Warburton Mountain Bike Destination
Yarra Ranges Council
27-Aug-2021

Land Use and Planning Impact Assessment

Environment Effects Statement - Technical Report

Revision 3.0 – 27-August-2021

Prepared for – Yarra Ranges Council – ABN: 21 973 226 012

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Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
1.0	26-Nov-2020	Working draft	David Hyett Project Director	
2.0	21-May-2021	Revision following round 1 TRG comments	David Hyett Project Director	
3.0	27-August 2021	Revision following round 2 TRG comments	David Hyett Project Director	

Executive summary

Overview

Warburton Mountain Bike Destination ('the project') is a proposed world class mountain biking destination centred around Warburton. Land required for the project (the project area) is located approximately 70 kilometres east of Melbourne. The proponent for the project is Yarra Ranges Council.

In accordance with the *Environment Effects Act 1978* (EE Act), the project requires an environment effects statement (EES) to be prepared to allow stakeholders to understand the likely environmental impacts of the project and how they are proposed to be managed.

AECOM was commissioned to undertake a land use and planning impact assessment to inform the EES. This technical report presents the findings of the assessment and is an attachment to the EES.

With the implementation of the mitigation measures recommended throughout this assessment, potential adverse impacts on amenity and land use at local and regional scales associated with project activities have been avoided or minimised.

The use and development proposed by the project will be enabled via a Planning Scheme Amendment (PSA) to the Yarra Ranges Planning Scheme, to be considered and approved by the Minister for Planning. Facilitation of the PSA by the Minister for Planning recognises the state significance of the Project and allows for the introduction of an Incorporated Document to the project area.

Once approved, the Incorporated Document will exempt the project from the need for a planning permit under any other provision of the planning scheme. Development would be undertaken in accordance with the specific conditions within the Incorporated Document without further planning approval being required.

The draft PSA has been prepared and forms part of the EES, with the amendment process running in parallel to the EES.

Existing conditions

The project is located entirely within the municipality of the Yarra Ranges. The project spans throughout the Yarra Ranges National Park and areas of state forest. From the north, the project extends from the summit of Mount Donna Buang, through the Yarra Ranges, across the town of Warburton and the Warburton Golf Course, to the south towards Wesburn Park and Mount Tugwell.

The Shire of Yarra Ranges is recognised for its natural beauty and diverse habitats as well as its environmentally significant factors that attract residents and tourists. Residents value the lifestyle of the Shire for its scenic bushland environment and mountainous landscapes. The landscapes contain significant areas of remnant native vegetation of which much is of zoological or botanical significance. The Shire attracts over 2.2 million tourists each year.

The study area of the project has a large proportion of land that sits within a conservation land use typology, characterised by areas of high policy protection reflecting particular conservation or ecological significance. The project also covers land use typologies or community facilities and tourist attractions, services and utilities and roads.

Impact assessment

An iterative assessment was undertaken to evaluate potential impacts associated with the project, considering the existing conditions within the study area and associated construction and operational activities.

Potential impacts investigated included the following:

<u>Construction Impacts</u>

- Temporary disturbance to existing land uses from proposed construction activities.
- Noise associated with construction activities resulting in amenity impacts to sensitive noise receptors, including residential and recreational land uses.

- Airborne dust from construction activities resulting in poor air quality affecting amenity at sensitive air quality receptors including residential and recreational land uses.
- Construction activities that temporarily change the visual amenity of sensitive areas of affected land (i.e. areas of landscape significance).
- Construction vehicles temporarily impact access to public and/or private land or temporarily increase safety concerns for road users including pedestrians and cyclists.

Operation/visitation Impacts

- The proposed location and siting of the project results in land use changes that are inconsistent with existing land uses and policy (in the local or regional setting), or reasonably foreseeable future land use directions for public or private land.
- Noise from events during operation results in noise affecting amenity at sensitive noise receptors.
- Increased tourist and visitor numbers to Warburton results in parking congestion, impacting the ongoing use of land.
- Use of land for mountain biking and associated tourist activities results in risk to life from threat of bushfire, impacting the ongoing use of land.

Infrastructure impacts

- New built form elements change the visual amenity at sensitive areas of land (i.e. areas of landscape significance, or areas of cleared land where new built form will be more prominent).
- Increased vehicles on local roads results in real or perceived changes to access to public and private land or increased safety concerns for road users including pedestrians and cyclists.

Management of potential impacts

Potential impacts on land use due to the project would be avoided, mitigated or managed to required standards through the recommended mitigation measures. Mitigation measures include:

- **LP01:** Minimise amenity impacts through a CEMP and consultation with affected landowners and stakeholders.
- **LP02:** Minimise amenity impacts through OEMP and consultation with affected landowners and stakeholders.
- **LM01:** Mountain bike trail design would avoid large tree removal, make use of natural landform to minimise substantial earthworks and material and planting selection should be appropriate to the setting.
- **LM02:** The design of the Visitor's Hub and associated facilities would respond sensitively to its unique environmental setting.
- **LM03:** Bridge designs would respond sensitively to their unique environmental setting.
- **LM04:** Trail heads would be designed to minimise vegetation impacts; earthworks and the materiality and colour palette would be responsive to the sensitive landscape setting.
- **LM05:** Construction methods would focus on non-intrusive methods of construction, and construction equipment storage and material laydown would be located so as not to impact sensitive view receptors.
- **AM01:** Dust suppression would be used at construction areas as required using water sprays, water carts or other devices on unpaved work areas, spoil and aggregate stockpiles during the loading and unloading of dust generating materials.
- **AM02:** Vehicle movements will be restricted after vehicles have arrived at work sites and vehicles, plant and equipment would remain within the construction footprint and on designated roads and tracks.
- **AM03:** Construction vehicles with potential for loss of loads, such as dust or litter, would be covered when using public roads.

- **AM04:** Weather conditions would be monitored for extreme heat and/or wind events using systems such as the Bureau of Meteorology forecasts and works would be modified if conditions are likely to result in air quality impacts at sensitive receptors.
- **AM05:** Maintain vehicles and equipment as per manufacturer's specifications to ensure minimal exhaust emissions.
- **AM06:** Minimise land clearance during construction to reduce the likelihood of wind-blown dust. Rehabilitate as soon as practicable.
- **AM07:** Develop traffic management plan for major mountain biking events which would consider the reduction of exhaust emissions related to queuing and congestion.
- **NM01**: Construction noise would be managed in accordance with Section 4.3.3 of EPA Publication 1834. This includes the development of a plan to manage noise during construction in consultation with the EPA.
- **NM02**: Noise monitoring would be undertaken prior to construction to confirm the applicable noise criteria for evening and night-time works if construction must occur outside of normal working hours. Monitoring results will inform the noise management plan.
- **NM03**: Helicopter noise associated with bridge construction would be limited to normal working hours and the community will be consulted prior to helicopter use.
- **NM04**: Noise from operational activities, specifically bike wash stations would be limited through location at appropriate distance from nearest residents.
- **NM05**: Noise due to bike pass-bys, specifically audible at properties on Martyr Road would be suppressed in the form of noise barriers to this section of trails, subject to consultation with the immediate landowners. Noise barriers must be built from a non-porous material with no gaps, including at the base and a surface density of at least 15 kg/ m2 at its thinnest point. Barriers would be at least 1.8 m higher than the trail surface and be located as near to the trail as possible.
- **NM06**: Noise from larger events, including regional, state and national competitions, would be managed by locating large crowds away from sensitive receptors and briefing event staff and participants on potential noise impacts.
- **HM01:** Implement and comply with the approved Cultural Heritage Management Plan (CHMP15276) management conditions to preserve registered and unidentified Aboriginal cultural heritage places and values.
- **TP1:** A Traffic Management Plan would be prepared to manage temporary traffic impacts during construction.
- **TP2:** A stakeholder communication plan would be prepared and implemented.
- **TP3:** A Road Safety Audit would be undertaken.
- **TP4:** Upgrades to road/surface pavements may be undertaken to improve local transport efficiency and safety during project operation.
- **TP5:** Cyclist and pedestrian safety improvements would be undertaken.
- **TP6**: A heavy vehicle route audit would be undertaken.
- **TP7:** Operational parking management plan would be developed to ensure that parking congestion does not exceed acceptable limits for visitors and residents.
- **TP8:** An emergency access plan would be developed and approved prior to the commencement of project operation.
- **BF1**: An Emergency Management Plan would manage risks associated with bushfires.

Residual Impacts

The project supports the long-term vision for the conservation and recreational use of the land and supports a variety of state, regional and local land use objectives. The short and long term impacts to land use are able to be appropriately managed and mitigated, such that the project would not result in unacceptable or substantial long-term impacts to the existing composition of land uses within the project area and would not diminish the significance of these areas. The project would establish a well-considered network of mountain bike trails which would support the local economy and recreation and visitation to the region. The project will allow for dedicated mountain bike trails which in turn would act to discourage illegal use of existing walking trails, thereby improving safety and amenity for other visitors to the area.

It is determined that this assessment along with relevant supporting EES technical assessments and reports provide sufficient justification and mitigation measures to appropriately reduce the risk of land use impacts caused by the project.

Abbreviations

Abbreviation	Definition
BMO	Bushfire Management Overlay
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
C1Z	Commercial 1 Zone
EE Act	*Environment Effects Act 1978*
EES	Environment Effects Statement
EMO	Erosion Management Overlay
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
ESO	Environmental Significance Overlay
GWZ	Green Wedge Zone
HO	Heritage Overlay
LSIO	Land Subject to Inundation
MNES	Matters of National Environmental Significance
OEMP	Operations Environmental Management Plan
P&E Act	*Planning and Environment Act 1987*
PCRZ	Public Conservation and Resource Zone
PPF	Planning Policy Framework
PPRZ	Public Park and Recreation Zone
PSA	Planning Scheme Amendment
PUZ1	Public Use Zone Schedule 1 – Service and Utility
RAP	Registered Aboriginal Party
RCZ	Rural Conservation Zone
RDZ1	Road Zone – Category 1
RDZ2	Road Zone – Category 2
RO	Restructure Overlay
SLO	Significant Landscape Overlay
SUZ	Special Use Zone Schedule 2 – Major Tourist Facility
VHI	Victorian Heritage Inventory
VHR	Victorian Heritage Register
WWWCHAC	Wurundjeri Woi Wurrung Cultural Heritage Aboriginal Corporation
YRPS	Yarra Ranges Planning Scheme

Glossary

Term	Definition
Sensitive receptors	Includes, but is not limited to, residential dwellings, hospitals, schools, childcare facilities, elderly and retirement facilities. These are areas where the occupants are more susceptible to changes to land use, including the adverse effects during construction and operation such as noise and air pollution.
The project	Warburton Mountain Bike Destination ('the project') is a proposed world class mountain biking destination centred around Warburton, approximately 70 km east of Melbourne. It consists of approximately 186 km of mountain bike trails providing a variety of mountain bike experience to suit all levels of riding.
The project area	The area in which use and development for the project will occur.
The study area	The area investigated for the purposes of this report.
Yarra Ranges Council	The Yarra Ranges Council is the proponent for the project

1.0 Introduction

The Warburton Mountain Bike Destination ('the project') is a proposed world class mountain biking destination centred around Warburton, approximately 70 km east of Melbourne. The project is anticipated to consist of up to 177 kilometres of mountain bike trails providing a range of mountain bike experiences to suit all levels of riding.

Yarra Ranges Council has identified mountain biking as an opportunity for tourism growth within this region which would also support the economy of the township and the health and well-being of its residents. It seeks to create iconic trails eligible for International Mountain Bike Association Gold Ride Centre status which would position Warburton as an internationally significant mountain bike destination.

On 21 May 2020, The Victorian Minister for Planning issued his decision that an environment effects statement (EES) is required under the *Environment Effects Act 1978* (EE Act). On 16 June 2020 the Commonwealth Department for Agriculture, Water and Environment issued a decision that the project is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and that the project will be assessed under the assessment bilateral agreement with the State of Victoria.

The purpose of this report is to assess the potential land use and planning impacts associated with the project and provide technical advice to inform the preparation of the EES required for the project.

2.0 Scoping requirements

2.1 EES evaluation objectives

The *Scoping Requirements for Warburton Mountain Bike Destination Environment Effects Statement* ('scoping requirements') by the Minister for Planning set out the specific environmental matters that need to be addressed by Yarra Ranges Council in order to satisfy the Commonwealth and Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project in accordance with the *Ministerial guidelines for assessment of environmental effects* under the EE Act.

The following evaluation objective is relevant to the land use and planning study:

- *To minimise potential adverse social, economic, amenity and land use effects at local and regional scales.*

2.2 EES scoping requirements

The aspects from the scoping requirements relevant to the evaluation objective are shown in Table 1, as well as the location where these items have been addressed in this report.

Table 1 Scoping requirements relevant to land use and planning

Aspect	Scoping requirement	Section addressed
Key issues	*Potential for project works and operations to affect business (including tourism) operations or other existing or approved land uses, including private and recreational land use (e.g. bushwalking).*	Section 9.0 Impact Assessment Specialist Report E: Socio-economic Technical Report
	Positive and adverse socio-economic effects, at local and regional scales, potentially generated by the project, including potential for increased employment, traffic, tourism and visitation as well as pressures on existing housing and community infrastructure (including health services).	Specialist Report E: Socio-economic Technical Report
	Potential for dust emissions resulting from construction works and activities.	Section 9.0 Impact Assessment Appendix D – Air Quality Technical Report
	Potential for project construction or operation to result in noise at residences adjacent to proposed tracks.	Section 7.0 (Risk Assessment) Appendix E – Noise Technical Report
	Relocation or other impacts to existing infrastructure.	Section 9.0 Impact Assessment Section 9.1.3. Infrastructure.
	Potential for temporary or permanent changes to use of or access to existing infrastructure and land in the project area and in its vicinity.	Section 9.0 Impact Assessment Section 9.1.3. Infrastructure.

Aspect	Scoping requirement	Section addressed
	Potential for impacts on reasonably foreseeable upgrades to public infrastructure.	Section 9.0 Impact Assessment Section 9.1.3. Infrastructure. Section 9.1.4 Overall Response and Section 9.2.2 Land Use Impacts
	Potential for adverse impacts on visual or landscape values.	Appendix C – Landscape and Visual Impact Assessment
Priorities for characterising the existing environment	*Describe the demographic and social character of residential communities and businesses near the project.*	Specialist Report E – Socio-economic Technical Report
	Describe existing and reasonably foreseeable land uses within and adjacent to the proposed project area.	Sections 7.0 (Existing Condition)
	Identify dwellings and any other potentially sensitive receptors (e.g. residential, commercial, industrial, recreational areas etc.) that could be affected by the project's potential effects on air quality, and noise levels, especially vulnerable receptors including children and the elderly.	Appendix D – Air Quality Technical Report Appendix E – Noise Technical Report
	Appropriately characterise background levels of air quality (e.g. dust), noise and vibration near the project, including existing established residential areas and other noise sensitive receptors.	Appendix D – Air Quality Technical Report Appendix E – Noise Technical Report
	Describe proposed transport routes during construction and operations (for employees, construction equipment and other project-related transportation). This should include description of existing roads and their ability to accommodate traffic generated by the project.	Specialist Report F – Transport Technical Report
	Identify existing and reasonably foreseeable land uses and businesses occupying land to be traversed by, adjacent to, or otherwise affected by impacts from the project.	Sections 7.0 (Existing Condition)
	Identify strategic plans specifying or encouraging land use outcomes for land to be occupied by the project.	Section 4.0 (Legislation, policy and guidelines)
	Identify visual and landscape values near the project, including public and private vantage points from which elements of the project may be visible.	Appendix C – Landscape and Visual Impact Assessment
Design and mitigation measures	*Identify potential and proposed design responses and/or other mitigation measures to avoid, reduce and/or manage any significant effects for sensitive receptors during project construction and operation arising from dust, noise, traffic and lighting, in the context of applicable policy and standards.*	Section 11.0 (Mitigation and Contingency Measures) Construction Environmental Management Plan (CEMP) Operations Environmental

Aspect	Scoping requirement	Section addressed
		Management Plan (OEMP)
	Identify options for mitigating impacts from project construction or operation on any potentially affected private land, businesses and community facilities.	Section 11.0 (Mitigation and Contingency Measures) CEMP OEMP
	Describe and evaluate the proposed traffic management and safety principles to address changed traffic conditions during construction and operation of the project	Specialist Report F: Transport Technical Report
	Outline any transport infrastructure works required to address adverse impacts of project construction and operation, including impacts on accessibility (e.g. access road construction and upgrades).	Specialist Report F: Transport Technical Report
	Identify measures for mitigating or managing visual or landscape impacts of the project.	Appendix C – Landscape and Visual Impact Assessment Section 11.0 (Mitigation and Contingency Measures)
	Identify project design and management measures that will assist in reducing greenhouse gas emissions resulting from the construction and operation of the project.	Specialist Report F: Transport Technical Report
Assessment of likely effects	*Identify implications for communities, current land uses and businesses and immediately foreseeable changes in land use.*	Section 8.0 Risk Assessment Section 9.0 Impact Assessment
	Assess the expected positive and adverse socio-economic effects, at the local and regional scales, potentially generated by the project, including impacts on employment, impacts of increased tourism/visitation and impacts on the capacity and costs of local housing and community infrastructure (including health services).	Specialist Report E: Socio-economic Technical Report
	Describe the likely extent and duration of any temporary disruption to existing land uses arising from project construction.	Section 9.2 (Construction impact assessment)
	Assess the potential for dust, noise, vibration, traffic, lighting and visual impacts at sensitive receptors adjacent to the project during project construction and operation (both with and in the absence of the proposed mitigation measures), with consideration of relevant standards. This needs to include consideration of changes to impacts during mountain biking events.	Section 9.2 (Construction impact assessment) Section 9.3 (Operation impact assessment) Section 11.0 (Mitigation and Contingency Measures)
	Assess the potential for the project to result in increased traffic.	Specialist Report F: Transport Technical Report

Aspect	Scoping requirement	Section addressed
	Assess potential safety hazards to the public arising from project construction and operation (including safety risks associated with abandoned mine workings).	Specialist Report C: Cultural Heritage Specialist Report F: Transport Technical Report
	Describe the bushfire hazard for the immediate project area and broader landscape conditions and undertake appropriate risk assessment that considers the potential for increased risk of bushfire to people, property and community infrastructure due to the project.	Appendix G – Bushfire Assessment Section 9.2 (Construction impact assessment) Section 9.3 (Operation impact assessment) Section 11.0 (Mitigation and Contingency Measures)
	Assess the potential for cumulative impacts on social, economic, amenity and land use values in relation to any other existing or planned projects, and land uses including tourism developments in the area.	Section 11.0 (Mitigation and Contingency Measures) Specialist Report E: Socio-Economic Technical Report Specialist Report F: Transport Technical Report
Approach to manage performance	*Outline measures to monitor the success of commitments to mitigate or manage effects on social, economic, amenity and land use values during all phases of the project.*	Section 11.0 (Mitigation and Contingency Measures) Specialist Report E: Socio-Economic Technical Report CEMP OEMP
	Describe the approach to monitor effects and develop contingency measures to be implemented in the event of adverse residual effects on social, economic, amenity and land use values requiring further management.	Section 11.0 (Mitigation and Contingency Measures) Specialist Report E: Socio-Economic Technical Report CEMP OEMP
	Describe any further measures that are proposed to enhance social outcomes, and either manage risks to landscape and recreational values, or enhance visual amenity outcomes both for residents living near the project and for visitors to the locality, to form part of the EMF (see Section 3.7).	Section 11.0 (Mitigation and Contingency Measures) Specialist Report E: Socio-Economic Technical Report

2.3 Linkages to other technical reports

This report has interdependencies with the following reports: Landscape and Visual, Air Quality, Noise, Biodiversity and Habitats, Cultural Heritage, Socio-economic, Transport and Bushfire. The interdependencies with these technical reports relates to assessment of impacts associated with:

- Predicted changes to landscape and visual impacts.
- Changes to noise and air quality and the potential amenity impacts.
- Ecological values likely to be located within the area and the potential impacts to biodiversity.
- Aboriginal cultural heritage findings and the measures recommended to mitigate impacts.
- Amenity impacts affecting existing land use of nearby residents.
- Amenity and accessibility constraints impacting land use associated with increased vehicular movement as a result of the project.
- Risks associated with bushfire and the management required to mitigate risk to users of the project.

The specialists undertaking these assessments worked collaboratively to evaluate these potential impacts and design suitable mitigation measures to be adopted by the project.

3.0 Project description

3.1 Project overview

The project is a proposed world class mountain biking destination centred around Warburton, approximately 70 kilometres east of Melbourne (refer to Figure 1). A significant informal network of mountain bike trails exists within the region and there is evidence of increasing use of these trails by local and visiting riders. Mountain biking in this locality started around 15 years ago and was concentrated in the Yarra State Forest in the vicinity of Mount Tugwell.

Yarra Ranges Council has identified mountain biking as an opportunity for tourism growth within the region which would also support the region and the health and well-being of its residents. The project would create iconic trails eligible for International Mountain Bike Association Gold Level Ride Centre status which would position Warburton as an internationally significant mountain biking destination.

The project objectives are to:

- Facilitate tourism growth and associated positive economic and jobs growth in the Yarra Valley region.
- Create iconic mountain bike trails eligible for International Mountain Bike Association Gold Ride Centre status.
- Create spectacular riding experiences that have a competitive advantage over existing mountain bike destinations and leverage Warburton's beautiful township, rural valley and surrounding forested slopes.
- Enhance the health and well-being of the community.
- Maintain the significant biodiversity and heritage values within the project area and provide opportunities for the community to connect with and appreciate their importance.

The project consists of up to approximately 177 kilometres of mountain bike trails providing a range of mountain bike experience to suit all levels of riding as shown in Figure 2. The project also includes a new Visitor's Hub and main trail head at the Warburton Golf Course and other trail heads at Mount Tugwell, Mount Donna Buang and Wesburn Park.

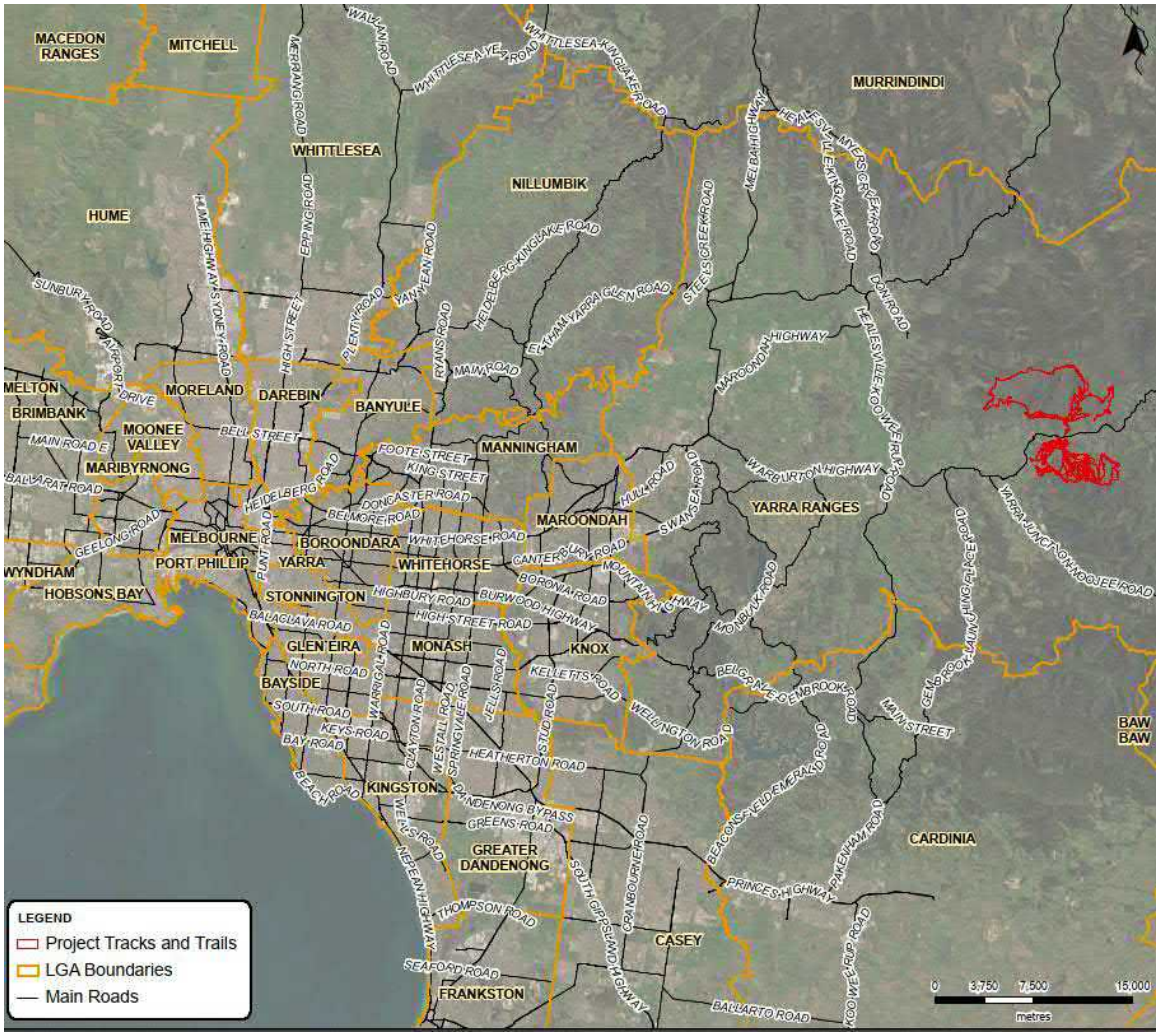

Figure 1 Project location

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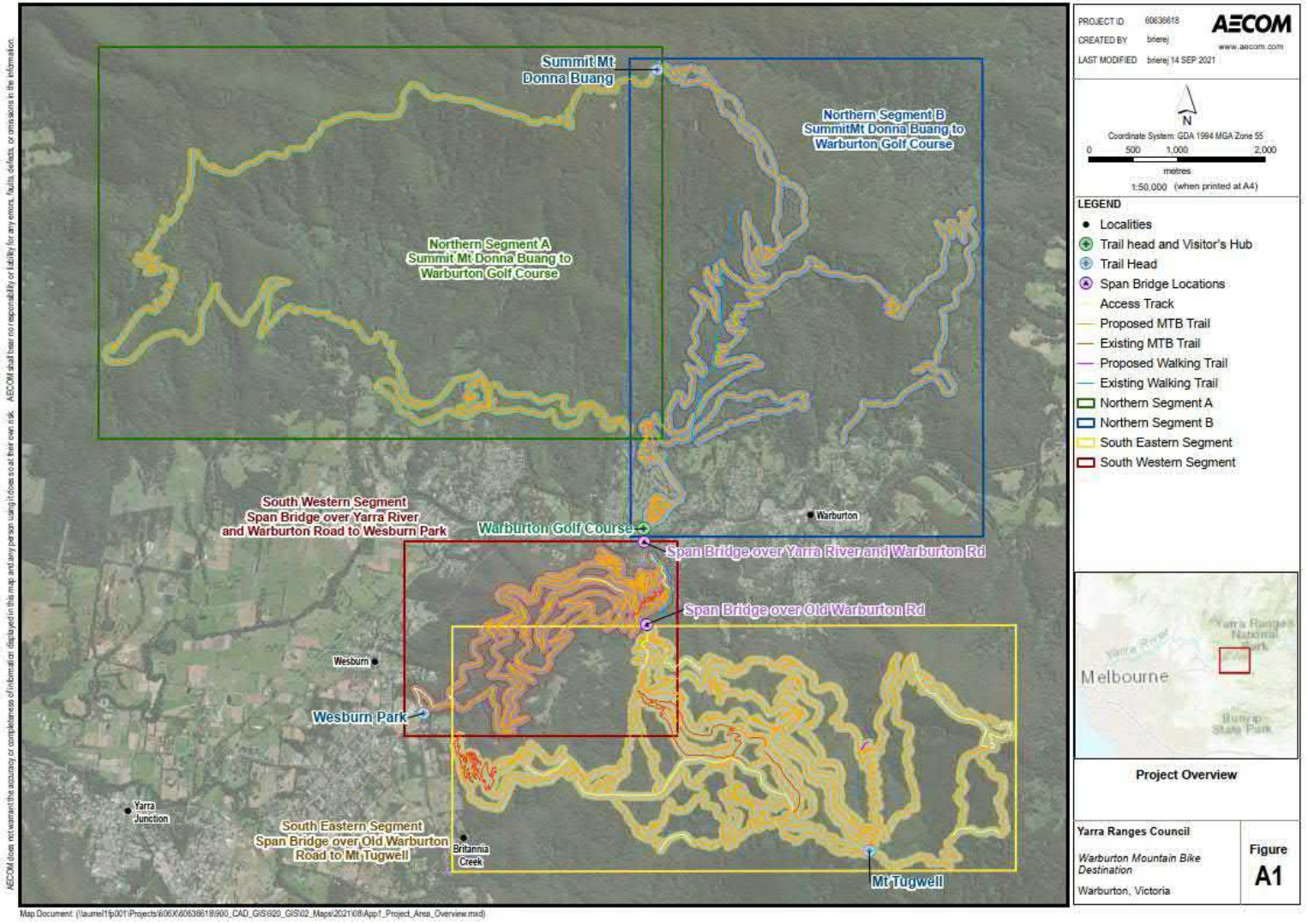

Figure 2 Project overview

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3.2 Project development

It is recognised that there are opportunities to avoid and minimise environmental impacts during the many stages of project development. During project inception and early design development stages of the project, decisions on the location of the project, its design and construction techniques have enabled impacts to be significantly avoided and minimised in accordance with the hierarchy presented in Figure 3.

