style="list-style-type: none"> <li>• reduce the extent of an ecological community</li> </ul>	The proposed development will result in a reduction in the extent of the ecological community. Approximately 0.42ha of Robertson Rainforest will be cleared to allow for the proposed development, and 0.85ha will be managed as an Inner Protection Area.
<ul style="list-style-type: none"> <li>• fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines</li> </ul>	The removal of vegetation within the subject land is not expected to fragment a patch of Robertson Rainforest. The Robertson Rainforest within the Subject Land comprises a smaller patch on the edge of a larger extent of to the east. Although this is expected to reduce the extent of this patch, it will not fragment it into two or more patches. Other areas of Robertson Rainforest within the vicinity are largely disconnected and fragmented.
<ul style="list-style-type: none"> <li>• adversely affect habitat critical to the survival of an ecological community</li> </ul>	The proposed action will not adversely affect habitat critical to the survival of this ecological community. Impacts to this ecological community will be restricted solely to the subject land, where it is expected that the composition of the community will be substantially altered, not only from clearing, but also APZ management. However, this is not expected to impact on Robertson Rainforest adjacent to the subject land and elsewhere within the locality.
<ul style="list-style-type: none"> <li>• modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns</li> </ul>	The proposed development has the potential to alter the natural hydrology occurring within and surrounding the Subject Land due to excavation works during construction and an increase in hard surfaces. This may alter water runoff levels and increase nutrients into adjacent areas of Robertson Rainforest, causing an increase in weed infestations. However, it is unlikely that the proposed development will significantly exacerbate such factors given that weed infestations already occur within the Robertson Rainforest surrounding the subject land.
<ul style="list-style-type: none"> <li>• cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting</li> </ul>	The proposed development is expected to impact on characteristic and functionally important species of Robertson Rainforest within the subject land. The proposed development will result in the removal of 0.42ha of Robertson Rainforest, as well as the modification of 0.85ha of Robertson Rainforest for an APZ. The modification for an APZ is expected to result in a large reduction in canopy species, which may in turn change the structure of the rainforest canopy to a more open-forest. This will result in an increase in light infiltration which may have implications for shrub and groundlayer species within the zones that are adapted to a closed canopy environment.

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Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for Robertson Rainforest in the Sydney Basin Bioregion	
EPBC Act Status: Critically Endangered	
	It is not expected that the proposed development will impact any characteristic and functionally important species outside of the subject land.
<ul style="list-style-type: none"> <li>• cause a substantial reduction in the quality or integrity of an occurrence of an ecological community including but not limited to: <ul style="list-style-type: none"> <li>- assisting invasive species that are harmful to the listed ecological community, to become established or</li> <li>- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or</li> </ul> </li> </ul>	<p>The proposed development may enhance weed infiltration into adjacent habitat by an increase in edge effects. However, the abundance of invasive species within the subject land and adjacent properties is already apparent. It is therefore not expected that the quality and integrity of adjacent Robertson Rainforest will be significantly altered by the proposed development.</p> <p>The use of pesticides, fertilisers and herbicides within the subject land should be minimised, particularly as these have the potential to runoff into adjacent areas of Robertson Rainforest.</p>
<ul style="list-style-type: none"> <li>• interfere with the recovery of the species</li> </ul>	It is not expected that the removal and modification of Robertson Rainforest within the subject land will interfere with the recovery of this ecological community given the implementation of the impact mitigation measures as outlined in this report.
<b>References:</b> Department of the Environment and Energy (2019). Conservation Advice (incorporating listing advice) for the Robertson Rainforest in the Sydney Basin Bioregion. Canberra: Department of the Environment and Energy. Available from: <a href="http://www.environment.gov.au/biodiversity/threatened/communities/pubs/61-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/communities/pubs/61-conservation-advice.pdf</a> . In effect under the EPBC Act from 05-Sep-2019.	

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