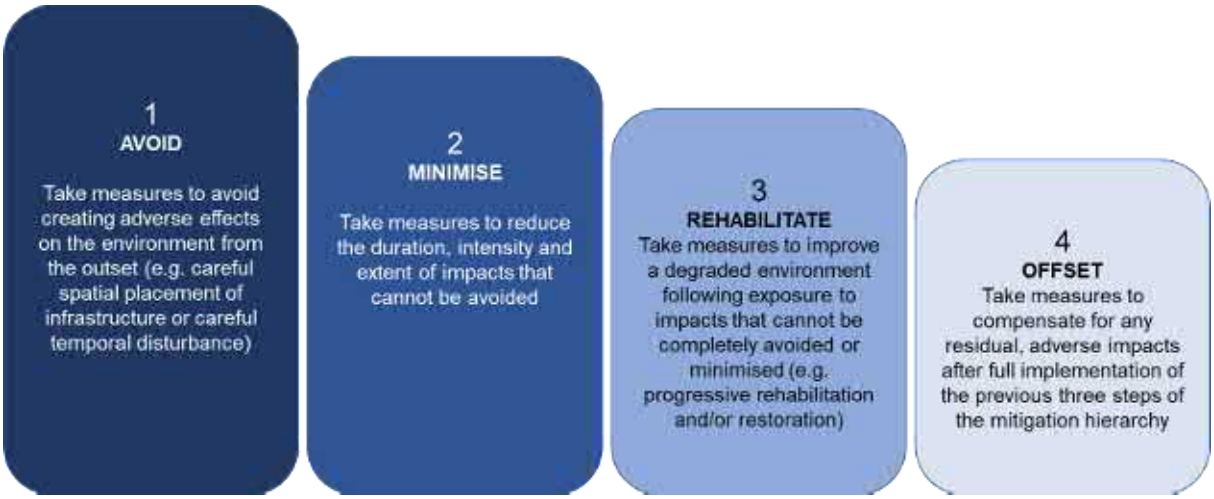


Figure 3 Mitigation hierarchy

Avoidance of impact has been a key focus of development of the trail network and has culminated in the preparation of a project description which is found at Chapter 3 of this EES. A description of how avoidance of impact has informed the design in relation to Land Use and Planning can be found at Section 6.4.

Examples of this include the decision to design waterway crossings without directly impacting waterways, creating trails on previously disturbed areas wherever possible and adoption of a construction technique which avoids impacts to large trees.

After opportunities to avoid impact were exhausted, minimisation and rehabilitation measures were developed. These are described in the construction and operation impact assessment sections below.

3.3 Main project components

The main project components proposed are as follows:

- Upgrade of existing mountain bike trails - approximately 12 kilometres (seven per cent of project length).
- New mountain bike trails – up to approximately 155 kilometres (87 per cent of project length).
- Existing vehicle roads and tracks to be incorporated into the mountain bike trail network - approximately 10 kilometres (six per cent of project length)
- New Visitor's hub and main trail head at the Warburton Golf Course and new trail head facilities at Mount Tugwell, Mount Donna Buang and Wesburn Park. An additional network access point to the network would be provided at Dee Road.

The network would comprise 61 trails, each with a length of between 100 metres and 22 kilometres. Each trail has a trail difficulty rating assigned, ranging from easy over intermediate, to difficult and extreme. Some of the trails are returning loops, while others are point-to-point trails. All trails have also been categorised into six different styles including, adventure, air flow, downhill, flow country, gravity and wilderness, as described in the project description chapter of the EES.

The northern trail network (located on the north side of the valley) consists of around 36 per cent of the trails. The southern trail network (located on the south side of the valley) consists of around 64 per cent of the trails.

The trails would have a bench width of between approximately 1.2 and 3.3 metres with a ride line of approximately 400-1200 millimetres except for the trail on Cemetery Track. The development footprint to be assessed is based on an average width of two metres (one metre for the trail corridor with a trail buffer of 0.5 metres on each side). A head-height clearance of 2.5 metres has been assumed.

The trail network would include built form elements such as bridges, platforms, culverts, rock armour, jumps and berms. Minimal signage is proposed to be associated with the trail and trail heads and this would consist of small maps at strategic intersections and along with safety and name signage. Some trail sections would include elevated structures and drainage works to avoid and minimise impacts to waterways and associated biodiversity values.

The grade of individual trail sections would vary according to the local topography, trail difficulty and style. Typically, the maximum trail grade would be less than 15 per cent, with most of the trails having grade under 10 per cent.

The new Visitor's Hub and main trail head is proposed to be developed at the south end of the Warburton Golf Course, where the existing car park is to be upgraded and extended to accommodate around 245 cars with room for future expansion if required. An upgraded shelter and a bike wash down station would be established for the use of mountain bike riders. Runoff from the wash bays would be captured by a sump and recirculated where practicable. Excess silt and soil would be captured by a silt retention system which would also serve the car park. This system would be designed to meet Melbourne Water requirements. The Visitor's Hub would be the main trail head and would allow direct access to the north and south trail zones.

Three other trail heads are proposed as follows:

- A new trail head would be established on top of Mount Tugwell, off Mount Bride Road and would include a car park, a bus turnaround bay, a bike hygiene station, toilets and picnic area.
- The existing trail head at Mount Donna Buang would be upgraded with improvements to the car park, toilets and picnic area and installation of a bike wash down station.
- An additional 120 car parks would be established at Wesburn Park to facilitate access to connecting trails.

Drainage would be upgraded at the other trail head locations to meet current Melbourne Water requirements

3.4 Alternative to Trail 1

During the project development process, consideration was given to feasible trail alternatives for key trails where there is potential for significant environmental impact. Through a screening process that focussed on ecological, heritage and socio-economic factors, the need to investigate alternative trail alignments was identified in order to ensure a network design that minimises the potential for significant environmental impact.

Further information on this work is provided in the EES Chapter 4 – Project development and alternatives.

The investigations identified Trail 1, nicknamed Drop-a-K as a candidate for consideration of alternative alignments.

Trail 1 is approximately 23 kilometres in length and traverses the Yarra Ranges National Park from the summit of Mount Donna Buang travelling in a westerly direction through forested land alongside Road 2 before meandering generally south east through forested land towards the Warburton township, also intersecting Woiwurrung State Forest.

The project identified an alternative to this trail, being the combination of Trail 45, Trail 46 and Trail 47, with a combined length of approximately 15 kilometres, as shown in Figure 2.

Trails 45 and 46 are within the Yarra Ranges National Park and commence at the summit of Mount Donna Buang, following a south easterly direction through forested land towards the Warburton township, before tying into Trails 5 and 6. Trail 47 commences at Mount Donna Buang Road and travels east within the National Park to tie into Trail 8. The trails are respectively of length; 4 kilometres (Trail 45), 5.5 kilometres (Trail 46) and 5.6 kilometres (Trail 47).

3.5 Project timing

The timing of the key project phases is proposed as follows:

- Project development and approval: 2020 - mid 2022.
- Project construction, Stage 1 (approximately 110 kilometres): progressively from mid-2022.
- Project operations and maintenance: staged opening during 2022 and beyond.

4.0 Legislation, policy and guidelines

4.1 Legislation and Guidelines

The legislation, policy and guidelines relevant to this assessment are summarised in Table 2.

Technical reports for air quality, noise and landscape and visual impacts have been undertaken and are included at Appendix C, Appendix D and Appendix E. These technical reports that inform this Land Use and Planning Technical Report should be referred to for other relevant legislation, policy and guidelines.

A Planning Report has been prepared for the Planning Scheme Amendment (PSA) for the Warburton Mountain Bike Destination and includes a detailed assessment of the project against relevant state and local legislation, policies and guidelines (refer to EES Attachment I). The Planning Report has informed the land use impact assessment by providing greater context regarding the long-term visions, objectives and strategic directions for land use within the Yarra Ranges municipality.

Table 2 Legislation relevant to the assessment

Document title	Summary	Relevance to the project
Commonwealth government		
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	The EPBC Act is the Commonwealth's principal environmental protection and biodiversity conservation legislation. The EPBC Act states that 'controlled' actions, i.e. actions that are determined as likely to have a significant impact on a MNES are subject to assessment and approval under the EPBC Act.	The project is a controlled action requiring assessment and approval under the EPBC Act. The assessment of MNES is contained within the EES, in accordance with the bilateral agreement.
Native Title Act 1993 (Cth)	The *Native Title Act 1993* provides a national system for the recognition and protection of native title for Aboriginal and Torres Strait Islanders and for its coexistence with the national land management system.	Native Title should be considered to ensure there are no adverse impacts to Native Title Rights and agreements and to ensure the project does not affect native law title. The Yarra Ranges Council is affected by a Native Title (Gunaikurnai Land & Waters Aboriginal Corporation), however, this Native Title is not within the project area.
Victorian government		
Environment Effects Act 1978	Under the EE Act a referral to the Minister for Planning may be required if the project has the potential to have a significant effect on the environment. This includes the potential clearing of 10 hectares (ha) or more of native vegetation or the potential long term loss of a significant proportion of known remaining habitat or population of a threatened species within Victoria.	An EES is required for the project.
Aboriginal Heritage Act 2006 (Inc. Aboriginal Heritage Regulations 2007)	The Aboriginal Heritage Act 2006 (Aboriginal Heritage Act) recognises, protects and conserves Aboriginal cultural heritage in Victoria by requiring that high impact activities being undertaken within a legislated area of Aboriginal cultural heritage sensitivity, described in the Aboriginal Heritage Regulations 2007, have	The project has the potential to cause 'significant ground disturbance' and is located within an identified area of cultural heritage sensitivity. A CHMP is therefore required and is mandatory due to the determination for the requirement of an EES. A CHMP is currently being prepared and will be submitted once complete.

Document title	Summary	Relevance to the project
	a Cultural Heritage Management Plan (CHMP) approved.	The Registered Aboriginal Party (RAP) is the Wurundjeri Woi Wurrung Cultural Heritage Aboriginal Corporation (WWWCHAC)).
Planning and Environment Act 1987 (Inc. Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017))	Use and development of the land for the project requires planning approval in accordance with the Yarra Ranges Planning Scheme (YRPS).	The Planning and Environment Act (P&E Act) provides the context for the land use and planning impact assessment. A PSA is proposed in accordance with 20(4) of the P&E Act to introduce an incorporated document and the application of a Special Controls Overlay. The P&E Act also requires any PSA to be consistent with the Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan (Regional Strategy Plan).
Water Act 1989 (Inc. By-law No.1 Water Supply	The *Water Act 1989* (Water Act) provides the legal framework for managing Victoria's water resources. The main purpose of the Water Act is to: ● Promote the equitable and efficient use of our water resources; ● Make sure our water resources are conserved and properly managed for the benefit of all Victorians; and ● Increase community involvement in conserving and managing our water resources.	Under Section 67 of the Water Act a licence is required to construct, alter, operate, remove or decommission any works on a waterway.
Environment Protection Act 2017	The *Environment Protection Act 2017* (EP Act) requires that a Development Licence from the Environment Protection Authority (EPA) must be obtained before certain activities that have the potential to impact on the environment can be undertaken.	A Development Licence will not be required for the project.
Yarra River Protection (Wilip-gin Birrarung murron) Act 2017	The Yarra River Protection (Wilip-gin Birrarung murron) Act 2017 (Yarra River Protection Act) provides for the declaration of the Yarra River and specific areas of public land in its vicinity; for the purpose of protecting it as one living and integrated natural entity; declaration of the Greater Yarra Urban Parklands; development and implementation of the Yarra Strategic Plan (YSP) as a policy and planning framework; establishment of the Birrarung Council and give it the function of advising the Minister on matters relating to the YSP and generally in relation to the protection of the Yarra River land.	Melbourne Water is leading the preparation of the YSP which seeks to guide future use and development and identify areas for protection within the Yarra River corridor. The proposed works fall within the upper rural reach of the Yarra as defined within the Yarra River Action Plan (February 2017). The specific requirements under the Act in relation to developments have not been finalised and no requirements have been identified for the project, based on information released to date.
Heritage Act 2017	The Heritage Act 2017 (Heritage Act) establishes the Victorian Heritage Register (VHR) and the Victorian Heritage Inventory (VHI), for which consents, or permits must be obtained before any heritage place is disturbed. Any archaeological site older than 75 years is considered to have	The project may intersect with the following Heritage Overlay (HO) 214 (Lilydale – Warburton Railway) and HO140 (Mount Donna Buang-Bridle Tracks & Road). The project may also intersect with other sites listed on the Victorian Heritage Register, such

Document title	Summary	Relevance to the project
	potential archaeological value under the Heritage Act.	as the Lady Hopetoun Mine listed heritage site. . The project does intersect with a Victorian Heritage Inventory site, identified as VHI no. H8022-0111 'O'Shannassy Aqueduct Sawmill Site'. If a permit is required to disturb sites, this will be determined as part of the cultural heritage assessment.
Flora and Fauna Guarantee Act 1988	The Victorian Flora and Fauna Guarantee Act 1988 (FFG Act) was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. Threatened species and communities of flora and fauna, as well as threatening processes, are listed under the FFG Act. Section 47 provides that a permit is required for the removal of any listed protected flora from public land.	The project must consider impacts to flora and fauna and a formal ecological assessment is occurring as part of the EES process which will identify any ecological assets affected. A permit will be required to remove listed flora from public land.
Catchment and Land Protection Act 1994	The Catchment and Land Protection Act 1994 (CaLP Act) regulates the management of noxious weeds and pest animals, prohibits the movement and sale of noxious weeds of all categories anywhere in the state, and regulates the importation, keeping, selling and releasing of declared pest animals.	The project works would need to comply with the CaLP Act, particularly causing or contributing to land degradation, including taking all reasonable steps to conserve soil, protect water resources, eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds and where possible, eradicate established pest animals, as declared under the CaLP Act.
Wildlife Act 1975	The Wildlife Act 1975 (Wildlife Act) is the primary legislation in Victoria for the protection of wildlife. The Wildlife Act requires that wildlife research (i.e. fauna salvage and translocation) is regulated through a permit system, which is managed by DELWP.	The project must consider habitat removal. Authorisation for habitat removal must be obtained under the Wildlife Act through a licence granted by DELWP. Any persons involved in fauna removal, salvage capture or relocation of fauna during mitigation measures must hold a current Management Authorisation under the Wildlife Act.
Road Management Act 2004	The Road Management Act 2004 (RM Act) sets out the regulations and requirements for working within the road reserve and specifies the relevant road manager for arterial and local roads in Victoria. Code of practices are set out under the RM Act to provide guidance for road authorities.	Any works within a public road or adjacent to a public road will require a permit under the RM Act. The project includes trails that will intersect public roads and include trails adjacent to public roads. A permit will therefore be triggered under the RM Act.
Land Acquisition and Compensation Act 1986	The *Land Acquisition and Compensation Act 1986* sets out the process for the compulsory acquisition of interests in land and the payment of compensation. An acquiring authority must comply with the processes set out under the *Land Acquisition and Compensation Act 1986* where these powers are relied upon.	The preliminary project design intersects private property and various crown and park land. Where the project intersects private property, agreements are being negotiated with affected landowners for the use of their land.

Document title	Summary	Relevance to the project
Conservation, Forests and Lands Act 1987	Section 31 of the *Conservation, Forests and Lands Act 1987* allows the Minister to make Codes of Practice which specify standards and procedures for the carrying out works. The Code of Practice for VicForests (2014) applies to timber harvesting operations on State forest and private land in Victoria.	In consideration of the project activities, no approvals or licenses are required under the Conservation, Forests and Lands Act 1987.
Crown Land (Reserves) Act 1978	The *Crown Land (Reserves) Act 1978* provides for the reservation of land for a range of public purposes, stipulates how reserved land must be dealt with and prescribes key governance arrangements for committees of management appointed to manage reserved land.	Consent of the designated Crown Land manager may be required to develop or widen new and existing trails on public land. Management must be in accordance with the purpose of reservation.
Forests Act 1958 Forests (Recreation) Regulations 2010	The *Forests Act 1958* (Forests Act) outlines that all forest produce in state forest is the property of the Crown. The Forests Act also prohibits the removal of produce from state forest except in accordance with the regulations. Section 50 allows for areas of State forest to be set aside as a reserve and for regulations to be made in respect of that reserve.	Works will require consent of the public land manager under the Forest Act. This would apply to all listed State Forests intersecting the project area. DELWP is the Land Manger for the State Forest Land.
National Parks Act 1975 National Parks (Park) Regulations 2003	The *National Parks Act 1975* establishes the statutory basis for the protection, use and management of an outstanding system of national and other parks covering nearly 3.45 million hectares.	The proposed works fall within various State parks and reserves including the Yarra Ranges National Park (YRNP). Under Section 23 of the Act, approval of the Minister for Energy, Environment and Climate Change is required for permanent works to be carried out in YRNP. The works for which approval is required include the construction of a building or other structure or other permanent works for the protection, development or improvement of the park including the establishment of camping places, roads and tracks.

4.2 Policy

This section provides a high level overview of relevant policy. A more detailed assessment of the project against relevant Policy and strategic considerations is provided within the Planning report prepared for the PSA found in Appendix F.

4.2.1 State policy

4.2.1.1 Plan Melbourne

Plan Melbourne (2017 – 2050) provides the overarching strategic vision for growth in Metropolitan Melbourne. The Vision set out in Plan Melbourne aims to enable Melbourne and Victoria to maintain its competitive advantages, including energy resources, that create a diverse, flexible and resilient economy.

4.2.1.2 Victorian Waterway Management Strategy

The Victorian Waterway Management Strategy (the Strategy) provides the framework for government, in partnership with the community, to maintain or improve the condition of rivers, estuaries and

wetlands so that they can continue to provide environmental, social, cultural and economic values for all Victorians.

4.2.1.3 Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan

The *Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan* (the Regional Strategy Plan) aims to provide direction for the future allocation of public and private resources within the Yarra Ranges region. Section 46F of the P&E Act requires the Minister for Planning may not approve any PSA that is inconsistent with the Regional Strategy Plan. Section 46G of the P&E Act requires that no Government Department, Public Authority or Council may carry out works or undertakings in the Region which are not in conformity with the Regional Strategy Plan.

Key policy directions of the Regional Strategy Plan which must be addressed for the project include:

- Development be contained to ensure that it does not prejudice the conservation of natural resources and the amenity of those who live there and those who visit the area for recreation.
- Natural resources worthy of conservation include significant vegetation (both native and exotic) and wildlife habitats of importance.
- Planning that seeks to minimise fire risk.
- Planning for recreation that seeks to minimise any adverse effect of tourism and day-tripping on residents, existing land use and the environment, and ensures compatibility with the primary aims of the Policy.

The Regional Strategy Plan is reviewed in detail in the Planning Report submitted as part of the draft PSA. The Planning Report assesses that the Project is supportive of the Regional Strategy Plan and that the Regional Strategy Plan does not preclude the PSA from being approved.

4.2.1.4 Protecting Victoria's Environment – Biodiversity 2037

Biodiversity 2037 brings together conservation and social science to achieve the plan's vision which seeks for Victoria's biodiversity to be healthy, valued and actively cared for. The plan promotes collaboration and improved alignment across government, business, communities, Traditional Owners, Aboriginal Victorians and private land managers, to restore biodiversity and strengthen the economy. The plan also encourages community participation in caring for and enjoying the natural environment.

The plan identifies that Victoria's natural environment is our biggest tourist attraction attracting millions of local, domestic and international visitors every year, with Victoria's parks providing benefits to tourism, health, water purification, flood protection, coastal protection and carbon sequestration. Victoria's natural assets must therefore be protected from external impacts such as pollution, overuse and inadequate management of threats.

Good health and wellbeing are highlighted within the plan as a fundamental outcome that can be influenced by access to the natural environment. The plan identifies that time spent in natural spaces is linked to positive long-term health outcomes and provides children with opportunities to develop core skills including observation, problem-solving, reasoning, creativity and imagination, along with emotional and intellectual development and the acquisition of gross motor skills, such as agility, coordination and balance. Furthermore, the plan identifies the importance of natural assets for contributing to liveability and resilience.

Chapter 4 'A healthy environment for healthy Victorians' recognises links between Biodiversity 2037 and the government's *Victorian Public Health and Wellbeing Plan 2015-2019* and the importance of providing and promoting access to nature in order to reduce chronic disease risk factors, increase social inclusion and improve community liveability as a whole. Providing and improving natural spaces, facilities and programs in the right places will give people from multiple cultures more opportunities to experience nature.

Chapter 5 'Linking our society and economy to the environment' highlights the need to increase nature-based tourism as nature-based tourism and recreational activities are significant contributors to the Victorian economy and provide opportunities for people to connect with nature. Tourism should be managed to ensure sensitive areas are well managed and impacts to biodiversity loss are minimised.

4.2.1.5 Planning Policy Framework

The Planning Policy Framework (PPF) seeks to ensure that land use and development in Victoria meet the objectives of planning as set out in the P&E Act. The PPF is general in nature and is often used to guide more specific planning policies within a municipality. The PPF clauses that are most relevant to the project are detailed below:

- **Clause 11** (Settlement) aims to ensure needs of existing and future communities can be met by providing guidance for housing, employment, recreation, open space and community infrastructure. Planning should recognise and contribute towards health and safety, a high standard of urban design and amenity, and protection of environmentally sensitive areas and natural resources amongst other values.
- **Clause 11.01-1R** (Green wedges – Metropolitan Melbourne) outlines strategies seeking to balance the need to promote economic growth in green wedge areas without compromising their natural qualities.
- **Clause 11.03-5S** (Distinctive areas and landscapes) seeks to recognise the significance of geographic and physical features of the area and the important role of these areas as tourist destinations. Key values and activities of these areas should be protected and use and development that enhances the key characteristics should be supported. Use or development that could impact the long-term natural or non-urban use of land in these areas should be avoided. The Yarra Ranges Localised Planning Statement should be considered as relevant.
- **Clause 12.01-1S** (Protection of biodiversity) aims to assist the protection and conservation of Victoria's biodiversity, with strategies aimed at identifying key habitat and valuable biodiversity sites while strategically planning for the protection and conservation of biodiversity.
- **Clause 12.01-2S** (Native vegetation management) aims to ensure native vegetation is protected by avoiding the removal, destruction or lopping of native vegetation and minimise impacts from any native vegetation removal that cannot be avoided. Offsets should also be provided to compensate for any biodiversity impacts.
- **Clause 12.03-1S** (River corridors, waterways, lakes and wetlands) seeks to protect water bodies and wetlands for their environmental, cultural and landscape values while ensuring development responds to and respects significant areas of environmental, conservation, cultural, open space, aesthetic, recreation and tourism assets. The Yarra River should be protected due to its significant economic, environmental and cultural assets.
- **Clause 12.03-1R** (Yarra River Protection) seeks to protect the Yarra River corridor by maintaining and enhancing the natural landscape characteristics. Strategies include to strengthen the natural environment, promote a sense of place and landscape identity, retain and enhance enjoyment of the river, and ensure that development is designed to maintain the river's secluded and natural environment.
- **Clause 12.05-1S** (Environmentally Sensitive Areas) aims to protect and conserve environmentally sensitive areas including the Upper Yarra Valley.
- **Clause 12.05-2S** (Landscapes) aims to protect and enhance significant landscapes and open spaces that contribute to character, identity and sustainable environments.
- **Clause 13.02-1S** (Bushfire planning) seeks to strengthen the resilience of settlements and communities to bushfire by ensuring risk-based planning prioritises the protection of human life.
- **Clause 13.03-1S** (Floodplain management) aims to protect floodplains and waterways including the flood storage function and the flood carrying capacity of rivers, streams and waterways.
- **Clause 13.05-1S** (Noise abatement) seeks to control noise impacts on sensitive land uses.
- **Clause 13.06-1S** (Air quality management) aims to assist the protection and improvement of air quality.
- **Clause 15.03-1S** (Heritage Conservation) aims to ensure places of heritage significance are conserved.

- **Clause 15.03-2S** (Aboriginal cultural heritage) seeks to ensure the protection and conservation of places of Aboriginal cultural heritage significance.
- **Clause 17.04-1S** (Facilitating tourism) encourages tourism development that maximises the economic, social and cultural benefits of developing the state as a competitive tourist destination. Strategies include to promote tourism facilities that preserve and are compatible with assets and qualities of surrounding attractions.
- **Clause 19.02-6S** (Open space) aims to establish, manage and improve a diverse public open space network that support the community's needs. Open space networks should be linked through walking and cycling trails and should incorporate links between major parks and activity areas, along waterways, connecting places of natural and cultural interest.

4.2.1.6 Yarra Ranges Planning Scheme

4.2.1.6.1 Local Planning Policy

- **Clause 21.04** (Land Use) provides policies specific to different land uses within the Shire. Clause 21.04-2 sets out objectives, strategies, policy and implementation for Commercial land use. Key issues include that tourism contributes significantly to the economy of the Shire, and the challenge is to achieve a delicate balance between tourism, the environment and protecting the amenity of the existing residents. Objective 4 – Tourism, seeks to recognise and facilitate the development of appropriate tourism opportunities, especially those that integrate with and promote the agricultural, environmental and conservation attributes of the shire. Strategies include to service the needs of people visiting the natural features of the area; promote Warburton township for tourist facilities and attractions for visitors; and reinforce the role of Warburton as a service base for tours to the mountain attractions, Mount Donna Buang snowfields and the Yarra Ranges National Park.
- **Clause 21.07** (Landscape – Objectives, Strategies and Implementation) has regard to the Shire's landscapes of open valleys, rolling foothills and forested land. Key issues include the high environmental and landscape qualities, the scenic features of the non-urban areas and the vegetation that should be protected from poorly designed development and intrusive non-sustainable land uses. The objective is to retain and protect scenic landscapes, rural and green wedge character and special environmental features.
- **Clause 21.09** (Environment – Objectives, Strategies and Implementation) seeks to protect and conserve the environmental characteristics, biodiversity and the wider catchment area. Land use and development should consider environmental hazards such as flood, fire and landslip and should seek to ensure the natural environment is not adversely impacted.
- **Clause 21.10** (Infrastructure – Objectives, Strategies and Implementation) has regard to the design and standard of infrastructure, ensuring it meets the needs of current and future demands while suiting local characteristics. Physical infrastructure should be upgraded where appropriate in established urban areas. Utilities that maintain the environmental qualities of the Shire should be provided.
- **Clause 21.11** (Community Infrastructure – Objectives, Strategies and Implementation) aims to improve access to a range of well-planned community services, and to establish a network of recreational, leisure and cultural facilities and programs which reflect the natural environment.
- **Clause 22.05** (Vegetation Protection) seeks to protect and enhance the Shire's rich biodiversity. Objectives include to protect the long term viability of all remnant vegetation, sustain natural ecosystems for plants and animals, ensure that clearing of remnant vegetation will not adversely impact landscape values or wildlife habitat, and protect the habitat of native fauna.

4.2.1.6.2 Zones and Overlays

Zones and overlays are the primary method of managing land use and development within Victoria. All land, other than some Commonwealth owned land, is zoned for a particular use, such as residential, industrial or commercial. Some land will also have overlays affecting it. Overlays provide additional development controls for particular areas in relation to specific features such as heritage, bushfire or flood risk.

The percentages of zones within the study area of each segment is identified in Table 3 and Table 4 below.

Table 5, Table 6 and Figures contained within Appendix A identify the relevant zones and overlays applicable to the project.

Table 3 Percentage of Zones within Segments

Zone	Percentage within Northern Segment A	Percentage within Northern Segment B	Percentage within South Western Segment	Percentage within South Eastern Segment
PCRZ	43	61	63	97
RCZ	17	8	25	3
PUZ	32	19	2	>1
RDZ1	8	2	>1	**-**
GWZ	>1	6	3	>1
SUZ	-	4	3	**-**
LDRZ	-	>1	**-**	**-**
PPRZ	-	-	4	**-**

Table 4 Percentage of Overlays within Segments

Overlay	Percentage within Northern Segment A	Percentage within Northern Segment B	Percentage within South Western Segment	Percentage within South Eastern Segment
BMO	100	100	100	**100**
EMO	18	14	2	**12**
ESO	100	100	100	**98**
HO	12	9	-	>1
LSIO	>1	-	0.2	>1
RO	-	-	-	**0.19**
SLO	100	100	-	>1

Table 5 Relevant Zones

Planning Zone	Outcomes sought*
Commercial Zone (CZ1)	Seeks to create vibrant mixed use commercial centres for retail, office, business, entertainment and community uses while providing for residential uses at densities complementary to the role and scale of the commercial centre.
Green Wedge Zone Schedule 4 (GW4)	Seeks to provide for the use of land for agriculture while conserving and protecting land for its agricultural, environmental, historic, landscape, recreational and tourism opportunities. The zone also encourages sustainable use and development while protecting and enhancing cultural heritage significance and biodiversity of the area.
Rural Conservation Zone Schedule 3 (RCZ3)	Seeks to protect and enhance the natural environment for its historic, archaeological, scientific, landscape, faunal habitat and cultural values, agriculture is allowed, provided it is consistent with the environmental and landscapes values of the area.

Planning Zone	Outcomes sought*
Public Use Zone Schedule 1 - Service and Utility (PUZ1)	Recognises the use of land for the public utility and community services and facilities, including uses that are consistent with the intent of the public land reservation which is 'service and utility'.
Public Park and Recreation Zone (PPRZ)	Recognises areas for public recreation and open space, conserves areas of significance and provides for commercial uses where appropriate.
Public Conservation and Resource Zone (PCRZ)	The primary intention is to conserve and protect the natural environment or resources while also allowing for associated educational activities and resource-based uses.
Road Zone – Category 1 (RDZ1) and Category 2 (RDZ2)	Enables declared roads and other important roads or proposed roads to be designated, a road declared under the *Road Management Act 2004* must be designated Road Zone – Category 1. Other roads may be designated Road Zone – Category 1 or Category 2.
Special Use Zone (SUZ) Schedule 2 – Major Tourist Facility	Seeks to recognise or provide for the use and development of land for a specific purpose of which land is set aside for a major tourist facility.

Table 6 Relevant Overlays

Planning Overlay	Outcomes sought
Environmental Significance Overlay: ● ESO1 - Sites of Botanical Significance and Sites of Zoological Significance - Z19 – Black Sands Creek and Yarra State Forest - Z31 – Ben Cairn Scenic Road and adjacent areas - Z18 – Mount Toole-Be-wong – Don River - Z38 – Ythan Creek and Dirty Gully Warburton - B44 – Myrtle Gully Scenic Reserve - B45 – Myrtle Creek (Don River) Public Purpose Reserve - B46 – The Acheron Way and the Ben Cairn Road	Seeks to address areas where the development of land may be affected by environmental constraints and aims to ensure development is compatible with identified environmental values. Schedule 1 includes sites of botanical significance and zoological significance as these areas hold unique landscape and environmental character. These sites contribute to important ecological processes and biodiversity which form core habitat areas with the network of wildlife corridors along roadsides and watercourses. Development within or near these sites must be appropriately managed to ensure these areas are protected.
Significant Landscape Overlay: ● SLO1 – Yarra Ranges Significant Landscapes	Seeks to identify, conserve and enhance the character of significant landscapes, it is used where vegetation is identified as an important contributor to the character of an area.

Planning Overlay	Outcomes sought
● SLO3 – Donna Buang Range	The Donna Buang Ranges provides a mountainous landform backdrop to the Shire and the landscape covers the forested western and southern slopes of the range. The forested areas recognised as being of conservation significance as a major habitat for native plants and animals. The current landscape values of the area require maintenance of land management practices to ensure the consistent forest cover is protected.
Heritage Overlay: ● HO335 – School Teachers House (Former) St Johns Road, Warburton ● HO140 – Mount Donna Buang-Bridle Tracks & Road Warburton ● HO342 – Yarra Yarra Hydraulic Gold Sluicing Company. Old Warburton Road, Old Warburton	Aims to conserve and enhance heritage places of natural or cultural significance and those elements which contribute to the significance of heritage places. The overlay also seeks to ensure development does not adversely affect the significance of the heritage places.
Erosion Management Overlay (EMO)	Seeks to protect areas prone to erosion, landslip or other land degradation processes by minimising land disturbance and inappropriate development.
Bushfire Management Overlay (BMO)	Seeks to ensure that development of land prioritises the protection of human life, ensuring development is only permitted where the risk to life and property from bushfire is reduced to an acceptable level.

4.2.1.6.3 Particular Provisions

- **Clause 51.03** (Upper Yarra Valley and Dandenong Ranges Strategy Plan) seeks to ensure consistency between the Yarra Ranges Planning Scheme and the Regional Strategy Plan pursuant to Part 3A of the P&E Act.

  Clause 51.03-2 states that "*if there is any inconsistency between any provisions of this clause or a schedule to this clause and any other clause or provision of the Yarra Ranges Planning Scheme, the requirements of this clause or a schedule to this clause prevail*".

  The Schedule to **Clause 51.03** identifies that the Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan aims to contain urban development to a level compatible with conservation of the Region's rich environmental features and with its high standards of amenity. The Regional Strategy Plan also aims to achieve a balance between the natural environment and economic and social infrastructure.

  Clause 51.03-3 identifies the permit requirements for construction and works, as well as removal or lopping of vegetation.

- **Clause 52.12** (Bushfire Protection: Exemptions) aims to facilitate the removal of vegetation in specified circumstances to support the protection of human life and property from bushfire.
- **Clause 52.17** (Native Vegetation) seeks to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation, in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DELWP, 2017) (the Guidelines).
- **Clause 52.29** (Land Adjacent to a Road Zone, Category 1, or a Public Acquisition Overlay for a Category 1 Road) aims to manage the impacts of proposed land use and development on identified existing and planned roads.

- **Clause 52.33** (Post Boxes and Dry Stone Walls) seeks to conserve historic post boxes and dry stone walls.
- **Clause 53.02** (Bushfire Planning) seeks to ensure development prioritises the protection of human life, appropriately responds to bushfire hazard, and is only permitted where bushfire risk can be reduced to an acceptable level.

4.2.2 Local policy

4.2.2.1 Yarra Ranges Council Plan (2017-2021)

The Council Plan outlines Council's objectives and the key priority activities that will be targeted, including how these will be undertaken. The Council Plan aspires to protect core values including natural beauty, a connected community and balanced growth. Council's five strategic objectives are:

- Connected and healthy communities.
- Quality infrastructure and liveable places.
- Protected and enhanced natural environment.
- Vibrant economy, agriculture and tourism.
- High performing organisation.

4.2.2.2 Yarra Ranges National Park Management Plan (June 2002)

The Yarra Ranges National Park Management Plan aims to provide directions for management of the National Park including to preserve and protect significant conservation areas and water resources.

The Management Plan facilitates and manages recreational activities within the Park through several management zones and overlays, each with a general management aim.

The Yarra Ranges National Park was reserved under the *National Parks Act 1975* following a Government accepted recommendation of the Land Conservation Council to establish the park for the purpose of protecting the area's significant mature wet forests and Cool Temperate Rainforest.

The area of the Park within which part of this project is located falls within the Conservation and Recreation Zone and the Recreation Development Zone as defined by the Management Plan. The Conservation and Recreation Zone is recognised as having important natural values and scope for recreation activities, and the plan seeks to protect sensitive natural environments and provide for sustainable dispersed recreation activities and small-scale recreation facilities without significant impact on natural processes.

The Recreation Development Zone recognises areas with facility development within a natural setting and seeks to provide primarily for high-use visitor nodes with a concentration of recreation and/or interpretation facilities.

Within both of these zones, bicycle riding is identified as a permitted activity subject to appropriate conditions. The plan specifically seeks to provide opportunities for cycling that are consistent with the protection of park values.

Section 5.8 of the Management Plan identifies cycling as an increasing use of the park. The Management Plan states that cycling is restricted to public vehicular access roads and tracks, and certain tracks used by management vehicles that include some sections of walking tracks. Management strategies include to:

- Permit cycling on roads, tracks and ski trails in accordance with tables 3, 5 and 6 of the Management Plan.
- Cycling should not be permitted on existing walking tracks except as specified in table 5 of the Management Plan.
- The O'Shannassy aqueduct walking route should be investigated for cycling use.
- Use of the park by cyclists should be monitored and appropriate measures should be undertaken if park values are being adversely affected or if conflicts arise between users.

The Management Plan establishes a long-term management framework for the Park and is intended to guide the development and delivery of management programs and actions affecting the Park. The Management Plan would require amendment following the EES to incorporate the approved trails.

4.2.2.3 Yarra Ranges Council Green Wedge Management Plan (July 2010)

The Yarra Ranges Council Green Wedge Management Plan aims to establish a vision and objectives for the Yarra Ranges portion of the Yarra Valley and Dandenong Ranges green wedge and to identify a set of policies, programs and actions that support the sustainable management of the Yarra Ranges green wedge.

4.2.2.4 Recreation and Open Space Strategy (2013-2023)

The Recreation and Open Space Strategy provides a framework to guide and manage improvements to sport and recreation facilities, parks, community spaces and recreation reserves. The Strategy aims to create healthy and active environments, while encouraging people to connect with the unique natural bushlands and waterways of the Yarra Ranges. With public land including the Yarra Ranges National Park making up 65% of the total land within the Yarra Ranges, the Strategy highlights the importance of providing open space and recreation areas and identifies that walking and cycling are the most popular recreation activities within the Shire. The Strategy seeks to plan for a healthy, active and supported community that is connected via a network of trails and footpaths and recreation opportunities, while protecting the significant and unique natural landscape.

4.2.2.5 Warburton Place Plan

Council is currently preparing the Warburton Place Plan to guide Council's directions and actions for Warburton over the next 20 years. The plan intends to ensure that Warburton's future aligns with the values and culture of the area. Council is currently in the process of preparing the plan based on community feedback received during consultation in 2019.

Feedback received to date has identified the environment and sustainability as key community values.

The community has an interest in how increases in tourism can be leveraged to benefit the town, its residents, and businesses, while ensuring that the town keeps its village atmosphere.

4.2.2.6 Yarra Ranges Council Planning Scheme Amendments of Planning Permit Applications of relevance

Amendment C148 of the Yarra Ranges Planning Scheme introduces a new Municipal Strategic Statement, introduces new local policies, revises vegetation and building controls for rural areas, and updates the Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan (Amendment 122). The amendment seeks to ensure the planning scheme reflects new and updated strategies and remove any confusing or difficult elements within the planning scheme. Specifically, the amendment proposes to include:

- A rewritten Municipal Strategic Statement that provides clearer strategic direction and decision-making guidance on a wide range of land use and development issues.
- The introduction of three new local planning policies: Major Retail Developments, Environmentally Sustainable Development, and Dwellings in Green Wedge Areas.
- The deletion of eight local planning policies which will become redundant as a result of new policy guidelines contained in the revised Municipal Strategic Statement and revised overlay schedules.
- A set of new Significant Landscape Overlays that contain design guidelines for new development in Green Wedge areas.
- A new Environmental Significance Overlay that identities the important biodiversity habitats in Yarra Ranges and provides targeted controls to protect these areas.
- The removal of redundant Significant Landscape Overlay and Environmental Significance Overlay schedules.
- A 5% public open space contribution requirement through the Schedule to Clause 52.01.
- The removal of redundant requirements from the Schedule to Clause 53 of the planning scheme.

No new planning permit requirements will be triggered as a result of the new ESO and SLO controls. The new controls will introduce strategic policies aligned with the Regional Strategy Plan. The proposed PSA for the project (refer to Appendix F) assesses the Regional Strategy Plan and ensures the project is consistent with the purpose and controls of the Regional Strategy Plan.

Amendment 122 of the Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan proposes changes to clauses within three chapters of the Regional Strategy Plan to bring it into line with more contemporary and effective planning provisions proposed as part of the major revision of the Yarra Ranges Planning Scheme. The amendment is being considered concurrently with Amendment C148 to the Yarra Ranges Planning Scheme. These amendments are seriously entertained and have been adopted by Council and are with the Minister for Planning for approval.

4.3 Guidelines

A more detailed assessment of the project against relevant guidelines is provided within the Planning report prepared for the PSA found in Appendix F.

4.3.1 State guidelines

Guidelines for the removal, destruction or lopping of native vegetation (December 2017)

The purpose of the Guidelines is to describe the application of the state-wide policy in relation to assessing and compensating for the removal of native vegetation including the assessment of impacts from removing native vegetation on biodiversity, and the calculation of offsets to compensate for the loss in biodiversity value. In addition to the requirements of the Guidelines, the *Flora and Fauna Guarantee Act 1988* and the EPBC Act may also require consideration and compliance. The Guidelines are incorporated into all planning schemes in Victoria. This means that the

Guidelines (as relevant and appropriate):

- Must be considered by planning authorities when preparing a planning scheme amendment.
- Must be considered by responsible authorities when making decisions in relation to development plans.
- Must be applied when a permit is required under Clauses 52.16 or 52.17 of planning schemes.
- Must be applied when developing a Native Vegetation Precinct Plan (NVPP).
- May be considered in other planning decisions to meet state-wide objectives for native vegetation protection and management.

5.0 Consultation

Development of the project and preparation of the EES have been informed by consultation with stakeholders and the community. Table 7 lists specific community and stakeholder feedback and how this feedback has been considered by the project or in the land use and planning impact assessment.

Table 7 Stakeholder engagement undertaken for land use and planning

Community and stakeholder feedback	Consideration in project design or impact assessment
Concerns that the project does not promote and protect the amenity for residents as prescribed by the Yarra Ranges Planning Scheme	The impact assessment in Section 9.0 assesses the project from a Strategic, Construction and Operation perspective. This includes consideration of potential amenity impacts to existing sensitive receptors such as residential properties.
Concerns about the project intersecting with private property	Where the project intersects private property is described in Section 7.2 and Section 9.1.
Concerns about trails being located in the Yarra State Forest and the Yarra Ranges National Park	The impact assessment considers the changes to land use in Section 9.3.
Concerns regarding increased loss of amenity due to increased traffic	The impact assessment considers the implications of this in Sections 9.2 and 9.3.
Noise, air quality and visual impacts affecting the ambience of the area for locals	The impact assessment at Sections 9.2.3 and 9.3.3 discuss the construction and operation impact assessment.
Requests to keep the trails away from specific areas	The impact assessment at section 9.1 has considered the strategic impact of land use, including the appropriateness of locating within specific land use areas.
Concerns regarding the need for a fire emergency plan	This impact assessment section and the Amendment proposed for the project addresses the bushfire risk and outlines the requirements for an Emergency Management Plan.
Positive effect of the project for local business and economy	The strategic policy relating to the economy and the potential for the project to have a positive impact in that regard are outlined in Section 9.1.

6.0 Method

6.1 Overview of method

This section describes the method that was used to assess potential impacts of the project. Figure 4 shows an overview of the assessment method. A risk-based approach was applied to prioritise the key issues for assessment and inform measures to avoid, minimise and offset potential effects.

The approach used in the assessment has been guided by the evaluation framework that applies to the Project comprising the regulatory framework (that is, applicable legislation and policy) as well as the scoping requirements set by the Victorian Minister for Planning, which include the Commonwealth Department of Agriculture, Water and Environment assessment guidelines.

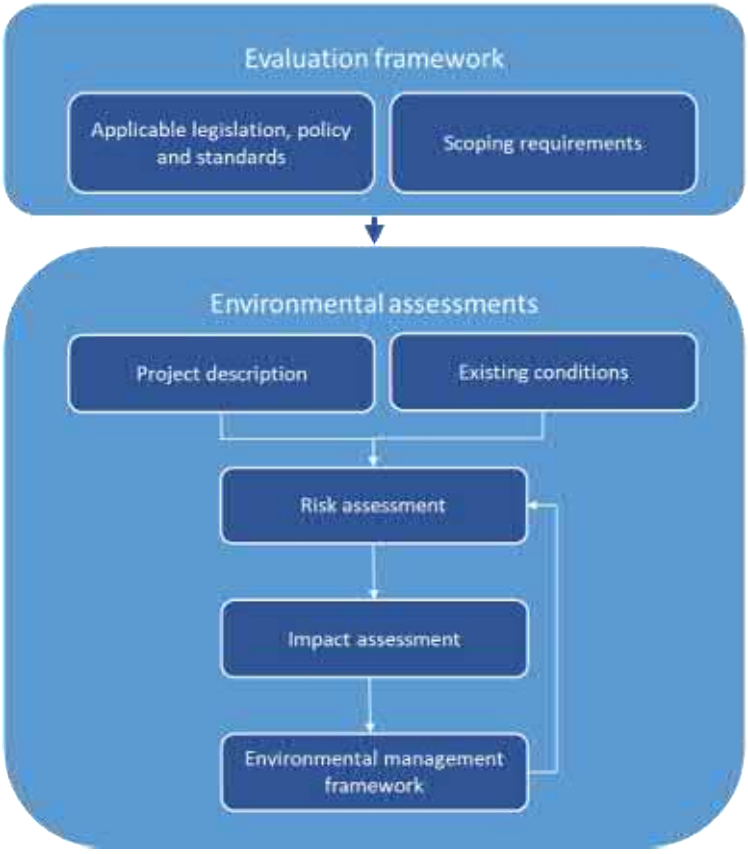


Figure 4 Overview of EES assessment framework

The environmental assessments were undertaken according to the following steps:

- Characterise existing environmental conditions.
- Consider the project design and the proposed construction and operation activities in the context of the existing environmental conditions.
- Undertake an initial risk assessment to evaluate the likelihood and consequence of environmental risks associated with proposed project activities assuming adoption of standard mitigation measures to determine the relative importance of environmental issues associated with the Project.
- Complete an assessment of potential direct and indirect impacts that analyses the spatial and temporal extent, magnitude and nature of the potential impacts giving consideration to the sensitivity and significance of affected receptors.
- Evaluation of the predicted outcomes against applicable legislation, policy and standards.

- Evaluation of the potential for cumulative impacts caused by impacts of the project in combination with impacts of other projects that are taking place or are proposed nearby.
- Where necessary identify additional mitigation measures to address potentially significant environmental effects.
- Identification and evaluation of the residual environmental effects including magnitude, duration and extent, considering the proposed mitigation measures and their likely effectiveness.

Based on the findings of the environmental assessments, an environmental management framework has been established to monitor and evaluate environmental management and contingency measures in relation to the residual environmental effects. The environmental management framework specifies the committed mitigation and management measures and describes the roles and responsibilities for implementation throughout project construction and operation. The environmental management framework is described fully in Chapter 16: Environmental management framework.

The specific methods adopted during the key steps are described in the sections below.

6.2 Study Area

The study area for this assessment has been split into three segments:

- Northern Segment – Summit Mount Donna Buang to Warburton Golf Course.
- South Western Segment – Span Bridge over Yarra River and Warburton Road to Wesburn Park.
- South Eastern Segment – Span Bridge over Old Warburton Road to Mount Tugwell.

The segments can be viewed at Figure 2.

For the purpose of this assessment, the corridor for the proposed trails is 20 metres (10 metres either side of the centreline of the trail). The 20 metre study area is used to identify and discuss the planning controls (zones and overlays) and the existing land uses within the area immediately surrounding the project. Land use and planning impacts have also been discussed at a broader scale.

Given the regional context and the large areas of public conservation and forested land typical of the locality, land use impacts may be considered beyond the study corridor, including regional or precinct based issues and strategies.

Technical reports for air quality, noise and landscape and visual impacts have been undertaken and are included at Appendix C, Appendix D and Appendix E. The technical reports inform this Land Use and Planning Technical Report and should be referred to for details of related impacts discussed within this report, including detail relating to the relevant study areas established for each of these studies.

6.3 Existing conditions

A site visit was undertaken in February 2021 to analyse the existing conditions of the study area. A comprehensive assessment was also undertaken to understand the existing conditions of the study area to inform the environmental impact assessment for the works. The existing conditions assessment incorporated:

- A review of the legislative framework which applies to land contained in and around the study area, including State and local government strategic planning policy to identify where the proposed works would impact on strategic plans and land use plans identified by Yarra Ranges Council;
- A review of the Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan.
- A review of the Yarra Ranges Planning Scheme, and particularly:
    - The PPF, Local Planning Policy; and
    - Zones, overlays and relevant particular provisions.

- A review of current strategic planning work and future Planning Scheme Amendments being considered by the State and Yarra Ranges Council.
- A desktop assessment of VicPlan online mapping tool including aerial imagery and zone and overlay mapping.

6.4 Avoidance and design

The ability to avoid impacts (in accordance with the mitigation hierarchy) is greatest early in the project when key decisions are made regarding project location, design and construction approach. These key initiatives are set out in the project development chapter of the EES. The key decisions made from the outset that have served to avoid and mitigate potential impacts on land use planning are presented in this section, preceding the assessment that is presented for the project.

Relevant to this topic, the following measures have been adopted in relation to the design, construction and operation of the project to avoid and minimise impacts:

- Minimisation of trails on private property (including modifications to avoid Merlino Avenue area and Old Warburton properties).
- Minimisation of trails near residences by focusing trails in natural areas.
- Provision of additional parking at Warburton Golf Course and Wesburn Park to cater for peak parking demand.
- Use of small construction teams and small plant and equipment for construction of trails.
- Restriction of construction works to normal working hours.
- Staged construction of the project over several years to enable adjustment of businesses and communities.

6.5 Risk assessment

6.5.1 Overview of risk assessment method

An environmental risk assessment has been completed to identify environmental risks associated with construction and operation of the project. The risk-based approach is integral to the EES as required by section 3.1 of the Scoping Requirements and the *Ministerial guidelines for assessment of the environmental effects under the Environment Effects Act 1978*.

Specifically, the EES risk assessment aimed to:

- Provide a consistent evaluation tool that is used for all assessments to systematically rate the key issues associated with the project.
- Identify key risks associated with the project that may require further examination through the detailed impact assessments
- Inform project development and/or development of measures to avoid, mitigate and manage environmental impacts

The risk assessment process adopted is consistent with AS/NZS ISO 31000:2018 Risk Management Process. The following tasks were undertaken to identify, analyse and evaluate risks:

- Use existing environmental conditions and identify applicable legislation and policy to establish the context for the risk assessment
- Develop likelihood and consequence criteria and a risk matrix
- Consider construction and operational activities in the context of existing conditions to determine risk pathways
- Identify standard controls and requirements to mitigate identified risks
- Assign likelihood and consequence ratings for each risk to determine risk ratings considering design, proposed activities and standard mitigation.

6.5.2 Assigning a consequence level

Consequence refers to the outcome of an event affecting an asset, value or use. Table 8 presents the consequence framework describing the consequence levels from 'insignificant' to 'severe'. The consequence criteria have been developed in the form of project-wide criteria rather than discipline specific, to enable a consistent assessment of consequences across a range of potential environmental effects.

Consequence criteria is assigned based on the maximum credible consequence of the risk pathway occurring. Where uncertainty regarding consequences existed, a conservative approach to assessing risk has been adopted.

Consequence criteria considered the following characteristics:

- Spatial extent of impact
- Duration and reversibility of potential impacts
- Sensitivity and significance of the receiving environment
- Magnitude, or severity of potential impact.

Each risk pathway will be assigned a level of consequence taking into account the guidance in Table 8. That consequence level, together with the likelihood level, will be used to determine a risk rating in accordance with the risk matrix presented in Section 6.5.4.

Table 8 Guide to consequence levels

Level	Criteria
Insignificant	● No detectable changes or very short-term and localised. ● Readily reversible (insignificant) impact (<1 year for recovery). ● Resilient or highly disturbed receiving environment or population. ● No impact to native vegetation or habitat. ● No impact on critical habitats such as Cool Temperate Rainforest / Cool Temperate Mixed Forest, Mount Donna Buang Wingless Stonefly or Leadbeater's Possum. ● Heritage: No observable impact to tangible and intangible heritage values, sites remain intact and unaffected. ● Social: No measurable impact to local character, amenity and access to public space/facilities. General community support, no impact to economy. ● Transport: Existing transport services unaffected and transport infrastructure can comfortably accommodate the project. Transport safety unaffected.
Minor	● Short-term localised detectable changes. ● Impact likely to be readily reversible (within 5 years for recovery). ● Resilient or disturbed receiving environment or population. ● No impacts on critical habitats such as Cool Temperate Rainforest / Cool Temperate Mixed Forest, Mount Donna Buang Wingless Stonefly or Leadbeater's Possum. ● Heritage: Low degree of disturbance or low degree of observable impact to locally significant heritage values. No impact to state or nationally significant heritage values. ● Social: Low degree of impact to local character, amenity and access to public space/facilities. Individual opposition to the project, short term isolated economic issues. ● Transport: Existing transport services experience isolated and short-term disruption and transport infrastructure can accommodate the project. Transport safety not materially affected.
Moderate	● Short or medium-term detectable changes at a number of locations within the study area. ● Impact likely to be medium-term and reversible (5–10 years for recovery). ● Undisturbed receiving environment or population. ● Short-term, localised impacts on critical habitats such as Cool Temperate Rainforest / Cool Temperate Mixed Forest, Mount Donna Buang Wingless Stonefly or Leadbeater's Possum. ● Heritage: Limited degree of impact to heritage values of state or local significance. ● Social: Limited degree of impact to local character, amenity and access to public space/facilities, some community resistance, economic pressure on community. ● Transport: Existing transport services experience minor but ongoing disruption or transport infrastructure can accommodate the project except for occasional short periods. Transport safety reduced somewhat but safety levels are satisfactory.
Major	● Long-term changes that are significant regionally. ● Impact likely to be medium to long-term and potentially irreversible (> 10 years to recover). ● Sensitive receiving environment or population. ● Material impacts on critical habitats such as Cool Temperate Rainforest / Cool Temperate Mixed Forest, Mount Donna Buang Wingless Stonefly or Leadbeater's Possum. ● Heritage: High degree of impact to heritage values of State or local significance. ● Social: High degree of impact to local character, amenity and access to public space/facilities. Vocal community conflict, declining economic stability. ● Transport: Existing transport services experience significant and ongoing disruption or transport infrastructure is strained for extended periods due to the project. Transport safety is reduced with the potential for injuries.
Severe	● Permanent changes that are significant at a State or Commonwealth level. ● Impact likely to be long-term and irreversible. ● Highly sensitive receiving environment or population. ● Significant impacts on critical habitats such as Cool Temperate Rainforest / Cool Temperate Mixed Forest, Mount Donna Buang Wingless Stonefly or Leadbeater's Possum. ● Heritage: Very high degree of heritage destruction or loss of heritage values. ● Social: Very high degree of impact to local character, amenity and access to public space/facilities. Public backlash, economic distress.

Level	Criteria
	• Transport: Existing transport services cease to function, and transport infrastructure is constantly overextended due to the project. Transport safety is reduced with the potential for fatalities.

6.5.3 Assigning a likelihood level

'Likelihood' is the combination of the chance of an event and the chance of the identified consequence occurring. The likelihood criteria ranges from 'rare' where the event and consequence may occur only in exceptional circumstances to 'almost certain' where the event and consequence is expected to occur in most circumstances. Likelihoods are assigned for the maximum credible consequence according to the levels presented in Table 9.

Table 9 Guide to likelihood levels

Level	Description
Rare	The event could occur but only in exceptional circumstances
Unlikely	The event could occur but is not expected in the course of normal circumstances
Possible	The event may occur in the course of normal circumstances
Likely	The event will probably occur in the course of most normal circumstances
Almost Certain	The event is expected to occur in the course of most normal circumstances

6.5.4 Assigning a level of risk

Risk is defined as a combination of the likelihood of an event occurring and the consequence of that event occurring. A risk rating was determined by these factors using the risk matrix, presented in Table 10.

Table 10 Risk matrix

		Consequence rating				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood rating	Rare	Very Low	Very Low	Low	Medium	Medium
	Unlikely	Very Low	Low	Medium	Medium	High
	Possible	Very Low	Low	Medium	High	High
	Likely	Low	Medium	High	High	Very High
	Almost certain	Low	Medium	High	Very High	Very High

When risks are rated as medium or above, the impacts associated with the risk pathway are assessed in an increasing level of detail and will prompt further exploration of potential mitigation and management actions to reduce the overall impact.

6.6 Impact assessment

This study has assessed the impacts of construction and operation of the project on land use and planning assets and values to be protected.

The following approach has been undertaken consistent with the methodology outlined in Section 6.1.

- Characterise existing environmental conditions and identify potential effects of the project on the existing environment (pre-mitigation) (Section 7.0 and Section 8.0).

- Identification of design and mitigation measures that could substantially reduce and/or mitigate the likelihood, extent and/or duration of potential effects (Section 9.0).
- Assessment of the likely residual effects of the project on the existing environment and evaluate their significance assuming implementation of design and mitigation measures (Section 11).
- Proposed performance criteria and management to evaluate whether the project's effects are maintained within permissible levels and propose contingency approaches if they are not (Section 11).

The assessment of land use and planning impacts during construction and operation of the project had due regard to the requirements of the assessment articulated in the EES scoping requirements, which included assessing the implications for:

- Strategic land use planning for Victoria and the Yarra Ranges region; and
- Existing and reasonably foreseeable land uses occupying land to be traversed by, or adjacent to the project. This included consideration of:
  - Existing and planned infrastructure;
  - Existing planning permissions;
  - Planning permit applications that have been publicly advertised;
  - Seriously entertained planning scheme amendments; and
  - Opportunities to protect other existing or reasonably foreseeable land uses, or the project itself.

The assessment has also included:

- Review of the conclusions of other relevant EES specialist studies;
- Review and consideration of relevant existing and seriously entertained policies and strategies applicable to land affected by the project; and
- An assessment of longer term anticipated or speculative land use changes.

A cumulative impact assessment has been undertaken on a project level. No major projects where there is potential for impacts to overlap temporally and spatially have been identified. Accordingly, no cumulative impacts with other projects are anticipated.

6.7 Assessment of alternative to Trail 1

The assessment of the identified alternative to Trail 1 (the combination of Trail 45, Trail 46 and Trail 47) contained in this report included the following tasks:

- Describe the existing conditions relevant to Trail 1 and the alternative to Trail 1.
- Identify the residual environmental impacts determined for construction and operation of Trail 1 and the alternative to Trail 1.
- Undertake a comparative analysis of Trail 1 and the alternative to Trail 1.
- Identify the preferred trail for each discipline based on the comparative analysis.

6.8 Limitations, uncertainties, assumptions

The following limitations, uncertainties and assumptions apply to this assessment:

- Information is current at the date of issuing this report.
- This land use and planning impact assessment responds to the evaluation objectives and scoping requirements as set out by the Minister for Planning and where applicable to the land use and planning assessment. It does not provide a full assessment of the project against all relevant

legislation. Associated approvals under the various applicable state and local legislation and policy will be addressed where appropriate by other parts of the project EES.

6.9 Inputs from other EES technical reports

Table 11 Inputs from other EES technical reports

Technical report	Land use and planning interdependency
Appendix C: *Landscape and Visual Technical Report*	The Report assesses the project's predicted landscape and visual impacts and recommends mitigations to manage these impacts. The Report considers a study area generally comprising land within one kilometre of the project's footprint. It is assessed that this study area includes six landscape character types including township, residential, active recreation, rural valley, forested slopes and Yarra River and floodplain. Eight sensitive visual receptors are identified, which generally comprise key representative viewpoints for visitors to landmarks in the study area or road users on key roads. project elements that may be viewed from key viewpoints include trail heads and proposed bridge structures which will be located in vegetation clearings. The Report recommends landscape and visual impact mitigations relating to the design of mountain bike trails, the Visitor's Hub, bridges and trail heads. Further detailed assessments relating to landscape and visual impact mitigations are also recommended.
Appendix D: *Air Quality Technical Report*	The Report assesses potential air quality impacts associated with the project and identifies mitigations to manage these impacts. Sensitive air quality receptors to the project are assessed to include residential properties on Dammans Road and Warburton Highway, hotel properties on Warburton Highway and Martyr Road, and the Warburton Golf Club Air quality impacts during the project's operation are assessed to be potentially associated with increased vehicle traffic on key roads during peak weekend travel periods. However, impacts are not expected to be of significance to sensitive receptors and are not predicted to exceed relevant ambient air quality standards. Construction impacts are predicted to be associated with dust generation for construction of the Visitor's Hub. The Report recommends mitigations to manage potential impacts associated with air quality changes for sensitive receptors.
Appendix E: *Noise Technical Report*	The Report provides a noise assessment and proposes mitigation measures for potential impacts associated with construction and operational noise. Sensitive receptors to the construction and operation of the project are identified as including residential properties proximate to Warburton and the proposed trail head and Visitor's Hub at the Warburton Golf Course.

Technical report	Land use and planning interdependency
	It is recommended that potential noise impacts associated with the project can be avoided, mitigated or managed to required standards through mitigation measures. The mitigations relate to managing noise from construction activities and events and conducting noise monitoring.
Appendix G: *Bushfire Assessment Report*	This report provides an overview of the State bushfire planning policy and an analysis of fire behaviour likely to affect the project area, taking into account landscape scale and local conditions. It assesses the bushfire risk, taking into account existing and future communities, the nature of the Project, existing uses in the project area, access arrangements and the views of the relevant fire authority. It identifies the potential ignition sources associated with construction and operation of the project and the implications of increased visitor numbers to areas of relatively high fire risk. It identifies suitable bushfire mitigation measures that could be incorporated into the Project to reduce the risk from bushfire to an acceptable level. An Emergency Management Plan will be developed to mitigate bushfire risks for trail users and visitors.
Specialist Report A: *Biodiversity and Habitats*	The Biodiversity and Habitats Report assesses the project's biodiversity and habitat impacts associated with construction and operation. It is assessed that construction and operation have the potential to impact on a range of biodiversity values, including Leadbeater's Possum, Cool Temperate Rainforest and Cool Temperate Mixed Forest and Mount Donna Buang Wingless Stonefly. It is noted that avoidance measures have been integrated into project design to mitigate impacts to Commonwealth and state significant species. Micro-siting of trails prior to construction, the use of elevated water crossing and adopting an approach of hand-building trails in sensitive areas would result in significant further impact reductions. A monitoring and maintenance program is put forward for implementation in the OEMP to mitigate operational impacts. Total native vegetation removal is assessed to comprise up to 37.047 hectares of understorey vegetation removal with Trail 1. The trail network including the alternative (Trails 45, 46 and 47) would require up to 35.754 hectares of understorey vegetation removal.
Specialist Report C: *Cultural Heritage*	The CHMP confirms that the project area does not contain any registered Aboriginal places and has a very low archaeological potential for Aboriginal cultural heritage material due to its erosion profiles, prior land use and landform characteristics. The CHMP recommends mitigations to manage impacts to cultural heritage during the project's construction and operation.
Specialist Report E: *Socio-economic*	The socio-economic report considers the potential for the project works and operations to affect business (including tourism) operations or other existing or approved land uses, including private land use.

Technical report	Land use and planning interdependency
	The report considers the potential for the project construction activities to disrupt local residents. The report also considers the potential for the project operations to impact access, safety and enjoyment of other recreation users.
Specialist Report F: *Transport*	The Report assesses the transport and traffic impacts potentially associated with the project. The Report assesses that the project's surrounding road network as a popular location for on-road cyclists, features one currently operating bus route and accommodates low volumes of visitor and local road traffic. Traffic and transport risks are identified, and corresponding mitigations are recommended to appropriately manage these risks during construction and operation of the project.

7.0 Existing conditions

The existing conditions of the land use and planning environment being considered throughout this assessment are described in this section.

7.1 Regional Context

This section describes the existing land use within the study area and situates this description within a broader regional context.

7.1.1 Location

The project is located entirely within the municipality of the Yarra Ranges Shire. The project is located within the localities of Warburton, Millgrove, Wesburn and Healesville (refer Figure A1 in Appendix A). The project spans throughout the Yarra Ranges National Park and areas of state forest (refer to Figure 7). Most of the northern segment (including northern segment A and northern segment B) is located within the Yarra Ranges National Park. The south eastern and south western segments are located outside of the Yarra Ranges National Park and parts of these segments are within state forest. From the north, the project extends from the summit of Mount Donna Buang, through the Yarra Ranges, across the town of Warburton and the Warburton Golf Course, to the south towards Wesburn Park and Mount Tugwell and Mount Bride.

The Shire of Yarra Ranges has approximately 244,700 hectares or 2447 square kilometres of land, of which 68 per cent is Crown Land comprising state government managed forests, reserves and national parks. Private landowners occupy 30 per cent of land within the Yarra Ranges and Council manages 2 per cent of land.

The Shire of Yarra Ranges is recognised for its natural beauty and diverse habitats as well as its environmentally significant factors that attract residents and tourists. Residents value the lifestyle of the Shire for its scenic bushland environment and mountainous landscapes. The landscapes contain significant areas of remnant native vegetation of which much is of zoological or botanical significance. The Shire attracts over 2.2 million tourists each year.

7.1.2 Transport and access

Warburton Highway is the main major arterial road servicing the Warburton region from the west. The Maroondah Highway and Donna Buang Road are arterial roads that service the Warburton region from the north. Old Warburton Road (refer to Figure 6) provides an alternative link from Warburton township, past McAvoy Falls to Wesburn Park. Other arterial roads include Yarra Junction Noojee Road providing access from the south of Warburton.

7.1.3 Infrastructure

The Lilydale-Warburton Rail Trail (refer to Figure 7) runs through the region and attracts walkers, cyclists and horse riders to the iconic 38 kilometre recreation trail, running alongside much of the Warburton Highway.

Several water supply conduits traverse the region including the Upper Valley Conduits, the Yarra-Silvan Conduit and the Yarra Valley Conduit. These are important assets that have the purpose of servicing the water supply system. The Upper Valley Conduits enable transfer of water from the Upper Yarra reservoir to the Melbourne metropolitan supply system. The Yarra-Silvan Conduit connects the Upper Yarra Aqueduct to Silvan Reservoir. The Yarra Valley Conduit allows flows to fluctuate throughout the year in response to storage levels in downstage storage reservoirs.

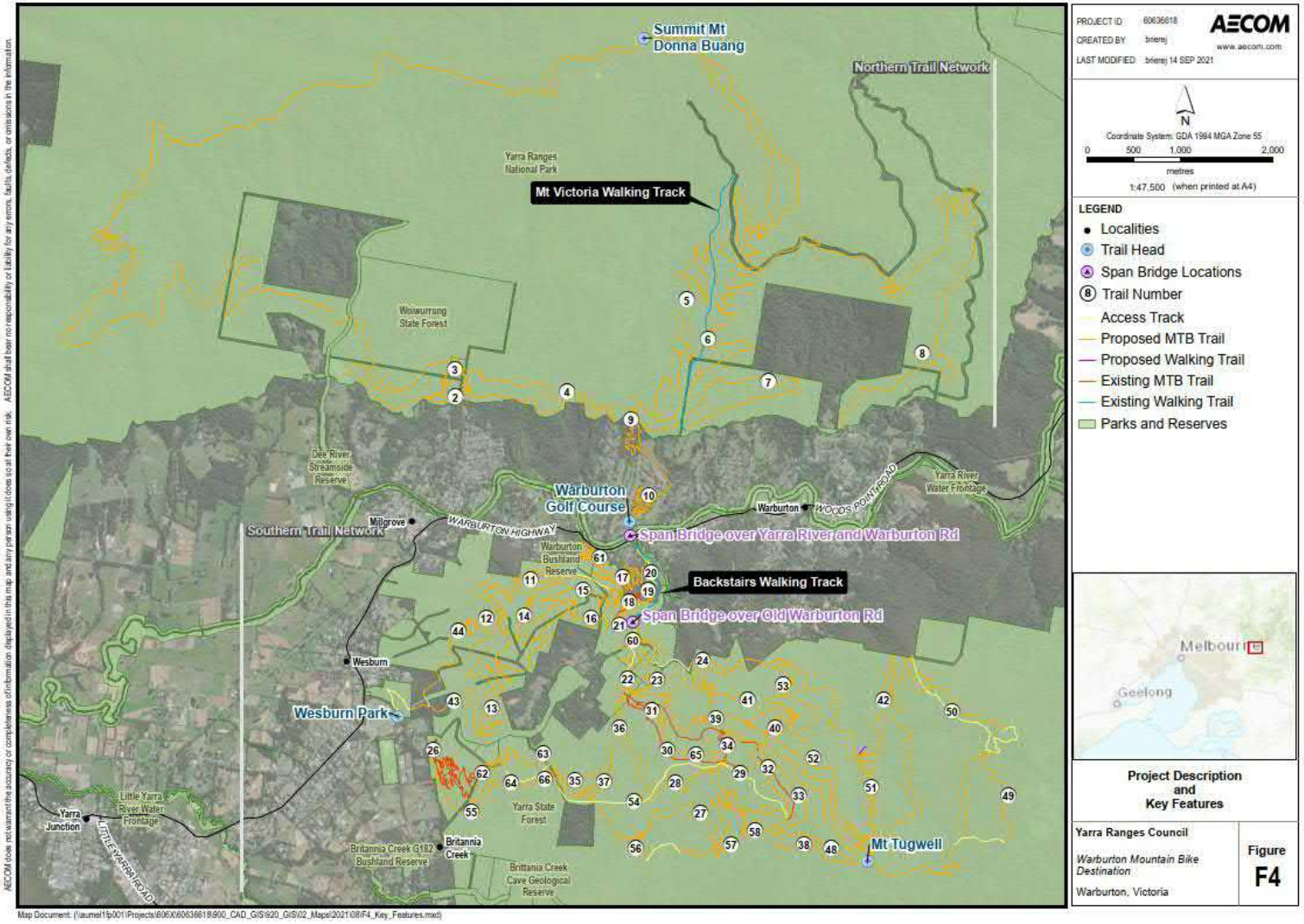


Figure 5 Key features of the project area

Figure 6 Old Warburton Road

Figure 7 Lilydale to Warburton Rail Trail

7.2 Context within the study area

7.2.1 Land uses and typologies

Based on the review of policies, strategies and planning controls, land use typologies in the study area were developed to assist in the determination of potential impacts. Within each typology there are notable individual land uses and precincts that are considered in the impact assessment in Section 9.2 and 9.3. The land use typologies identified within the study area generally comprise:

- Conservation
- Community Facilities and Tourist Attractions
- Residential
- Commercial
- Services and Utilities
- Road.

Table 12 provides further context to these typologies.

Table 12 Land use typologies throughout the study area

Typology	Context development of typology
Conservation	Areas of high policy protection reflecting a particular conservation or ecological significance. These spaces have varying degrees of public access and varying policy designations. Some conservation areas may be used for carefully managed conservation forestry purposes.
Community Facilities and Tourist Attractions	This typology is characterised by land uses that generally provide public access for tourist attractions and recreation including public park land, walking and cycling trails, and golf courses.
Residential	Established urban areas characterised by residential dwellings and local roads.
Commercial	Areas of land generally zoned for commercial purposes including cafes, restaurants and local businesses.
Services and Utilities	Various established or planned service and utility activities.
Road	Established or planned road corridors.

The discussion of the details of the proposed mountain bike trails is provided below and split into discussions of each segment (refer to Section 6.2 for details of the Study Area). The discussion of each segment also describes the existing conditions including the land use typology of the area.

7.2.1.1 Northern Segment

The northern segment is identified in Figure A1 of Appendix A as northern segment A and northern segment B. It is noted that the alternative to Trail 1 (Trails 45, 46 and 47) is discussed separately in Section 7.3 and is not included within the Northern Segment discussion despite being located within the area.

Existing land use within northern segment A and northern segment B is described below. Figures 3-7 of Appendix A identify the zones and overlays within the northern segment.

The northern segment includes the proposed network of trails to the north of the Warburton Highway and the Warburton Golf Course. The northern segment is the only segment out of the three that is located within the Yarra Ranges National Park. Most of the segment is located within the Yarra Ranges National Park except for a portion within northern segment A that sits within the Woiwurrung State Forest, and the area within northern segment B located within the Warburton Golf Course.

Northern segment A includes Trails 1, 2, 3 and 4. These trails span from the Summit of Mount Donna Buang which comprises an existing mountain and lookout tower. The segment travels through land within the PCRZ and the RDZ1 in a westerly direction through forested land alongside Road 2. The trail passes an existing car parking area before generally following alongside Donna Buang Road. The

segment passes by the Ben Cairn Rock and lookout and then meanders generally south east through forested land towards the Warburton township.

Northern segment A intersects the Woiwurrung State Forest located within the RCZ, before passing through an area zoned PUZ1 (service and utility) alongside the O'shannassy Aqueduct Trail.

Northern segment B includes Trails 5, 6, 7, 8, 9 and 10. These trails span from forested areas of land in the north where Donna Buang Road is located, towards residential areas within Warburton, towards the south. These portions of the trail are located within the PCRZ, RDZ1 and RCZ, as well as areas of PUZ1. The trails cross over the O'shannassy Aqueduct Trail, before then intersecting land north of the Warburton Golf Course within the SUZ, before then meandering towards the Warburton Golf Course where the main trail head facilities are proposed to be located. The Golf Course land is immediately north of the Warburton Highway and is within the GWZ.

The northern segment is entirely within the SLO and the BMO. Most of the northern segment is within the ESO with the exception of a small portion of the segment at the Warburton Golf Course land. Part of the northern segment towards Mount Donna Buang is within the HO. Towards Warburton township, part of the northern segment also lies within the EMO and a small portion of the segment is within the LSIO.

Residential

While there are no sensitive receptors such as residential, industrial or commercial areas located within the study area of the northern segment, there are some residential areas located south of the northern segment, towards the Warburton township as well as immediately to the east and west of the Warburton Golf Course (refer to Figure A8 of Appendix A).The residential areas to the west of Trail 9 are located approximately 100 m away. Residential areas to the west of Trail 10 are located more than 100 m from the trails. The residential areas to the east of Trail 10 are located approximately 100 m away. Residential areas are also located to the south of Trail 8, approximately 100m away. The Air Quality Technical Report (Appendix D) and the Noise Technical Report (Appendix E) address potential impacts on any sensitive receptors within proximity to the study area.

Private property to be traversed by Trail 10 includes the Warburton Golf Course and 40 Martyr Rd.

Conservation

The northern segment traverses mostly forested land within the PCRZ or PUZ1, as part of the Yarra Ranges National Park. The northern segment also traverses the Woiwurrung State Forest which is zoned RCZ. There are some existing vehicle tracks and car parking areas surrounding the northern segment. Existing creek lines and rivers also meander through the forested land nearby the northern segment including Platts Creek, Frenchmans Creek, Kennedy Creek, Mckenzie Creek, Dee River, Harrison Creek and Walkers Creek. Land within the northern segment is therefore predominantly used for forested land that is to be conserved and protected for its natural assets. It is anticipated that the use of land for the Yarra Ranges National Park will continue into the future.

It is noted that VicForest undertakes annual timber harvesting in coupes within the vicinity of the project. Coupes are planned and change on an annual basis, and are generally restricted from public access during harvesting. The importance of these industries has declined, and the importance of the forestry industry will decline further in Warburton in the future following the Victorian Government's decision to close native timber harvesting by 2030.

Community Facilities and Tourist Attractions

The Warburton Golf Course is met by the northern segment, where land is within the SUZ2 for major tourist attractions, as well as partially within the GWZ and the PUZ1. The land zoning of the Golf Course provides for the use of land for a major tourist facility, as well as ensures the land retains an open rural character and a non-urban landscape. It is therefore anticipated that the future use of land at the Golf Course would be limited to low-scale development consistent with the purposes of tourist activities and rural characteristics.

The Mount Victoria Walking Track is located within the northern segment B and is proposed to be intersected by Trails 5, 6 and 7 (refer to Figure A10 of Appendix A).

Pest, deer, duck and quail hunting is permitted in the Woiwurrung State Forest, through which Trail 1 and 3 of the northern segment traverses. Refer to Figure A9 of Appendix A for hunting areas.

Roads

The northern segment partially follows alongside Donna Buang Road which is within the RDZ1. Towards Warburton township, the segment is located nearby several local roads, however, the segment does not cross any of these local roads.

Figure 8 Warburton Golf Course

Figure 9 O'Shannassy Aqueduct Trail

7.2.1.2 South Western Segment

The south western segment is identified in Figure A1 of Appendix A. Existing land use within the south western segment is described below. Figures A3, A4, A5, A6 and A7 of Appendix A identify the zones and overlays within the south western segment.

The south western segment is located south west of Warburton Highway and the Warburton Golf Course. The south western segment includes Trails 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 43, 44 and 61. The south western segment commences within the Warburton Bushland Reserve as well as alongside Scotchmans Creek Water Frontage and Hermit Falls. The south western segment intersects parts of the existing Lilydale to Warburton Rail Trail which is located within the PPRZ. The south western segment is located on the western side of the existing 'Back Stairs Track' walking trail.

The south western segment heads west and traverses forested land within the GWZ, PCRZ, SUZ and the RCZ, passing by localities including Mount Little Joe, and Ballarat Gully. The trail traverses land nearby Blue Nose Creek Drain, Yarra Silvan Conduit, and Yankee Jim Creek, as well as the existing tracks associated with this, including the Yarra Silvan Conduit Track which is located within the PUZ. The trail then travels further south west before intersecting Wesburn Park, located within the PPRZ.

Most of the south western segment is within the ESO, with the entire segment being affected by the BMO. Other overlays applying to the south western segment include the EMO, HO and LSIO.

Residential

While there are no sensitive residential receptors located within the study area of the south western segment, there are some residential areas located to the north west of the study area, north east of the study area (towards the Warburton township), and to the west of the study area (nearby Wesburn Park) (refer to Figure A8 of Appendix A). The residential areas to the north east of Trail 17 are located approximately 100 m away. The residential areas to the north of Trail 61 are located more than 100 m away. The residential areas to the north of Trail 11 are located more than 100 m away. Residential land is also located west of Trail 44 and is located more than 100 m away. The Air Quality Technical

Report (Appendix D) and the Noise Technical Report (Appendix E) address any sensitive receptors within proximity to the study area.

Private property located near Wesburn Park will be traversed by Trail 43 and 44. Private property will also be traversed by Trail 17, near the Warburton township. The project does not affect areas of private land where dwellings are located, and only crosses parts of the land that are undeveloped and typically bushland/open space.

Commercial

While there are no sensitive commercial areas located within the study area of the south western segment, commercial areas within the Warburton Township are located to the north east, along the Warburton Highway and include cafes, restaurants and other local amenities. The Air Quality Technical Report (Appendix D) and the Noise Technical Report (Appendix E) address any sensitive receptors within proximity to the study area.

Conservation

The south western segment is mostly located within land zoned as PCRZ and the RCZ, as part of the Warburton State Forest. The land comprises many existing tracks for walking, riding and driving throughout the forested land. The zoning of the land for public and rural conservation protects the land for its natural assets. It is anticipated that the use of land as natural forested land will continue into the future and is not likely to change.

Community Facilities and Tourist Attractions

Some existing vehicle access tracks and a walking track are located within the south western segment, including the Backstairs Walking Track (refer to Figure A10 of Appendix A).

Existing mountain bike trails within the south western segment include Trails 18 and 19 which are both existing hand built trails. Some features of these trails will be re-built as part of the project.

The Lilydale to Warburton Rail Trail exists over the decommissioned railway line route that runs alongside the Warburton Highway. The Rail Trail is intersected close to the start of the south western segment where mountain bike traffic would flow from the northern segment, across the proposed Span Bridge over the Yarra River.

The south western segment ends at Wesburn Park which is utilised for its multifunctional recreation facilities including sporting facilities, designated off-lead dog areas, mountain biking and walking trails.

The Rail Trail and Wesburn Park are both within the PPRZ where land is currently set aside for recreational activities. It is anticipated that the use of land for public recreation at these locations will be maintained and is unlikely to change in the foreseeable future.

Pest, deer, duck and quail hunting is permitted within areas of State Forest, through which a number of trails within the south western segment traverse. Refer to Figure A9 of Appendix A for hunting areas.

Roads

The south western segment is set between Warburton Highway which is located to the north, and Old Warburton Road which is located to the south.

Figure 10 Wesburn Park

7.2.1.3 South Eastern Segment

The south eastern segment is identified in Figure A1 of Appendix A. Existing land use within the south eastern segment is described below. Figures A3, A4, A5, A6 and A7 of Appendix A identify the zones and overlays within the south eastern segment.

The south eastern segment includes trails 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 62, 63, 64, 65 and 6. The south eastern segment commences south of Old Warburton Road and largely traverses forested land conserved within the PCRZ. A small portion of land nearby Warburton township is within the RCZ, as well as the PUZ where the Yarra Silvan Conduit is located.

Spanning south, south east and south west from Old Warburton Road, the south eastern segment traverses forested land, intercepting vehicle tracks and creek lines including the Scotchmans Creek line and the Cemetery Creek line, as well as travelling nearby La La Falls and the La La Falls Walk.

The south eastern segment is entirely within the BMO and mostly within the ESO. Other overlays affecting small parts of the south eastern segment include the EMO, HO, LSIO and RO.

Residential

While there are no sensitive receptors such as residential, industrial or commercial areas located within the study area of the south eastern segment, there is residential land located nearby. North of the study area at Trail 42 immediately north of Old Warburton Road, dwellings are located more than 100 m away. There are also dwellings located west of Trails 55 and 26, approximately 100 m away (refer to Figure A8 of Appendix A). The Air Quality Technical Report (Appendix D) and the Noise Technical Report (Appendix E) address any sensitive receptors within proximity to the study area.

There is no private land within the south eastern segment affected by the project.

Conservation

The south eastern segment is almost entirely within the PCRZ where land is comprised of forested land including several existing vehicle tracks such as Mineshaft Hill Track, Justice Track, Cemetery Fireline and Cumming Spur Track. The zoning of the land for public and rural conservation protects the land for its natural assets. It is anticipated that the use of land as natural forested land will continue into the future and is not likely to change.

Community Facilities and Tourist Attractions

Existing vehicle access tracks are located within the south eastern segment. The Cemetery Fireline Track is included, as well as other management vehicle tracks.

The south eastern segment comprises some existing mountain bike trails (refer to Figure A10 of Appendix A).

- Trail 26 is an existing formalised mountain bike trail called Hey Hey My My. It is a mixture of hand-built and machine-built trail and was predominantly rebuilt in 2021.
- Trail 30 is an existing hand built trail. Some sections will be rebuilt.
- Trail 31 is a short alternate end section on Trail 30. Trail 31 is an existing informal hand built trail and some features will be rebuilt as part of the project.
- Trail 32 is an existing hand built trail. Some features are to be re-built as part of the project.
- Trail 33 is an existing informal trail that is hand built and requires some features to be rebuilt.
- Trail 34 is an existing informal trail that forms a link between Trails 30 and 32. Some features are to be re-built.
- Trail 66 is an existing informal trail that provides a short connection between 54 and 55. Works are required to improve the experience for mountain bike riders.

Pest, deer, duck and quail hunting is permitted within areas of State Forest, through which a number of trails within the south western segment traverse. Refer to Figure A9 of Appendix A for hunting areas.

Roads

The south eastern segment crosses Old Warburton Road at which a long span bridge is proposed to cross the main road that connects Warburton to Wesburn towards the south west of Warburton township.

Figure 11 Hey Hey My My Existing Mountain Bike Trail

7.3 Existing conditions information in relation to comparison of Trail 1 and the alternative to Trail 1

The alternative to Trail 1 is located within the northern trails, north of Warburton Highway. The alternative to Trail 1 includes Trails 45, 46 and 47 which are being assessed as a package to provide an alternate route to avoid environmentally sensitive areas of the current Trail 1 alignment. The alternative to Trail 1 is identified in Figure 2. Existing land use within the alternative to Trail 1 is described below. Figures A3, A4, A5, A6 and A7 of Appendix A identify the zones and overlays within the alternative to Trail 1.

Trails 45, 46 and 47 are located within the Yarra Ranges National Park. Trail 45 commences at the summit of Mount Donna Buang and traverses south towards Trail 46 which links up to trails 5 and 6 of northern segment B. Trail 47 travels generally east and north east from Donna Buang Road before joining up with Trail 8 as part of northern segment B. The alternative to Trail 1 is located entirely within the PCRZ and RDZ1.

The alternative to Trail 1 is located wholly within the SLO, BMO and ESO. The HO also applies to Trails 45 and 46.

Conservation

The alternative to Trail 1 is located entirely within the Yarra Ranges National Park where land is within the PCRZ and the RDZ1. The zoning of the land for public conservation protects the land for its natural assets. It is anticipated that the purpose and use of the land will continue to be natural forested land that is protected into the future and is not likely to change.

Roads

Trails 46 and 47 partially follow alongside Donna Buang Road which is within the RDZ1. No other local roads are crossed by the alternative to Trail 1.

8.0 Risk assessment

A risk assessment of project activities in accordance with the methodology described in Section 6.4 was carried out. The risk assessment has been used as a screening tool to prioritise the impact assessments and development of mitigation measures. The risk pathways link project activities (causes) to their potential effects on the environmental assets, values or uses that are considered in more detail in the impact assessment. Risks were assessed for the construction and operation phases of the project.

The identified risks and associated residual risk ratings for Land Use and Planning; Landscape and Visual; Air quality; and Noise are listed in Table 13. The likelihood and consequence ratings determined during the risk assessment process and the mitigation measures to be achieved are presented in Appendix B.

Table 13 Land use and planning risks

Risk ID	Potential threat and effects on the environment	Risk rating
Construction		
LR01	The proposed construction activities result in temporary disturbance to existing land uses.	Low
LR02	Noise associated with construction activities results in amenity impacts to sensitive noise receptors, including residential and recreational land uses.	Low
LR03	Airborne dust from construction activities results in poor air quality affecting amenity at sensitive air quality receptors including residential and recreational land uses.	Very low
LR04	Exhaust emissions from construction vehicles may result in poor air quality affecting amenity at sensitive air quality receptors including residential and recreational land uses.	Very low
LR05	Construction activities temporarily change the visual amenity of sensitive areas of affected land (i.e. areas of landscape significance).	Low
LR06	Construction vehicles temporarily change access to public and/or private land or temporarily increase safety concerns for road users including pedestrians and cyclists.	Low
Operation		
LR07	The proposed location and siting of the project results in land use changes that are inconsistent with existing land uses and policy (in the local or regional setting), or reasonably foreseeable future land use directions for public or private land.	Very low
LR08	Noise from events during operation results in noise affecting amenity at sensitive noise receptors.	Very low
LR09	Noise from bike pass-bys during operation results in noise affecting amenity at sensitive noise receptors, specifically properties on Martyr Road.	Low
LR10	New built form elements change the visual amenity at sensitive areas of land (i.e. areas of landscape significance, or areas of cleared land where new built form will be more prominent).	Low
LR11	Increased vehicles on local roads results in real or perceived changes to access to public and private land or increased safety concerns for road users including pedestrians and cyclists.	Low
LR12	Exhaust emissions from increased vehicles resulting in queuing and congestion during major mountain biking events may result in poor air quality affecting amenity at sensitive air quality receptors including residential and recreational land uses.	Low
LR13	Increased tourist and visitor numbers to Warburton results in parking congestion, impacting the ongoing use of land.	Low

Risk ID	Potential threat and effects on the environment	Risk rating
LR14	Use of land for mountain biking and associated tourist activities results in risk to life from threat of bushfire, impacting the ongoing use of land.	Low

9.0 Impact Assessment

This impact assessment follows a systems approach to identifying, assessing and managing potential environmental effects to ensure that relevant effects and responses are considered for land use and planning impacts. To ensure that the required assessment, including extent of investigations, is proportionate to the risk of adverse effects, a risk assessment of project activities was undertaken in accordance with the methodology described in Section 6.4 which has been used as a screening tool to prioritise the focus of the impact assessment.

9.1 Strategic Impact Assessment

This section provides a high-level overview of the relevant strategic impact considerations. A more detailed assessment of the project against relevant strategic considerations is provided within the Planning report prepared for the Planning Scheme Amendment found in Appendix F.

9.1.1 State and local planning policies

This section assesses the project against relevant State and Local Planning Policies and provides an assessment of the project's likely regional land use impacts.

The project supports the direction of the following policy documents:

- Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan – The project supports the ongoing implementation of the Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan by promoting tourism and recreation in the Yarra Valley while also fostering positive social and economic outcomes. In particular, the project responds to regional goals relating to recreation and tourism contained within Clause 16 of the Regional Strategy Plan. The Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan has been assessed in greater detail within the Planning Scheme Amendment Planning Report (refer to Appendix F).
- Yarra Ranges National Park Management Plan – The project accords with the general management aims outlined within the document as relevant for the Conservation and Recreation and the Recreation Development Zones in which the project sits. It does this by providing for sustainable dispersed recreation facilities without significant impact on natural processes. Furthermore, the project provides opportunities for recreation and tourism consistent with the strategic directions of the Yarra Ranges National Park Management Plan.

  Section 3.3 identifies that '*Walking and cycling opportunities will be enhanced with new and upgraded trails. Longer trails in the park will link into the regional trail network'*. It is also highlighted that recreational activities are permitted in accordance with 'Table 2' of the plan, whereby 'bicycle riding' is a use permitted with conditions under the relevant zones.

  The project is consistent with the management strategies outlined at Section 5.8 of the Management Plan. The project only intersects one existing walking track within the Yarra Ranges National Park, which is the Mount Victoria walking track (refer to figure A10 of Appendix F). As specified in Section 5.8 of the Management Plan, cycling should not be permitted on existing walking tracks except as specified in Table 5 of the management plan, and cycling should be permitted on roads, tracks and ski trails in accordance with Tables 3, 5 and 6. Table 5 of the management plan identifies the Warburton-Mount Victoria walking track. Table 3 identifies the Mount Victoria Track as a track outside the catchment area which is open to cycling.

  Furthermore, the project is consistent with strategies for conservation by ensuring the project is located outside of the catchment areas, ensuring any potential impacts to water resources are minimised, and ensuring work is undertaken as part of the project which will respond to ensuring protection of flora and fauna.

- Protecting Victoria's Environment – Biodiversity 2037 – The project supports the directions outlined for protecting biodiversity and encouraging access to the natural environment to enhance tourism and promote greater health and wellbeing. In particular, the project supports priority 4 (Increase opportunities for all Victorians to have daily connections with nature); priority 5 (Increase opportunities for all Victorians to act to protect biodiversity) and priority 7 (help to create more liveable and climate-adapted communities). The project supports these priorities by providing a major nature-based recreational activity that provides opportunities for physical activity, social connection, and access to nature. The project provides an attraction to the Yarra Valley and therefore provides economic benefits associated with tourism and employment opportunities.
- Plan Melbourne – The project supports the vision and outcomes set out in Plan Melbourne by facilitating a project that aims to enhance Melbourne's liveability with the implementation of new recreational facilities while creating local and regional employment opportunities.
- Clause 21.04 (Land Use) – The project will generate nature-based recreational tourism activities throughout the forested land, while contributing to development of commercial land uses within the Warburton town centre including the proposed Visitor's Hub. The project supports the objectives of this clause by promoting Warburton township for tourist facilities while reinforcing links to mountain attractions including Mount Donna Buang through the proposed mountain bike trails. Through the assessments, and the proposed mitigation and management measures, the project also seeks to ensure a balance is achieved between encouraging tourism and protecting the environment.
- Clause 21.07 (Landscape – Objectives, Strategies and Implementation) – The project will generate tourism to areas of natural significance to the Yarra Valley and will allow recreational uses to occur on formalised trails within an established natural environment. The project area's viability as a mountain bike destination is closely tied to its landscape character and it is in the interest of the project to balance recreational activities with positive environmental outcomes.
- Clause 21.09 (Environment – Objectives, Strategies and Implementation) – The project will respond to the Upper Yarra Valley's environmental sensitivities by enhancing its recreational value in a contained and managed area. Native vegetation removal will be required to create and maintain bike trails but will be limited to the smallest practical extent.
- Clause 21.11 (Community Infrastructure – Objectives, Strategies and Implementation) – The project includes new community facilities including a new Visitor's Hub and trail heads to service mountain bike activities. These public facilities will be located to minimise environmental impacts and with consideration of bush fire management practices. On the whole, the project will result in a net increase to the region's community infrastructure.
- Clause 22.05 (Vegetation Protection) – The project proposes to remove native vegetation to accommodate mountain bike trails and associated infrastructure. Native vegetation removal is viewed as being appropriate to facilitate a land use activity that supports leisure and tourism outcomes for the region. Additionally, the project will limit activities during operation to defined mountain bike trails and supporting facilities to avoid the existing informal arrangement where interactions between mountain bikers and native vegetation is not monitored or controlled.

9.1.2 Transport and access

The project will rely upon existing transport corridors for construction and operation. The project has suitable transport connections and does not directly impact any existing major transport corridors. Further details are provided in Specialist Report F: *Transport* of this EES.

9.1.3 Infrastructure

The project aligns with existing community infrastructure including existing trails or roads where possible. The project has been suitably designed to ensure impacts on existing community infrastructure, or water supply conduits within the region are avoided. Given the nature of the proposed trails, this component of the project is not expected to require any relocation of existing utilities or services, or other infrastructure. Existing roads that intersect the project alignment will have minimal impact, and similarly new infrastructure such as bridges will be put in place to cross existing

waterways. In locations such as Wesburn Park and the Warburton Golf Course where more substantial works will be undertaken, minor realignment or upgrade of existing infrastructure such as utility services may be required, however this will be carefully planned and managed through the detailed design process and construction methods on-site.

9.1.4 Overall response to strategic land use considerations

The project is considered to be consistent with relevant policy and land uses and successfully responds to technical considerations and potential impacts on land, affecting:

- Crown land.
- Road reserves and existing infrastructure alignments.
- Parts of public conservation areas and reserves.
- Private land.

The project will support tourism and economic development in accordance with state and local planning policies, including Clauses 17.04-1S (Facilitating tourism) and 21.11 (Community Infrastructure – Objectives, Strategies and Implementation) of the Upper Yarra Valley and Dandenong Ranges Regional Strategy Plan. By supporting development of this nature, state and local planning policies implicitly allow for the essential construction activities required to facilitate the development.

These land use activities are supported by state and local planning policies. The project will facilitate tourist development to support a competitive tourist destination by leveraging and responding to existing environmental assets in accordance with Clauses 17.04-1S (Facilitating tourism) and 21.11 (Community Infrastructure – Objectives, Strategies and Implementation) of the Upper Yarra Valley Planning Scheme and the Dandenong Ranges Regional Strategy Plan.

The natural assets of the Yarra Ranges environment and landscape has influenced the region's policy that seeks to balance protection of the natural biodiversity, while allowing the natural beauty to be enjoyed through tourism. The project seeks to utilise opportunities to enhance tourist attractions and community activities and facilities in a way that generates minimal impacts from development and ensures that land uses, and construction techniques reflect the existing conditions. Through minimising impacts, the project is able to ensure that it will not preclude other users or future development that may reasonably be expected to occur within the region.

The project is suitably located within the context of the Yarra Ranges National Park and the areas of State Forest through which it traverses. Through the areas of the Yarra Ranges of which the project is situated, the project responds to strategic policy by providing opportunities for mountain biking that will promote physical activity and contribute to improved health and wellbeing. The project aims to provide sustainable dispersed recreation activities and facilities while protecting the sensitive natural environment.

The project has sought to ensure that the planning and design minimises impacts to potential future uses by following existing roads or trails where possible, avoiding private land where possible, and minimising the footprint required for the trail extensions. The project also upgrades existing trails within areas of state forest, thereby enhancing an already existing footprint (refer to Figure A10 of Appendix A).

Overall, the project will establish Warburton as a tourist destination for mountain biking by formalising existing activities within state forest land and enhancing opportunities by extending trails; creating nature based recreational activities that provide access to the natural beauty of the Yarra Ranges National Park; and generating substantial positive economic benefits for the region during both construction and operation.

Accordingly, it is assessed that construction activities and operation of the project are consistent with the key planning policies and strategic directions as discussed in Section 9.1. Where minor impacts during construction or operation occur, mitigation measures can be implemented, resulting in negligible or minor residual risks (refer to Section 9.2.2, 9.2.3, 9.3.2, and 9.3.3). The project is consistent with strategic directions in relation to land use and planning of the broader region and is not considered to require any change in planning policy.

9.2 Construction impact assessment

This section describes the potential impacts to land use and planning assets, values and uses as a result of the construction of the project. For the following assessment, the construction impacts are considered in the context of each land use segment described at Section 9.2.1, before overall land use impacts and amenity impacts are discussed at Section 9.2.2 and Section 9.2.3.

Land use impacts during construction are generally temporary in duration and limited in nature. The impacts may also be associated with temporary activities that are inconsistent with established land use. Impacts may also be associated with the temporary occupation of roads or land during construction.

During construction, the project will require laydown areas to enhance existing trails, extend and construct new trails, and to develop the trail head facilities. This will result in a number of temporary changes to existing land uses, including temporary occupation of land.

The construction of the project would result in changes to existing land uses, which would be temporarily inconsistent with the existing land uses. Impacts to land use from construction are considered minor and are discussed for each segment below.

9.2.1 Segments

9.2.1.1 Northern Segment

The northern segment is primarily used for conservation, with other land uses including community facilities and road reserves. The primary purpose of the land within the northern segment is to protect, enhance and conserve the natural environment and resources while allowing for resource based land uses in accordance with the PCRZ and RCZ. A small portion of land within the northern segment is affected by the PUZ1. Furthermore, land within the northern segment is identified in the Yarra Ranges National Park Management Plan as being located within the Conservation and Recreation Zone and the Recreation Development Zone. The aim of these zones is to *protect sensitive natural environments and provide for sustainable dispersed recreation activities and small-scale recreation facilities without significant impact on natural processes and provide primarily for high-use visitor nodes with a concentration of recreation and/or interpretation facilities.* Construction of the northern segment consists of approximately 35 per cent of the overall trail network and includes construction of new trails. Other construction works include upgrades and improvements to the existing visitor node at Mount Donna Buang, with upgrades to the car park, toilets, picnic area and installation of a bike wash down station.

The new Visitor's Hub and main trail head is proposed to be developed to the south of Warburton Golf Course, where the existing car park would be upgraded from the current capacity of approximately 30 parking spaces to accommodate around 245 parking spaces, with room for future expansion if required. The Visitor's Hub would be co-located with the main trail head and would allow direct access to the northern and southern mountain bike trail networks. Other facilities would include a shuttle bus shelter, toilet and shower facilities, picnic tables, comprehensive visitor information and bike wash bays.

9.2.1.2 South Western Segment

The south western segment is primarily used for conservation, with community recreation and tourism facilities located within the area including the Lilydale to Warburton Rail Trail, consistent with the PPRZ and the PCRZ.

A longer span bridge is proposed across the Yarra River, allowing mountain bikers to safely cross the Yarra River, Warburton Highway and Dammans Road. The bridge would connect the northern and southern trail networks and provide access from the main trail head located adjacent to the Warburton Golf Course and the Warburton township. The bridge would span approximately 121 metres and would be a combined suspension and truss bridge.

New trails will be constructed, with some existing trails proposed to be upgraded (refer to Figure A1 of Appendix A).

A trail head will also be constructed at Wesburn Park and additional parking areas would be established at this location to facilitate access to connecting trails.

9.2.1.3 South Eastern Segment

The south eastern segment is primarily utilised for conservation land, including several walking trails and tracks amongst forested land and creek lines.

In addition to construction of new trails within this segment, two areas of existing mountain bike trails will be upgraded. A new trail head will also be constructed on top of Mount Tugwell, off Mount Brider Road. The trail head will include construction of a car park, a bus turnaround bay, a bike wash down station, toilets and a picnic area.

A longer span bridge over Old Warburton Road would be constructed within the south eastern segment, which would allow mountain bikers to cross over Old Warburton Road safely. The bridge is proposed to be a truss-style shared use bridge spanning approximately 23 metres across the Old Warburton Road and uphill ground slope.

9.2.2 Land Use Impacts

During periods of construction, the land in each segment will be utilised in a manner inconsistent with the established land use. This land occupancy is temporary, with construction anticipated to last for approximately 30 months over at least 2 separate stages.

The project seeks to minimise impacts and disturbance from construction by implementing mitigation measures consistent with the CEMP (LP01). This includes doing off-site works where possible, using existing disturbed areas, minimising on-site storage and structure erection, while utilising external depots for off-site pre-fabrication works whenever practicable.

Existing laydown areas are suitably located near the locations for the two main bridges over Warburton Highway and Old Warburton Road whereby no new laydown areas or associated vegetation clearing is required. Hand tools will be utilised where possible to minimise amenity impacts and works will be undertaken during daylight hours to avoid the need for construction lighting.

The residual land use impacts after implementation of mitigation measures consistent with the CEMP (LP01) are therefore considered minor. Although the land would be used in a manner inconsistent with the established land use during construction, the area of land affected by temporary occupancy at any one time would be minimised as far as possible, would be temporary (up to 30 months) and would be of minimal intensity.

It is noted that whilst hunting is not permitted in National Parks, the use of land for hunting is permitted within areas of state land and the land use occurs within parts of the project area. There may be seasons specified by the Game Management Authority, depending on what is being hunted, however, pest animals can be hunted at any time. The use of land for hunting may be impacted by the temporary occupancy of land for construction of the project.

Foresting is annually planned by VicForest in areas that may be required for project construction. The CEMP (LP01) should require consideration of current coupe areas and construction activities should not occur in zones where timber harvesting is planned.

In relation to bushfire risk, potential ignition sources related to construction are hot works associated with bridge construction, use of hydrocarbon fuels in vehicles and plant and workers smoking on-site. These risks would be managed through measures in the CEMP limiting fuel stored on works sites, requiring that water carts be available and prohibiting smoking.

While land occupancy will occur, construction will be periodic and temporary, and impacts will be minimised by implementing mitigation measures consistent with the CEMP (LP01).

After implementation of mitigation measures consistent with the CEMP, residual impacts are considered minor as the areas of land occupied at any one time would be minimal. Minor residual impacts may include disturbance to game (largely due to human presence) and thus the ability to hunt, however, this residual impact would occur in minimal areas at any one time, would be temporary (up to 18 months) and implementation of the CEMP (LP01) would minimise the intensity of construction activities within the area.

Separate from this project, a Master Plan is being prepared for Wesburn Park and this may lead to further redevelopment works occurring at Wesburn Park. This project is compatible with the Master Plan and will not preclude the ongoing use of Wesburn Park as envisaged by the Master Plan.

9.2.3 Amenity Impacts

Potential amenity impacts during construction include visual impacts from construction equipment, noise impacts from construction works and vehicle movement, and reduced air quality from dust during construction.

These amenity impacts will be managed in accordance with a CEMP and consultation with affected landowners and stakeholders (LP01). Other mitigations measures proposed during construction (further contained in the CEMP) include locating equipment and material out of view of potential sensitive receptors (LM05), dust suppression measures (AM01), restriction of vehicle movement within designated roads and construction footprints (AM02), covering of vehicles carrying loads during travel on public roads (AM03), and managing and monitoring noise in accordance with relevant EPA guidelines (NM01, NM02 and NM03). The full list of mitigation measures is contained in Table 15.

Residual amenity impacts from the small construction crews temporarily occupying land for construction activities would occur only within daylight hours, will not require construction lighting, and would migrate along alignment so any impact would be temporary. By operating in small teams and without large scale equipment, dust as a result of construction activities would be kept localised and minor in nature.

Residual amenity impacts after implementation of the mitigation measures are considered minor as intensity of construction activities would be minimised, the extent of affected land would be minimised, and works would be limited to the temporary construction period of approximately 18 months.

9.2.4 Residual Impacts

Following implementation of mitigation measures and the CEMP, residual impacts on land use and amenity would not be significant.

- Land occupancy for construction would be temporary and the intensity of construction activities would be minimised to an extent that significant residual impacts are not anticipated. Hunting may temporarily be impacted due to the potential disturbance to game (largely due to human presence).
- Due to the magnitude and temporal nature of the construction activities, visual, air quality and noise associated residual impacts are not significant. During construction, noise generating activities will be audible to sensitive receptors, however, noise levels are not considered intrusive.

9.3 Operation impact assessment

This section discusses potential impacts on land use as a result of operation of the project and the associated mitigations that aim to reduce and manage impacts appropriately. Mitigation measures referred to are defined in Section 10.0. Land use impacts during operation are generally related to a change of use or inability to use land in the same way as a result of the project. For the following assessment, the operation impacts are considered in the context of each land use segment described at Section 9.3.1, before overall land use impacts and amenity impacts are discussed at Section 9.3.2 and Section 9.3.3.

Operation of the project includes:

- The use of land for the trails; and
- The use of land for the trail heads including the main trail head and Visitor's Hub.

The project is consistent with and supported by existing and future land use anticipated in this location to facilitate the use of tourism and recreation. The operation of the project would result in impacts to existing land uses which is a change to the existing land use. This impact is considered minor and is discussed below.

9.3.1 Segments

9.3.1.1 Northern Segment

Approximately 35 per cent of the trail network will be located in the northern segment, north of the Warburton Highway. The Mount Donna Buang Trail Head facilities will operate in the northern segment, including the car park, toilets, picnic area and bike wash down station.

The new Visitor's Hub and main trail head will also operate within the northern segment, located adjacent to the Warburton Golf Course and the Warburton township.

9.3.1.2 South Western Segment

The south western segment will comprise the span bridge over the Yarra River, spanning approximately 121 metres. Existing trails will continue to operate and new trails will be added in this area.

9.3.1.3 South Eastern Segment

The span bridge over Old Warburton Road will operate within the south eastern segment. New and existing trains will be located within the segment and the new trail head will be operating at Mount Tugwell.

9.3.2 Land Use Impacts

The use of land for the project's operation is consistent with existing land uses within and nearby the study area. Currently, formal and informal mountain bike trails are already being used for mountain biking in the south western and south eastern segments within areas of state forest.

Outside of the National Park land, the project represents a continuation and expansion of the existing land use of formal and informal/illegal mountain bike trails within areas of state forest and is supported with ancillary activities to allow for more formalised and safer use of the area as well as better management of events and visitor access. Any large scale mountain bike event may be required to seek additional approvals from Yarra Ranges Council.

By formalising the existing use within areas of state forest, the project will limit mountain biking to defined trails and supporting facilities, which will ensure the interaction between mountain bikers, other recreational uses and native vegetation can be monitored and controlled.

The project also supports the development of new recreational nature based activities in areas of the Yarra Ranges National Park within the northern segment, consistent with the aims and strategies outlined in the Yarra Ranges National Park Management Plan. This constitutes a new land use for mountain bike trails, amongst the existing use of land for nature conservation and minor recreational activities (such as walking and seasonal snow play).

Land use and planning impacts associated with operation of the project include a permanent change to the use of land. This change to the use of land for mountain bike trails is anticipated to include an increase in visitors to the area.

Impacts from this change of land use and the associated visitors have been limited through the projects adopted design principles that avoid and minimise impacts, such as, the project footprint avoiding residences and the use of shuttle busses to Wesburn Trail head. Remaining impacts are mitigated through a number of mitigation measures. Consultation with the affected landowners and stakeholders will be undertaken in accordance with the OEMP (LP02). The potential upgrades to roads, pedestrian paths and cyclist routes will enhance network efficiency and safety to manage increased vehicles on local roads (TP4, TP5). The development of an operational parking management plan will manage parking without exceeding acceptable limits for residents and visitors (TP7). The full list of mitigation measures is contained in Table 15

Foresting is annually planned by VicForest in areas where trails may have been constructed. The OEMP (LP02) should require consideration of coupe areas and trail users should be notified of timber harvesting areas.

By attracting additional visitors to the project area, bushfire risk would be expected to increase somewhat because additional people would be in the area if a bushfire started, increasing possible

demand on emergency services. To mitigate this risk an Emergency Management Plan is being prepared in consultation with relevant fire authorities (BF1). The Emergency Management Plan would include procedures for monitoring bushfire threat, closure of the network due to fire risk and evacuation in the event of a fire. Subject to the adoption of the proposed mitigations, it is considered that the risk from bushfire associated with the project can be acceptably managed.

Consultation will ensure appropriate outcomes are achieved throughout the life of the project, and relevant management plans will continue to minimise risks and manage the project throughout its operation. Residual impacts to land use after implementation of the mitigation measures are therefore considered low.

It is noted that whilst hunting is not permitted in National Parks, the use of land for hunting is permitted within areas of state land and the land use occurs within parts of the project area. There may be seasons specified by the Game Management Authority, depending on what is being hunted, however, pest animals can be hunted at any time.

The project constitutes a change to the use of land; however, the new land use and the operation of the project is not considered to impact on the use of land for hunting. Multi use of state land is common (walking or mountain bike trails and hunting for example) and any single use cannot exclude another. Example locations where mountain biking and hunting occur together are the Blue Ranges, Buxton Mountain Bike Park and Rubicon. Furthermore, the Victorian government has advised that there is no evidence of significant issues arising from coexistence of these uses as hunters generally avoid high use areas and the game is not likely to be found around the presence of humans.

To keep users informed, it is proposed that suitable maps of the Warburton Mountain Bike Destination be made available on the Victorian government websites, to ensure they are known areas of recreational use. Other signage on the ground would also be employed. It is therefore considered that there are minimal impacts to the use of land for hunting, from the proposed change to the use of land for mountain biking.

9.3.3 Amenity Impacts

Amenity impacts as a result of the project include accessibility, air quality, noise, visual and traffic, amongst others. Potential amenity impacts during operation of the project may arise from occasional, planned events and peak visitor times. During this time, there may be impacts from noise associated with the events and visitors. A number of events are anticipated, including local and regional events, as well as potential state and national events. These are further described in Section 5.3 of Chapter 1: Project Description. It is anticipated that small scale local events would largely attract participants with only a small number of spectators and assistants. It is not expected that these events would have a significant noise footprint. Larger events, including regional, state and national events have the potential to involve temporary public address systems and music as part of the event.

Amenity impacts from operation of the project may also include permanent changes to the visual landscape due to new structural elements associated with the project's Visitor's Hub, trail heads and bridges, as well as other associated changes to the landscape.

Amenity impacts as a result of changes to the landscape, changes to noise and changes in land use will additionally be addressed through the preparation of an OEMP including consultation with affected stakeholders during project operation (LP02).

During occasional, planned events and peak visitor times, crowds will be managed so that noise is generated away from sensitive receptors and staff and patrons are aware of their potential noise impacts (NM06). In addition, noise from larger events would be addressed through event specific management plans. Further details are provided in Appendix E.

Changes to views of significant landscapes will be mitigated through design, with tree removal being limited where possible (LM01) and new planting proposed to soften views to new structures (LM01, LM02). It is proposed that site plans will be developed for the project's structural elements to ensure that the landscape response is fully considered prior to operation commencing (LM01, LM04). Colour palettes, materials and lighting that positively respond to the visual landscape will be selected (LM01, LM01, LM02). With the implementation of the mitigation measures proposed, the residual impacts are anticipated to be minimal, with the key landscape values and the existing landscape character

retained. Further details are provided in Appendix C. The full list of mitigation measures is contained in Table 15

The land will be used for leisure and recreational purposes which are consistent with established land uses or strategic directions (refer to Section 9.1) .Permanent amenity and land use impacts associated with project operation will be minor and manageable in accordance with the OEMP (LP02). Following the implementation of the mitigation measures, the operational activities will result in minor residual land use and planning impacts.

9.3.4 Residual Impacts

Following implementation of mitigation measures and OEMP, residual impacts on land use, landscape and visual, air quality and noise during operation would not be significant. Residual impacts include:

- The land would be used for leisure and recreational purposes which are consistent with established land uses or strategic directions. Existing road network and parking capacity is sufficient to manage the anticipated increase in demand from visitors to the project. In addition, it is anticipated that potential upgrades to roads, pedestrian paths and cyclist routes would enhance network efficiency and safety for visitors.
- The key landscape values and existing landscape character would be retained during operation. Changes to visual amenity will be permanent but localised, residual impacts would not be significant. Vehicle emissions and dust generating activities are short in duration and would not cause discernible changes to air quality at sensitive receptors. Impacts from noise would be audible and intrusive at properties on Martyr Road. A noise barrier has been recommended in this location; however, further design work and consultation with the immediate landowners would be required to define whether this approach is reasonable or feasible.

9.4 Cumulative Impacts

The introduction of the project to the region has considered the potential for cumulative impacts upon the study areas and concludes that there are no significant issues in this respect.

As identified in Section 9.1, the existing policy context highlights the recreation activities in this area which have developed as a result of the natural features of the area. Planning policy supports the sensitive siting and management of these activities, which this project achieves. Whilst there are other recreational activities in the region more broadly, the sensitive expansion of the mountain bike activities is not considered to result in significant cumulative impacts. As discussed in Section 9.3.2, by formalising the existing use within areas of state forest, the project will limit mountain biking to defined trails and supporting facilities, which will ensure the interaction between mountain bikers and native vegetation can be monitored and controlled. No major projects in the vicinity of the Warburton Mountain Bike Destination, that when combined with the project, would cause material cumulative impacts have been identified.

10.0 Assessment of alternative to Trail 1

The assessment and comparison of Trail 1 and the alternative to Trail 1 is based on the existing conditions information provided in Section 7.0.

The comparison is based on the residual impact of these options assuming effective implementation of the proposed mitigation and contingency measures outlined in Section 9.0 and Section 11.0.

Relevant impacts outlined in the impact assessment are described in Table 14. No new impacts for this topic have been identified in relation to the alternative to Trail 1.

Table 14 Comparison of impacts between Trail 1 and the alternative to Trail 1

Impact	Trail 1	Alternative	Conclusion
Temporary change in land use as a result of construction.	The length of Trail 1 is longer than the alternative, meaning there would be minor residual impacts from temporary land occupancy, to a larger extent of land. The land is, however, forested land within the PCRZ and RDZ1 and is not accessed on a regular basis.	The alternative is a shorter length of combined trails, resulting in less land affected by minor residual impacts from temporary land occupancy. The land is within the PCRZ and RDZ1 and is not accessed on a regular basis.	The residual impact does not differ substantially between Trail 1 and the alternative. The main difference is the length or extent of land affected by temporary land occupancy for construction, however, the residual impact is minor given the context (no sensitive receptors).
Potential amenity impacts during construction including visual impacts from construction equipment, noise impacts from construction works and vehicle movement, and reduced air quality from dust during construction.	The length of Trail 1 is longer than the alternative. Therefore, there would be minor residual impacts to amenity from temporary land occupancy for construction, to a larger extent of land. The land is, however, forested land within the PCRZ and RDZ1 and there are no sensitive receptors.	The alternative is a shorter length of combined trails, resulting in less land affected by minor residual impacts to amenity from temporary land occupancy for construction. The land is within the PCRZ and RDZ1 and there are no sensitive receptors.	The residual impact does not differ substantially between Trail 1 and the alternative. The main difference is the length or extent of land affected by temporary land occupancy for construction, however, the residual impact to amenity is minor given the context (no sensitive receptors).
Permanent land use impacts as a result of the project	Trail 1 is longer in length and therefore a larger amount of land currently conserved for natural assets will be impacted by a change in the use of land, introducing mountain bike riders to the area. Part of land nearby or alongside Donna Buang Road will also be impacted by the change in land use and the associated impacts.	The alternative is a shorter length of combined trails, resulting in a smaller extent of land undergoing a change in land use. Part of land nearby or alongside Donna Buang Road will also be impacted by the change in land use and the associated impacts.	The existing conditions of both Trail 1 and the alternative are relatively similar as the current land use is forested land as part of the Yarra Ranges National Park as well as Donna Buang Road. From a land use perspective, neither Trail 1 or the alternative will be more substantially impacted, other than that Trail 1 is longer and therefore more land is affected.
Use of land for the project resulting in amenity impacts including noise, traffic and air quality impacts.	The length of Trail 1 is longer than the alternative, meaning there would be minor residual impacts from	The alternative is a shorter length of combined trails, resulting in less land affected by minor residual impacts	The residual impact does not differ substantially between Trail 1 and the alternative. The main difference is the length or

Impact	Trail 1	Alternative	Conclusion
	permanent land use changes, to a larger extent of land. The land is, however, forested land within the PCRZ and RDZ1 and there are no sensitive receptors.	from permanent land use change. The land is within the PCRZ and RDZ1 and there are no sensitive receptors.	extent of land affected by the change of land use; however, the residual impact is minor given the context (no sensitive receptors). Furthermore, Trail 1 and the alternative do not pose a difference in scale or intensity of use, only that the use will be spread out on a slightly larger footprint.

Consideration of the above comparison of impacts indicates that the impacts do not differ substantially and the results of selecting Trail 1 or the alternative would be relatively similar. Therefore, from a land use and planning perspective, both Trail 1 or the alternative to Trail 1 would be equally preferred.

11.0 Summary of mitigation and contingency measures

Where impacts cannot be avoided or minimised to appropriately address impacts, mitigation measures have been developed in accordance with the mitigation hierarchy and the consideration of the level of potential impact.

The mitigation measures that have been recommended to avoid, mitigate or manage land use and planning impacts associated with the project are defined in Table 15.

Table 15 Mitigation measures relevant to land use and planning

Mitigation ID	Mitigation measure	Stage
LP01	Minimise amenity impacts through CEMP and consultation with affected landowners and stakeholders.	Construction
LP02	Minimise amenity impacts through OEMP and consultation with affected landowners and stakeholders.	Operation

In addition to the initial mitigation measures listed in Table 15, the relevant supporting EES technical assessments and reports outlined in Section 6.9 are considered to provide sufficient mitigation measures to appropriately reduce the potential for land use impacts caused by the project. Table 16 outlines the technical reports that this report has an interdependency with and summarises relevant mitigation measures proposed. For the specific wording of the mitigation measures contained within each report, please refer to the technical report for further information. Where it was deemed necessary, mitigation measures include monitoring of environmental performance and implementation of contingency actions should standards be exceeded.

Table 16 Supporting EES Technical Assessment Mitigation Measures

Technical Report	Proposed Mitigation Measures of Relevance
Appendix C: *Landscape and Visual Technical Report*	• **LM01:** Mountain bike trail design would avoid large tree removal, make use of natural landform to minimise substantial earthworks and material and planting selection would be appropriate to the setting. • **LM02:** The design of the Visitor's Hub and associated facilities would respond sensitively to its unique environmental setting. • **LM03:** Bridge designs would respond sensitively to their unique environmental setting. • **LM04:** Trail heads would be designed to minimise vegetation impacts; earthworks and the materiality and colour palette would be responsive to the sensitive landscape setting. • **LM05:** Construction methods would focus on non-intrusive methods of construction, and construction equipment storage and material laydown would be located so as not to impact sensitive view receptors.
Appendix D: *Air Quality Technical Report*	• **AM01:** Dust suppression would be used at construction areas as required using water sprays, water carts or other devices on unpaved work areas, spoil and aggregate stockpiles during the loading and unloading of dust generating materials. • **AM02:** Vehicle movements would be restricted after vehicles have arrived at on work sites and vehicles, plant and equipment would remain within the construction footprint and on designated roads and tracks. • **AM03:** Construction vehicles with potential for loss of loads, such as dust or litter, would be covered when using public roads. • **AM04:** Weather conditions would be monitored for extreme heat and/or wind events using systems such as the Bureau of Meteorology forecasts and works would be modified if conditions are likely to result in air quality impacts at sensitive receptors.

Technical Report	Proposed Mitigation Measures of Relevance
	• **AM05:** Vehicles and equipment would be maintained as per manufacturer's specifications to ensure minimal exhaust emissions. • **AM06:** Land clearance would be minimised during construction to reduce the likelihood of wind-blown dust. Rehabilitate as soon as practicable. • **AM07:** A traffic management plan would be developed for major mountain biking events which considers the reduction of exhaust emissions related to queuing and congestion.
Appendix E: *Noise Technical Report*	• **NM01**: Construction noise would be managed in accordance with Section 4.3.3 of EPA Publication 1834. This includes the development of a plan to manage noise during construction in consultation with the EPA. • **NM02**: Noise monitoring would be undertaken prior to construction to confirm the applicable noise criteria for evening and night-time works if construction must occur outside of normal working hours. Monitoring results would inform the noise management plan. • **NM03**: Helicopter noise associated with bridge construction would be limited to normal working hours and the community would be consulted prior to helicopter use. • **NM04**: Noise from operational activities, specifically bike wash stations would be limited through location at appropriate distance from nearest residents. • **NM05**: Noise due to bike pass-bys, specifically audible at properties on Martyr Road would be suppressed in the form of noise barriers to this section of trails, subject to consultation with the immediate landowners. Noise barriers must be built from a non-porous material with no gaps, including at the base and a surface density of at least 15 kg/ m2 at its thinnest point. Barriers would be at least 1.8 m higher than the trail surface and be located as near to the trail as possible. • **NM06**: Noise from larger events, including regional, state and national competitions, would be managed by locating large crowds away from sensitive receptors and briefing event staff and participants on potential noise impacts.
Appendix G: *Bushfire Assessment*	• **BF1**: An Emergency Management Plan would manage risks associated with bushfires.
Specialist Report C: *Cultural Heritage*	• **HM01:** Implement and comply with the approved Cultural Heritage Management Plan (CHMP15276) management conditions to preserve registered and unidentified Aboriginal cultural heritage places and values.
Specialist Report F: *Transport*	• **TP1:** A Traffic Management Plan would be prepared to manage temporary traffic impacts during construction. • **TP2:** A stakeholder communication plan would be prepared and implemented. • **TP3:** A Road Safety Audit would be undertaken. • **TP4:** Upgrades to road/surface pavements may be undertaken to improve local transport efficiency and safety during project operation. • **TP5:** Cyclist and pedestrian safety improvements would be undertaken. • **TP6**: A heavy vehicle route audit would be undertaken. • **TP7:** Operational parking management plan would be developed to ensure that parking congestion does not exceed acceptable limits for visitors and residents.

Technical Report	Proposed Mitigation Measures of Relevance
	• **TP8:** An emergency access plan would be developed and approved prior to the commencement of project operation.

12.0 Conclusion

The purpose of this report is to assess the potential land use and planning impacts associated with the Warburton Mountain Bike Destination and provide recommendations to inform the preparation of the EES required for the project. A summary of the key assets, values or uses potentially affected by the project, and an associated assessment of land use and planning impacts and recommended mitigation measures, are summarised below.

With the implementation of the mitigation measures recommended throughout this assessment, potential adverse impacts on amenity and land use at local and regional scales have been appropriately minimised.

Existing conditions

The review of existing conditions comprised the following:

- A review of the legislative framework which applies to land contained in and around the study area, including State and local government strategic planning policy to identify where the proposed works would impact on strategic plans and land use plans identified by Yarra Ranges Council.
- A review of the Regional Strategy Plan.
- A review of the Planning Scheme, and particularly:
  - The PPF, Local Planning Policy; and
  - Zones, overlays and relevant particular provisions.
- A review of current strategic planning work and future Planning Scheme Amendments (in particular Amendment C148 for new ESO and SLO controls) being considered by the State and Yarra Ranges Council.
- A desktop assessment of VicPlan online mapping tool including aerial imagery and zone and overlay mapping.

Based on these elements, an overview of the existing conditions was prepared to provide the basis of the construction and operation impact assessment.

Impact assessment findings

Project related activities during the construction phase are likely to temporarily impact land uses within or close to the study area. These temporary impacts during construction are expected to be confined in scale and be of relatively short duration at specific locations.

Operational impacts are limited, as the proposed development is not incompatible with land use designations for the proposed site and does not threaten the viability of existing land uses.

Aspects of the project that have been identified as resulting in impacts include:

- During construction, land use changes are considered to have minor land use and amenity impacts. To address any foreseeable impacts, initial mitigation measures are proposed through implementation of a Construction Environmental Management Plan (CEMP) which is subject to approval under the Incorporated Document.
- During operation, the project is considered to have minor land use and amenity impacts. Initial mitigation measures are proposed through implementation of an Operation Environmental Management Plan (OEMP) which is subject to approval under the Incorporated Document.

Mitigation and contingency measures

It is determined that the relevant supporting EES technical assessments and reports provide sufficient mitigation measures to appropriately reduce the risk of land use impacts caused by the project.

The project would not result in unacceptable or long-term impacts to the existing composition of land uses within the study area and would not diminish the long-term vision for the conservation and recreational use of the land. Rather, the project would support a variety of state, regional and local

land use objectives. In particular, the project would create a safe and well managed network of dedicated mountain bike trails which would in turn discourage illegal use of existing walking trails thereby improving safety for walkers.

Summary of residual impacts

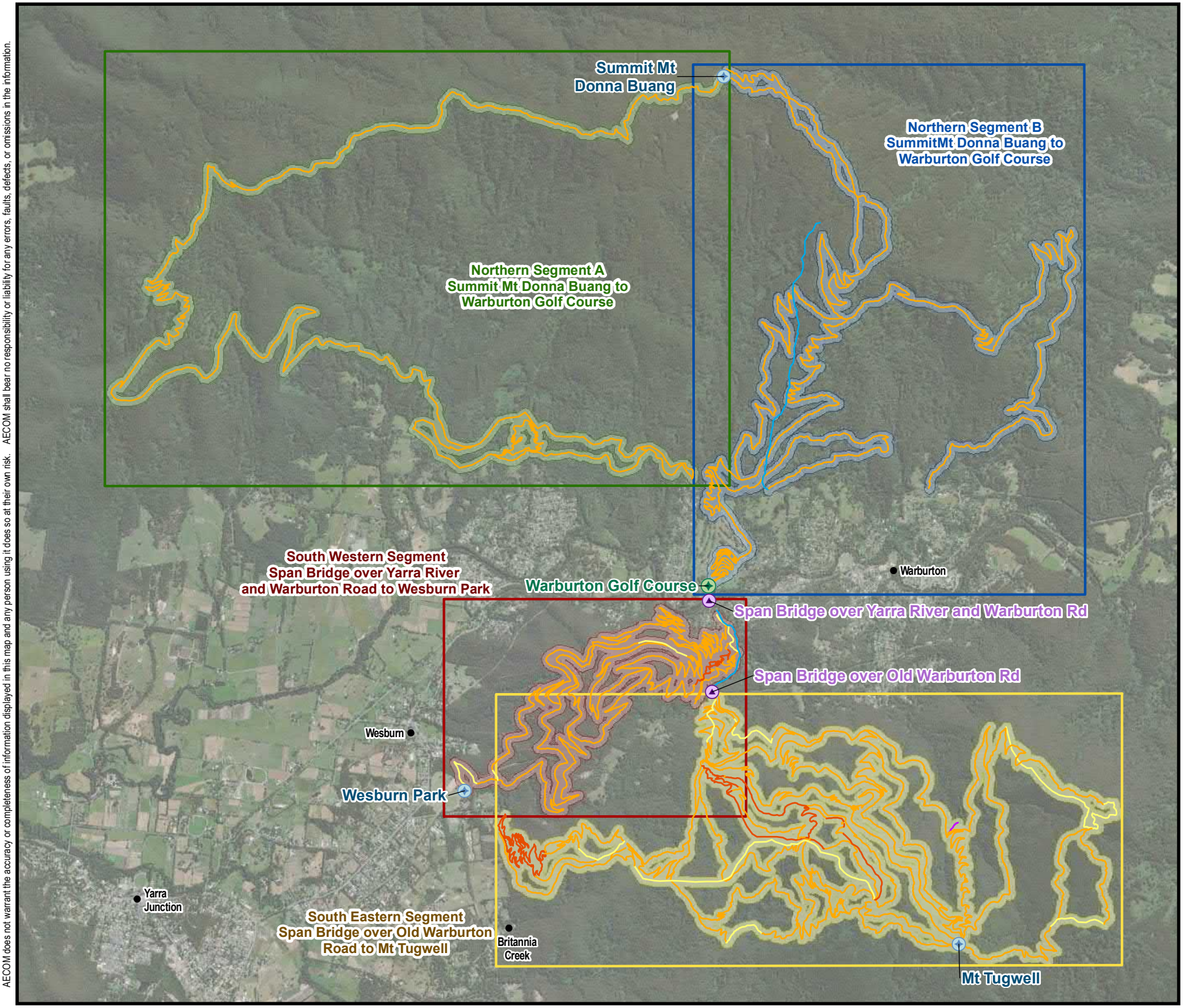
Following the implementation of mitigation measures, the following residual impacts have been identified:

- During construction:
    - Land occupancy for construction would be temporary and the intensity of construction activities would be minimised to an extent that significant residual impacts are not anticipated. Hunting may temporarily be impacted due to the potential disturbance to game (largely due to human presence), however would be managed through the by ensuring users are informed through the publication of suitable maps to be made available on the Victorian government websites.
    - Due to the limited and temporary nature of the construction activities, visual, air quality and noise associated residual impacts are not significant. During construction, noise generating activities would be audible to sensitive receptors, however, noise levels are not considered intrusive.
- During operation:
    - The land would be used for leisure and recreational purposes which are consistent with established land uses or strategic directions. As such, no significant impacts to land use are anticipated. In addition, the project does not prohibit the use of the land for bushwalking. Both the road network and parking have the capacity to absorb visitors to the area. It is anticipated that potential upgrades to roads, pedestrian paths and cyclist routes would enhance network efficiency and safety for visitors.
    - The key landscape values and existing landscape character would be retained during operation. Changes to visual amenity will be permanent but localised, residual impacts would not be significant due to the minor nature of the proposed infrastructure. Vehicle emissions and dust generating activities are short in duration and would not cause discernible changes to air quality at sensitive receptors. Impacts from noise would be audible and intrusive at properties on Martyr Road. A noise barrier has been recommended in this location; however, further design work and consultation with immediate landowners would be required to define whether this approach is reasonable or feasible.

All other potential impacts would not contribute to a significant change to existing conditions and are able to be managed through mitigation measures. No significant residual impacts are anticipated for these other impacts.

Appendix A

Plans



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LAST MODIFIED	brierej 14 SEP 2021

AECOM
www.aecom.com

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Coordinate System: GDA 1994 MGA Zone 55

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metres

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LEGEND

- Localities
- Trail head and Visitor's Hub
- Trail Head
- Span Bridge Locations
- Access Track
- Proposed MTB Trail
- Existing MTB Trail
- Proposed Walking Trail
- Existing Walking Trail
- Northern Segment A
- Northern Segment B
- South Eastern Segment
- South Western Segment

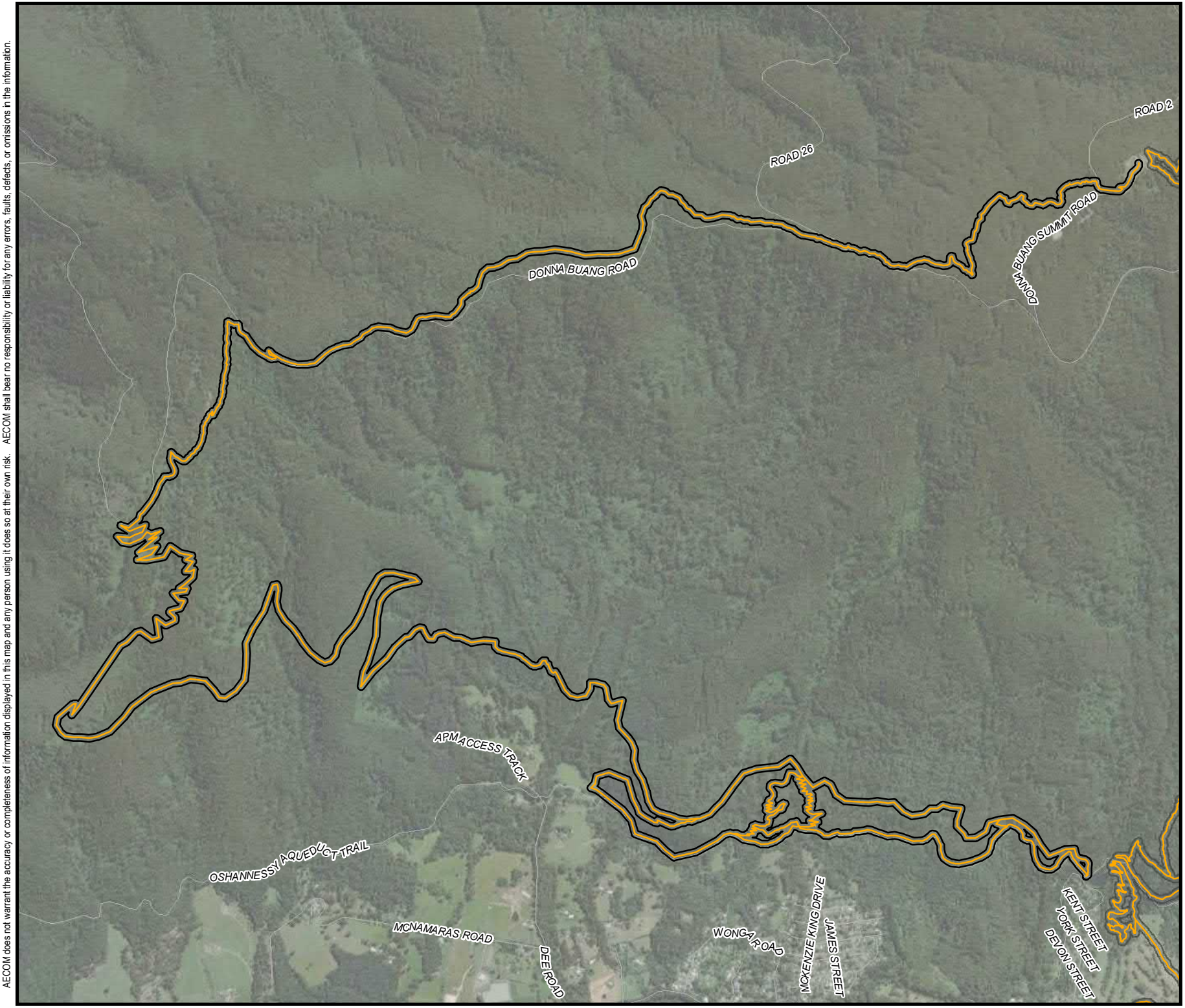
Project Overview

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure A1



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LAST MODIFIED	brierej 14 SEP 2021

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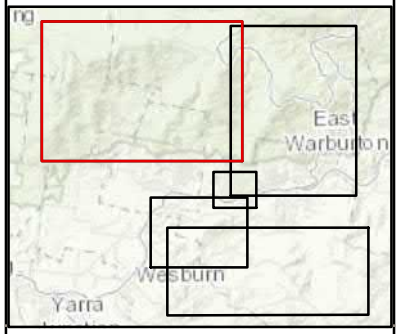
LEGEND

- Study Area
- Proposed MTB Trail
- Roads



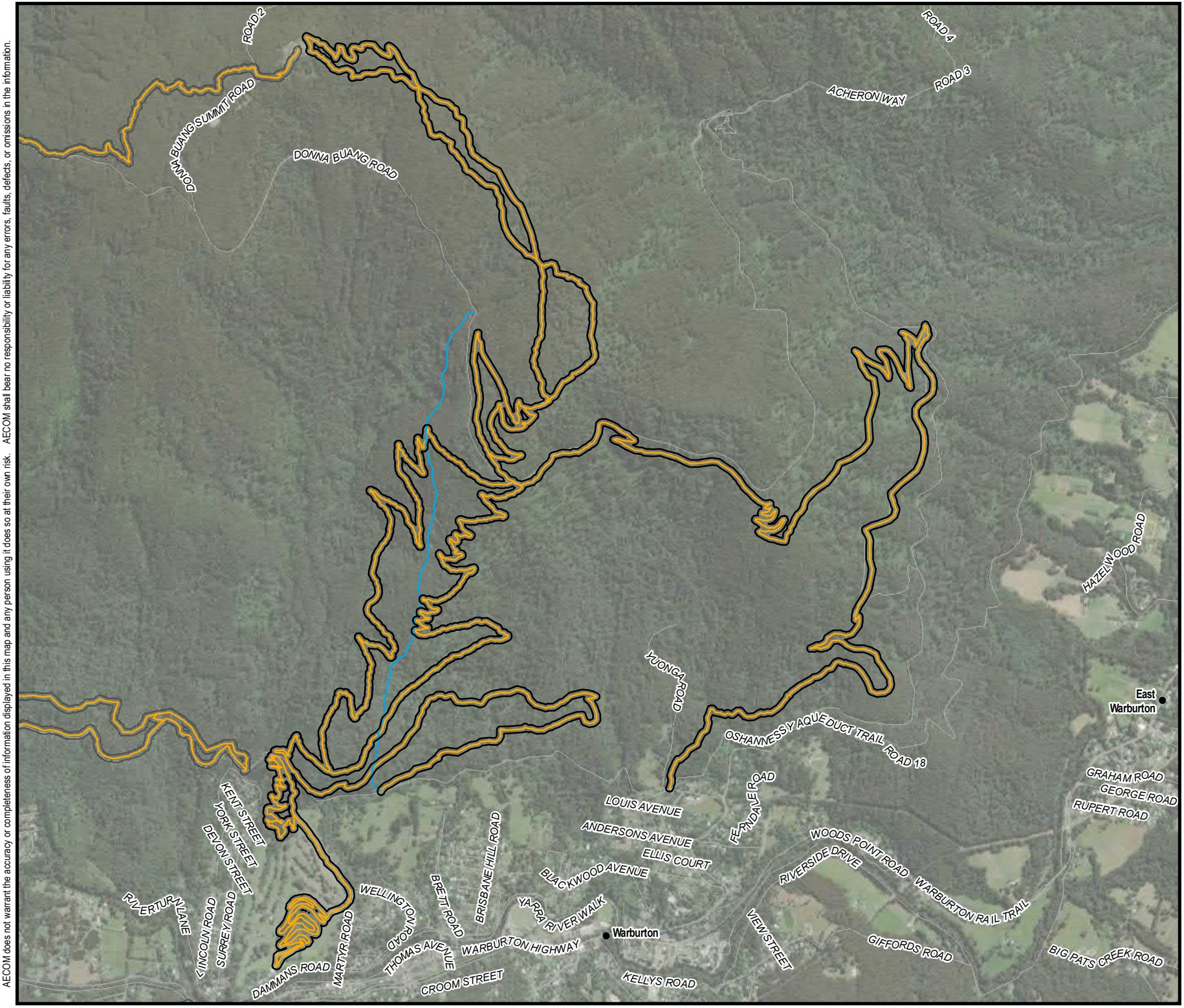
20m Corridor Areas
Northern Segment A

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A2a



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CREATED BY	brierej
LAST MODIFIED	brierej 14 SEP 2021

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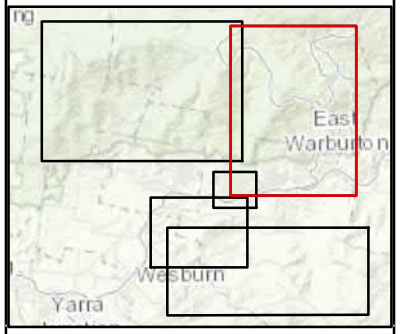
LEGEND

- Study
- Localities
- Proposed MTB Trail
- Existing Walking
- Roads



20m Corridor Areas
Northern Segment B

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A2b

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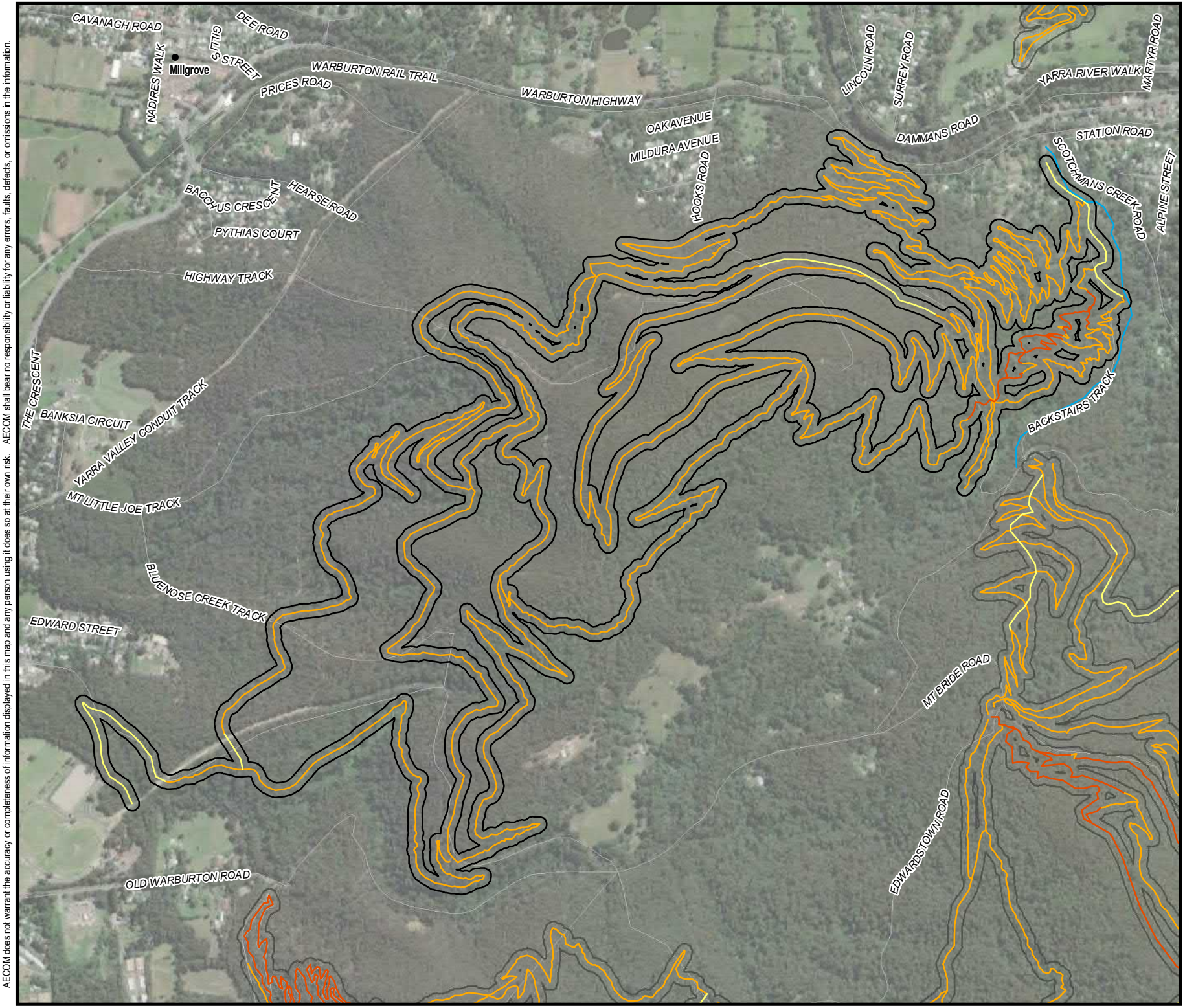

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LAST MODIFIED	brierej 14 SEP 2021

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metres

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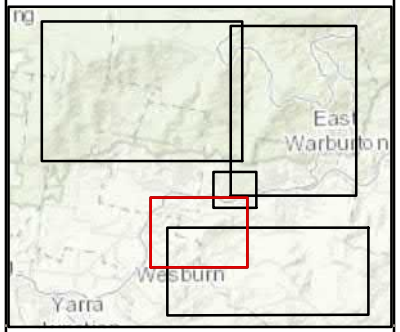
LEGEND

- Study
- Localities
- Access Track
- Proposed MTB Trail
- Existing MTB Trail
- Existing Walking Trail
- Roads



20m Corridor Areas
South Western Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A2c

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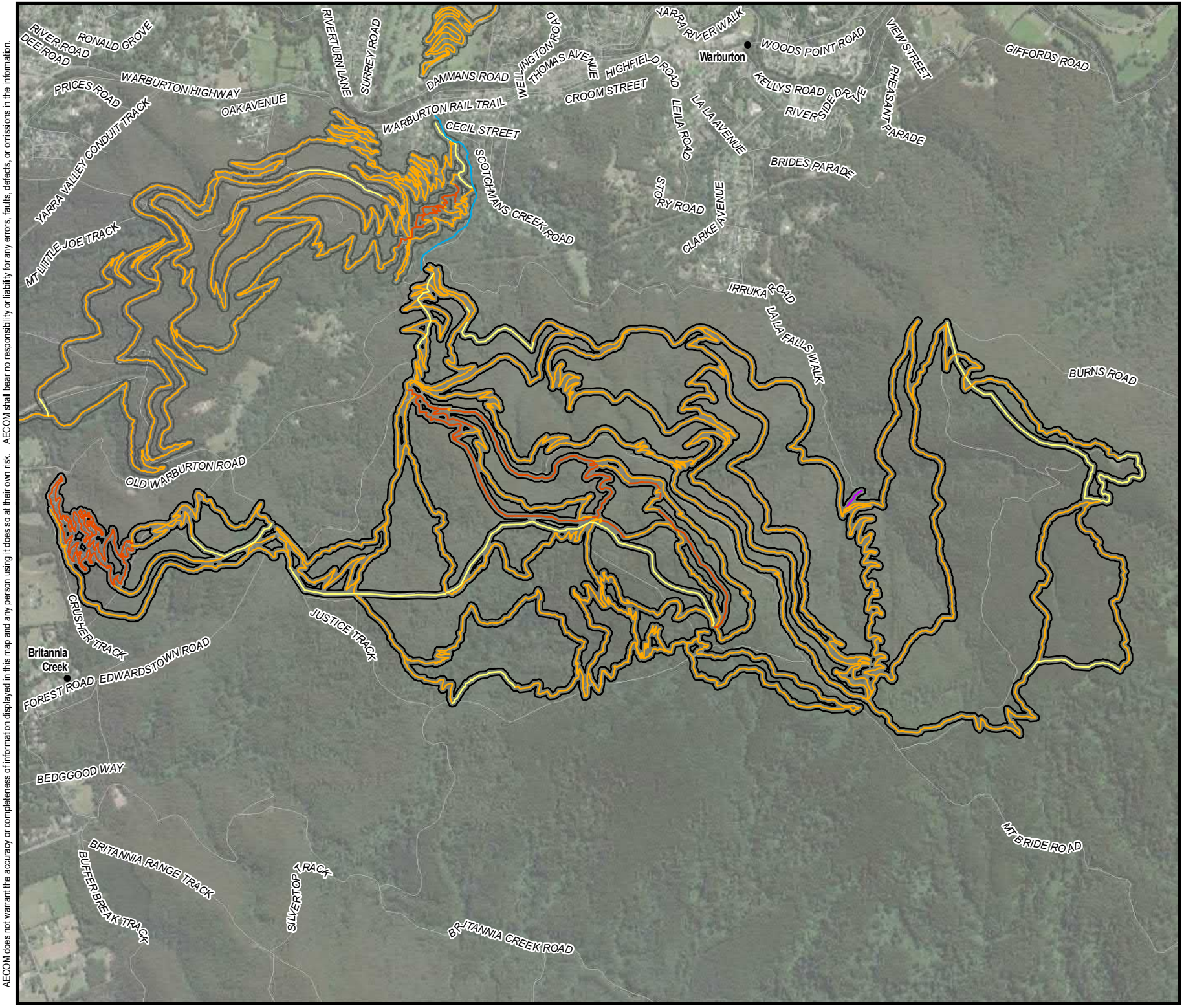

PROJECT ID 60636618
CREATED BY brierej
LAST MODIFIED brierej 14 SEP 2021

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N

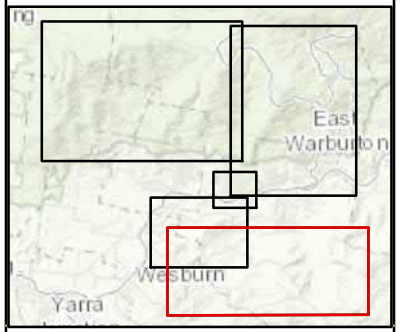
Coordinate System: GDA 1994 MGA Zone 55

0 260 520 1,040
metres

1:28,300 (when printed at A4)

LEGEND

- Study Area
- Localities
- Access Track
- Proposed MTB Trail
- Existing MTB Trail
- Proposed Walking Trail
- Existing Walking Trail
- Roads



20m Corridor Areas
South Eastern Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A2d

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App2_Corridors.mxd)

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Coordinate System: GDA 1994 MGA Zone 55

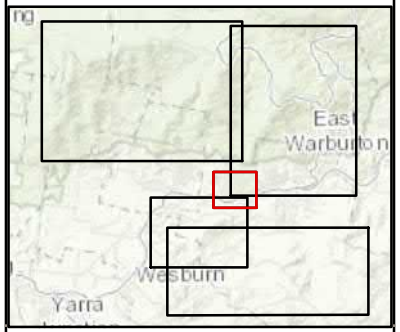
0 55 110 220

metres

1:6,040 (when printed at A4)

LEGEND

- Access Track
- Proposed MTB Trail
- Existing Walking Trail
- Roads



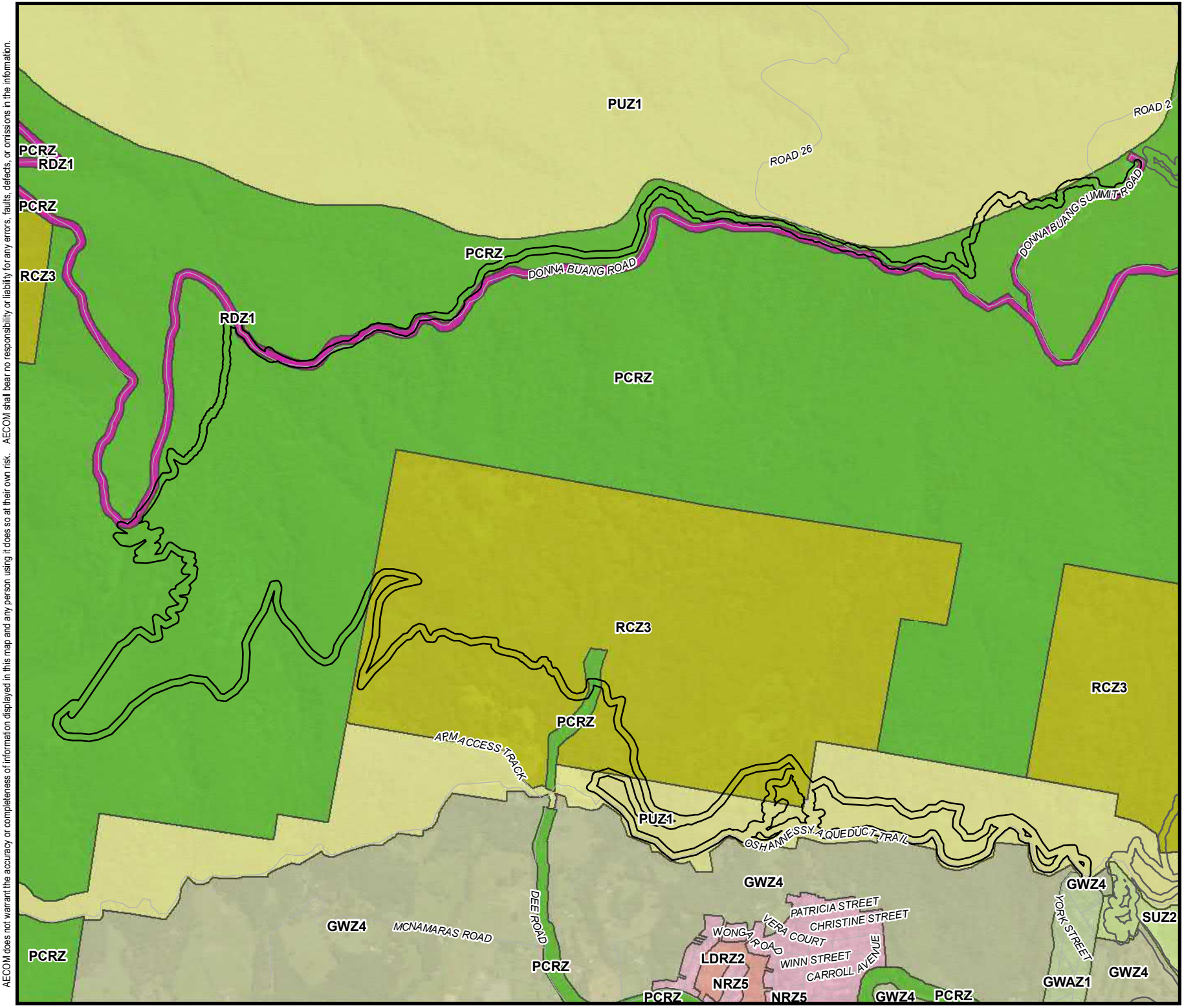
20m Corridor Areas
Central Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A2e



PROJECT ID 60636618
CREATED BY brierej
LAST MODIFIED brierej 14 SEP 2021

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N

Coordinate System: GDA 1994 MGA Zone 55

0 255 510 1,020

metres

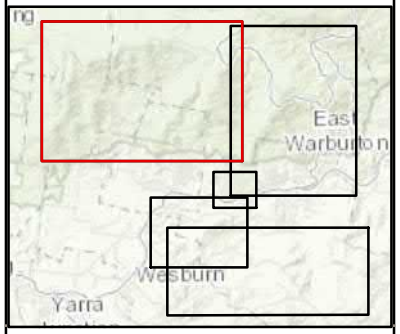
1:28,230 (when printed at A4)

LEGEND

- Study Area
- Roads

Planning Zones

- GWAZ - Green Wedge
- GWZ - Green Wedge
- LRDZ - Low Density Residential
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PUZ1 - Public Use - Service and Utility
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- SUZ - Rural



Planning Zones
Northern Segment A

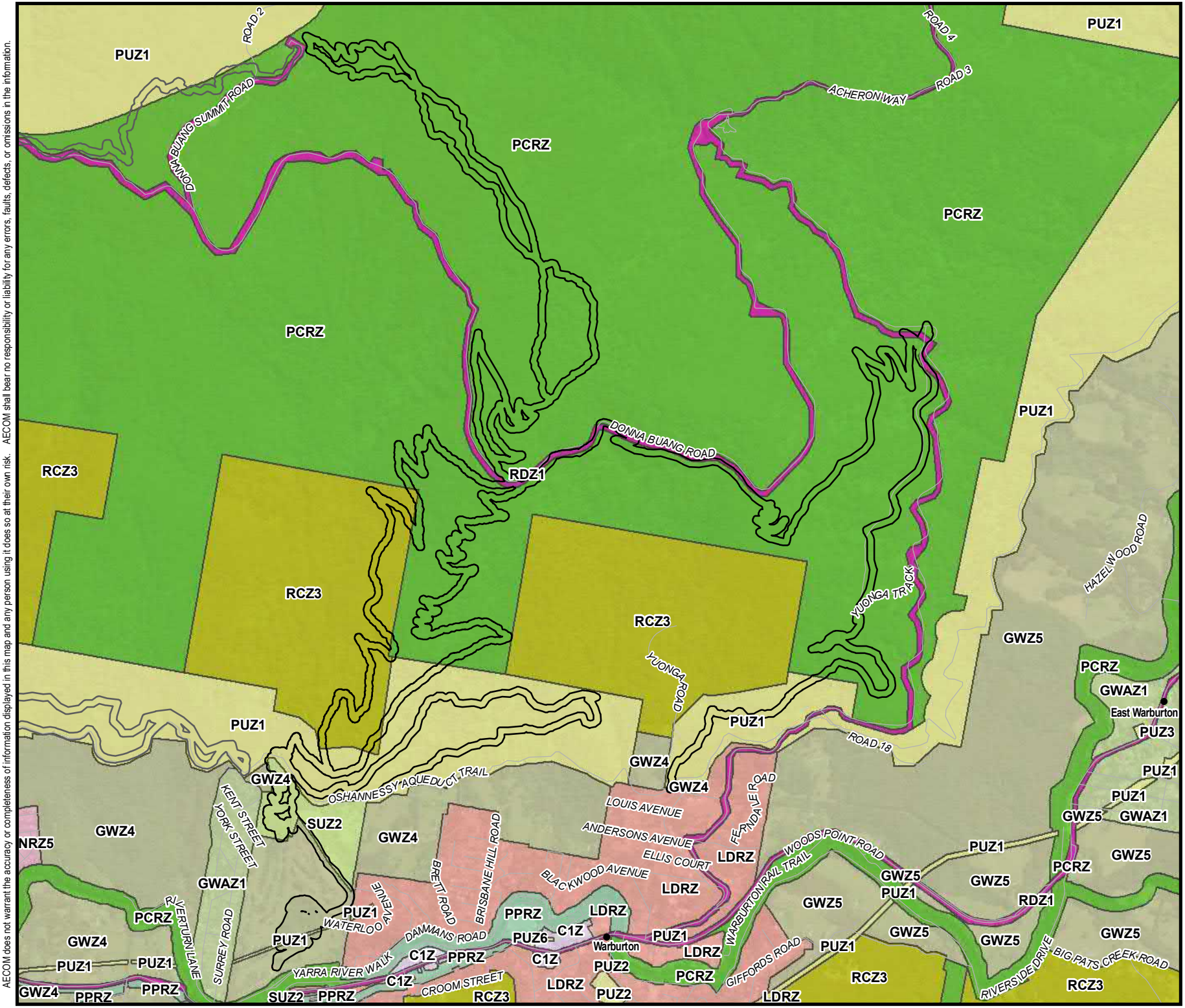
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A3a

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App3_Planning_Zones.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 255 510 1,020

metres

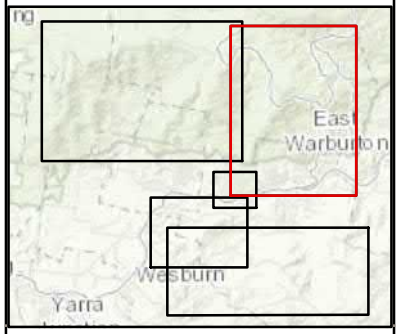
1:27,840 (when printed at A4)

LEGEND

- Study Area
- Localities
- Roads

Planning Zones

- C1Z - Commercial 1
- GWAZ - Green Wedge
- GWZ - Green Wedge
- LRDZ - Low Density Residential
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service and Utility
- PUZ2 - Public Use - Education
- PUZ3 - Public Use - Health Community
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public USe
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- SUZ - Rural



Planning Zones
Northern Segment B

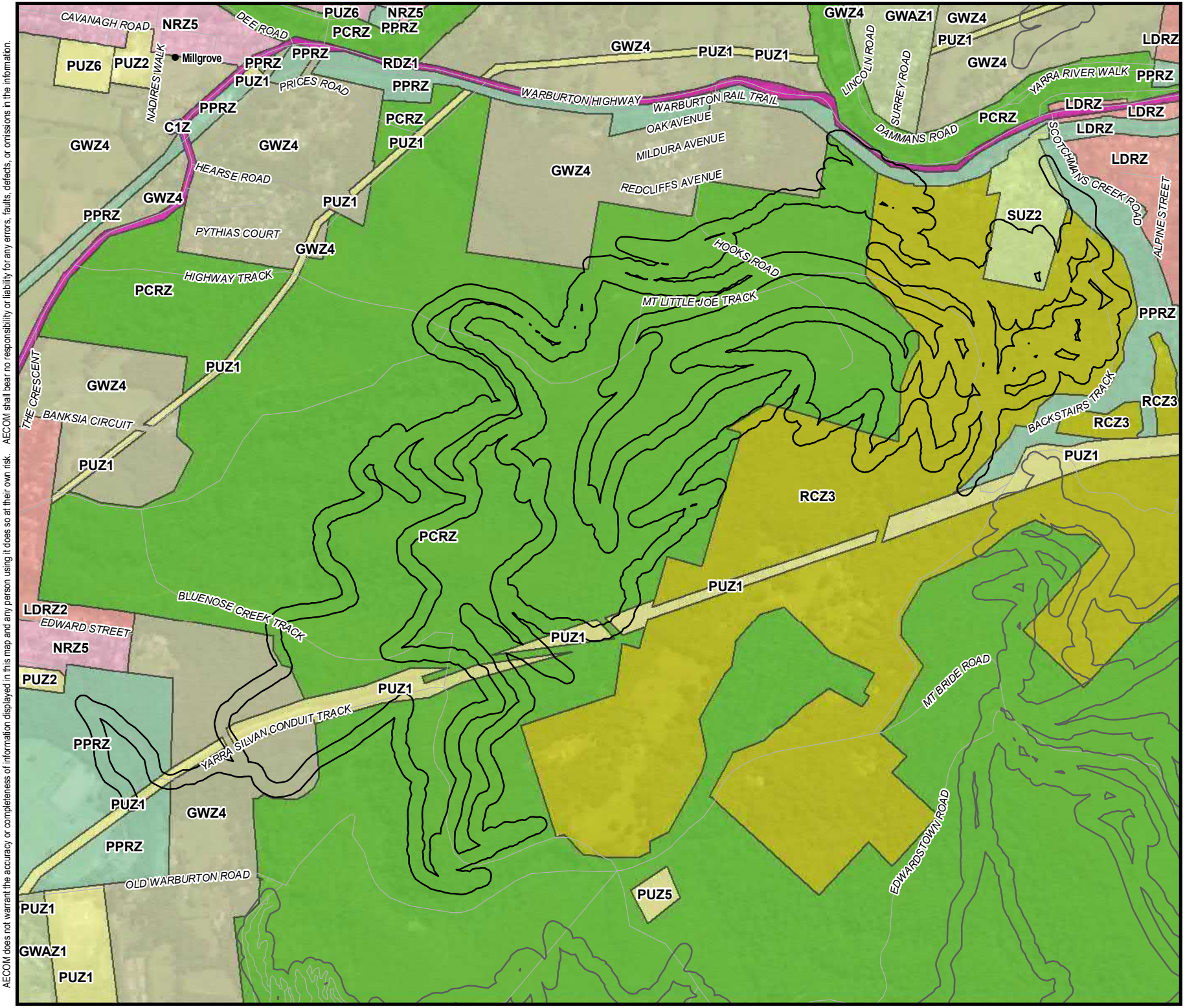
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A3b

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App3_Planning_Zones.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

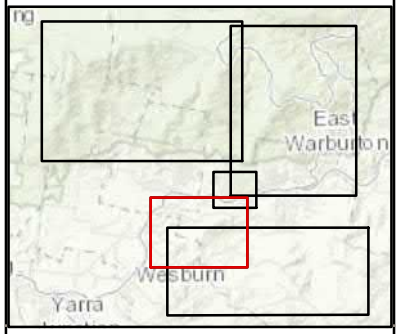
1:13,650 (when printed at A4)

LEGEND

- Study Area
- Localities
- Roads

Planning Zones

- C1Z - Commercial 1
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- LRDZ - Low Density Residential
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service and Utility
- PUZ2 - Public Use - Education
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- SUZ - Rural



Planning Zones
South Western Segment

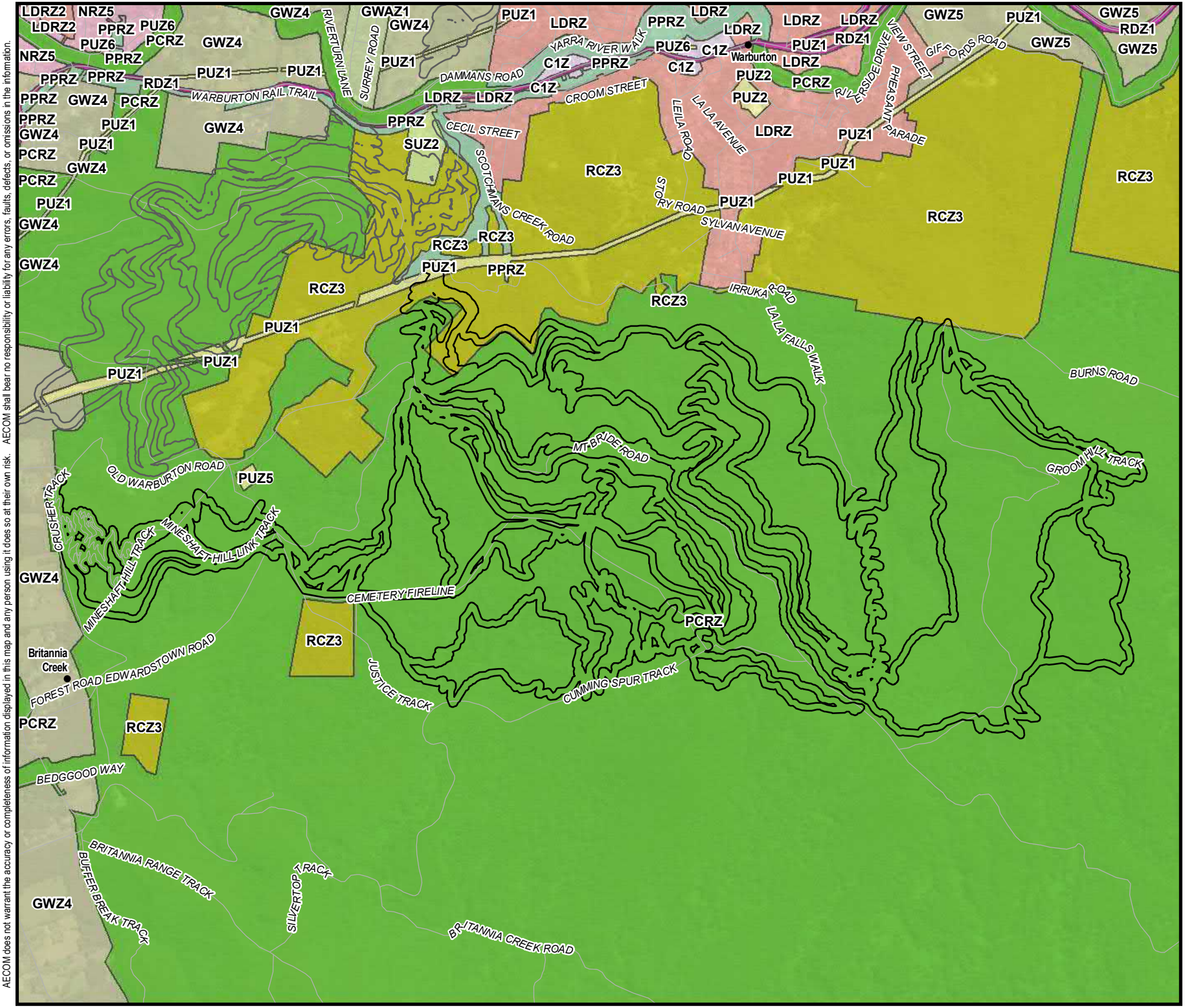
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A3c

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App3_Planning_Zones.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 260 520 1,040

metres

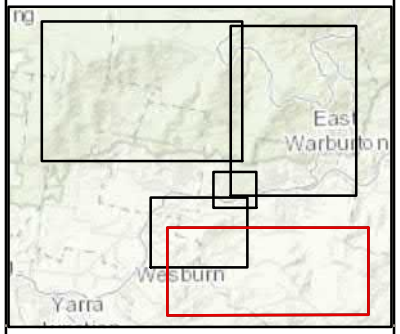
1:28,300 (when printed at A4)

LEGEND

- Study Area
- Localities
- Roads

Planning Zones

- C1Z - Commercial 1
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- LRDZ - Low Density Residential
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service and Utility
- PUZ2 - Public Use - Education
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public USe
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- SUZ - Rural



Planning Zones
South Eastern Segment

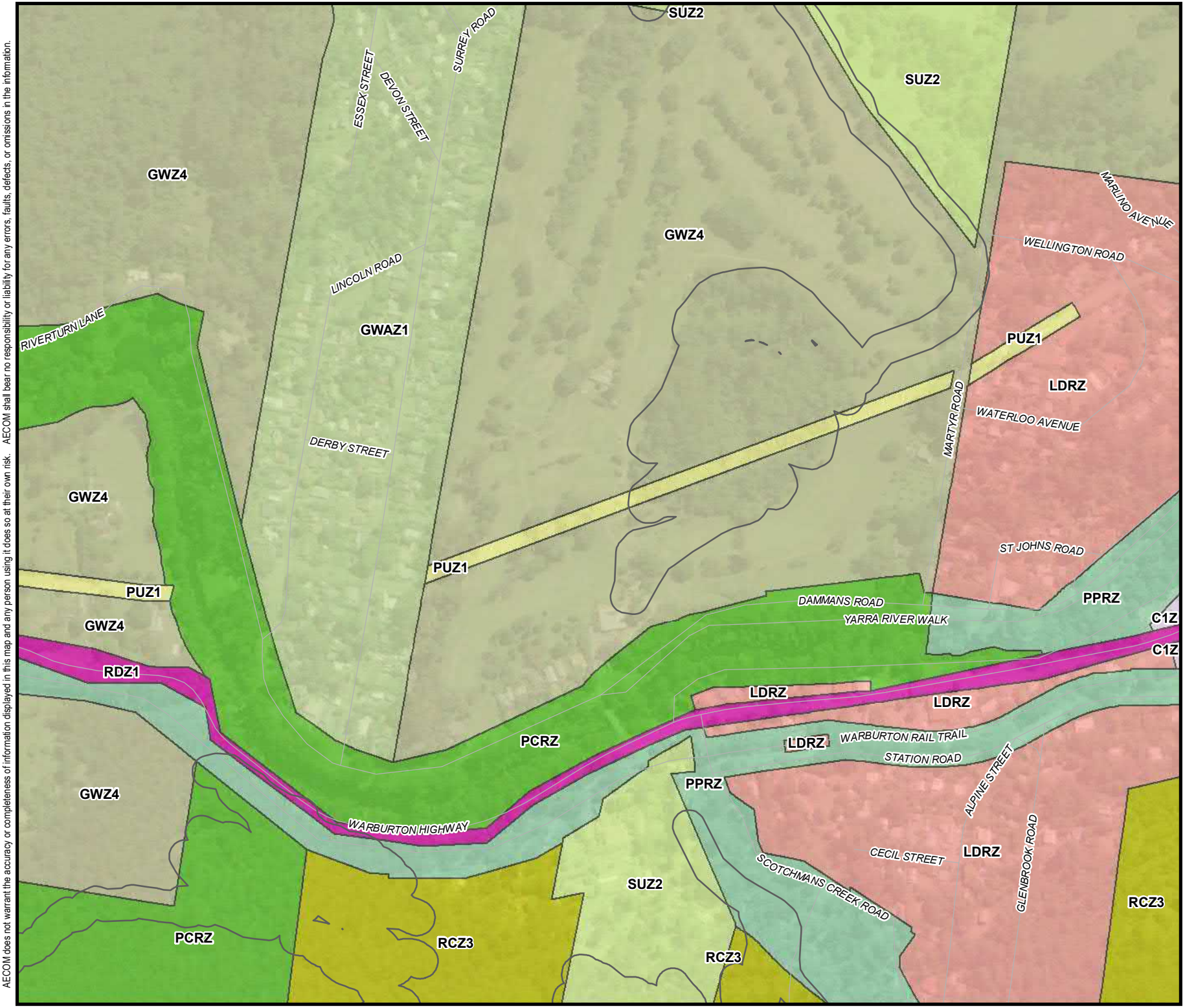
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A3d

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App3_Planning_Zones.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 55 110 220

metres

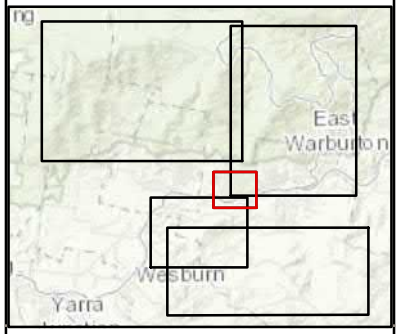
1:6,040 (when printed at A4)

LEGEND

- Roads

Planning Zones

- C1Z - Commercial 1
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- LRDZ - Low Density Residential
- PCRZ - Public Conservation & Resource
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service and Utility
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- SUZ - Rural



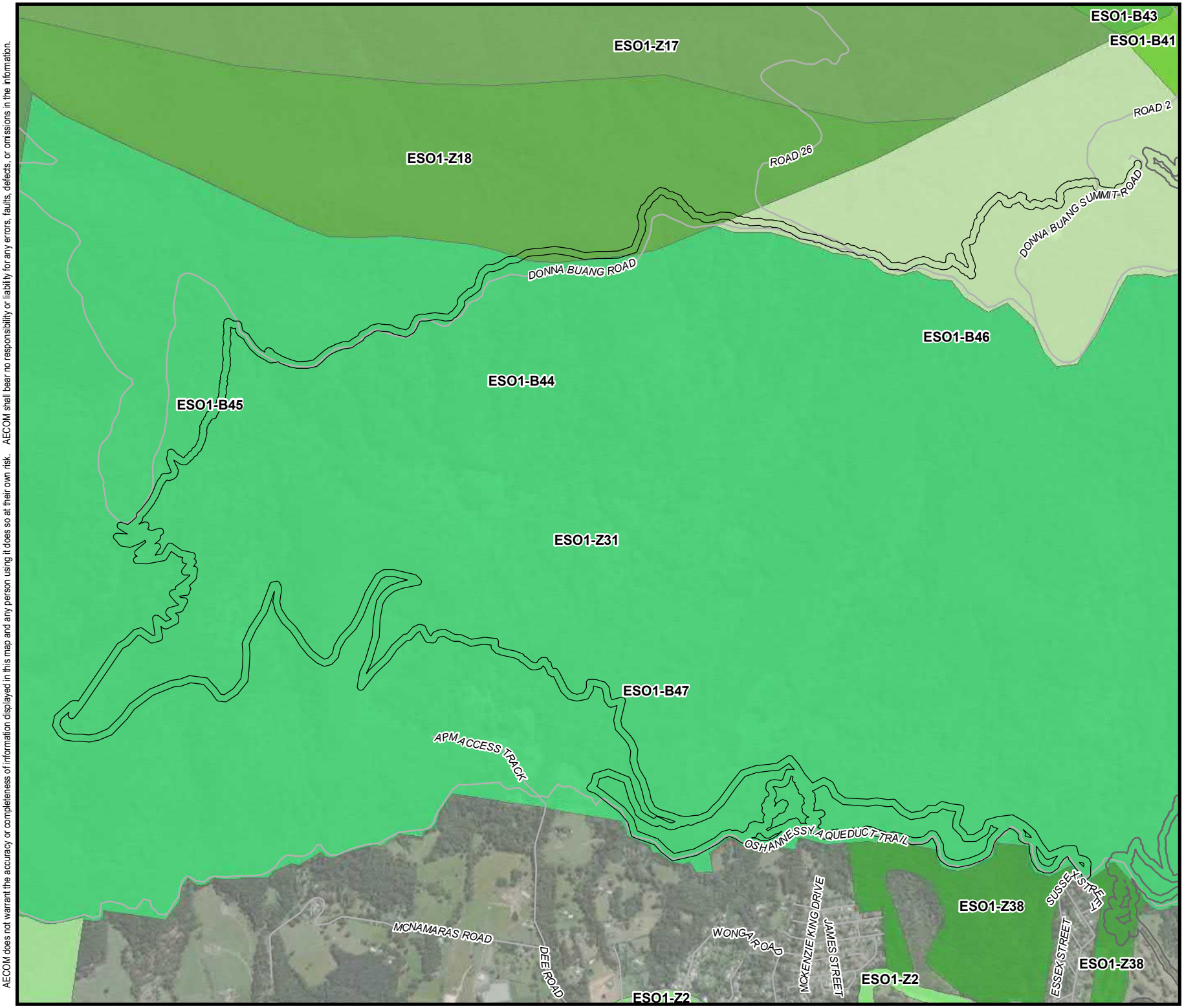
Planning Zones
Central Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A3e



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Coordinate System: GDA 1994 MGA Zone 55

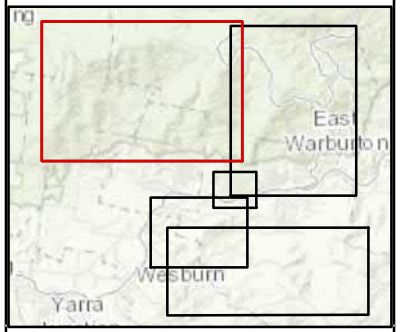
0 255 510 1,020

metres

1:28,230 (when printed at A4)

LEGEND

- Study Area
- Roads
- Environmental Significance Overlay - Schedule 1 (SITE B41)
- Environmental Significance Overlay - Schedule 1 (SITE B43)
- Environmental Significance Overlay - Schedule 1 (SITE B44)
- Environmental Significance Overlay - Schedule 1 (SITE B45)
- Environmental Significance Overlay - Schedule 1 (SITE B46)
- Environmental Significance Overlay - Schedule 1 (SITE B47)
- Environmental Significance Overlay - Schedule 1 (SITE Z17)
- Environmental Significance Overlay - Schedule 1 (SITE Z18)
- Environmental Significance Overlay - Schedule 1 (SITE Z2)
- Environmental Significance Overlay - Schedule 1 (SITE Z31)
- Environmental Significance Overlay - Schedule 1 (SITE Z38)



ESO Overlay
Northern Segment A

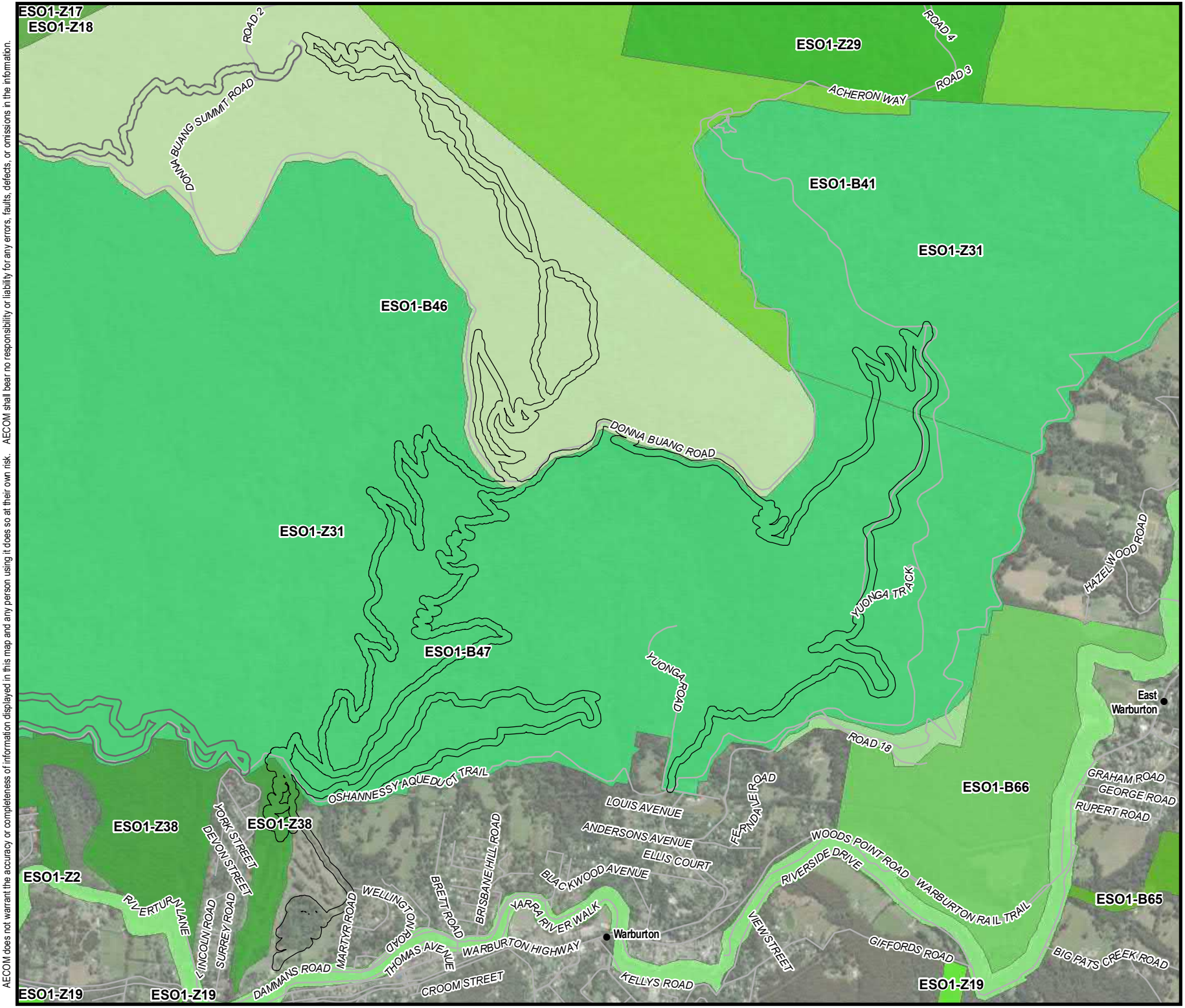
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A4a

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App4_ESO_Overlay.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 255 510 1,020

metres

1:27,840 (when printed at A4)

LEGEND

- Study Area
- Localities
- Roads
- Environmental Significance Overlay - Schedule 1 (SITE B41)
- Environmental Significance Overlay - Schedule 1 (SITE B46)
- Environmental Significance Overlay - Schedule 1 (SITE B47)
- Environmental Significance Overlay - Schedule 1 (SITE B65)
- Environmental Significance Overlay - Schedule 1 (SITE B66)
- Environmental Significance Overlay - Schedule 1 (SITE Z17)
- Environmental Significance Overlay - Schedule 1 (SITE Z18)
- Environmental Significance Overlay - Schedule 1 (SITE Z19)
- Environmental Significance Overlay - Schedule 1 (SITE Z2)
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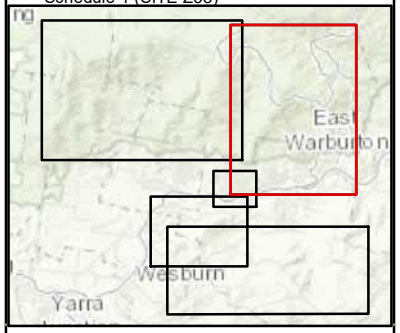


ESO Overlay
Northern Segment B

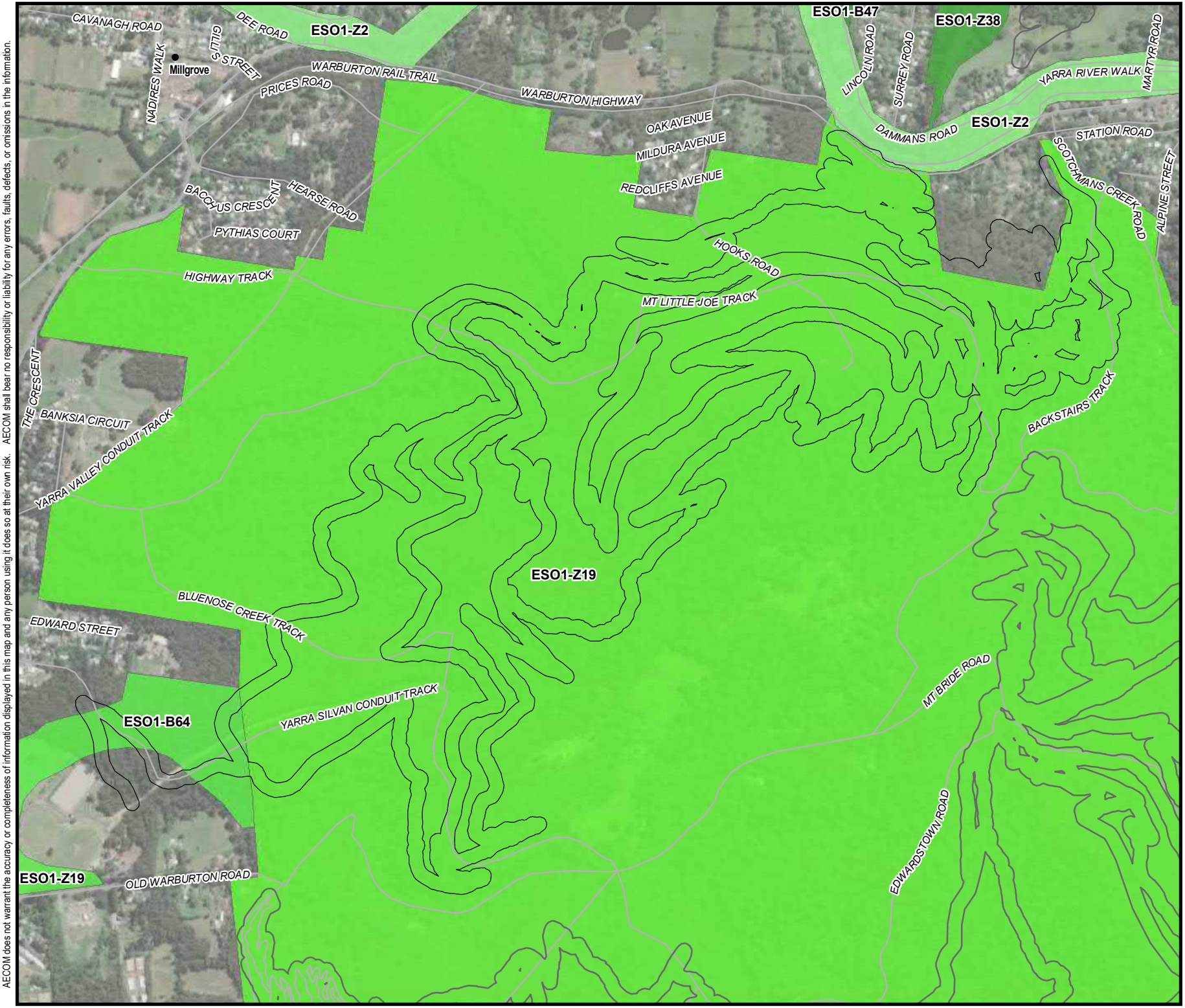
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A4b

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App4_ESO_Overlay.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

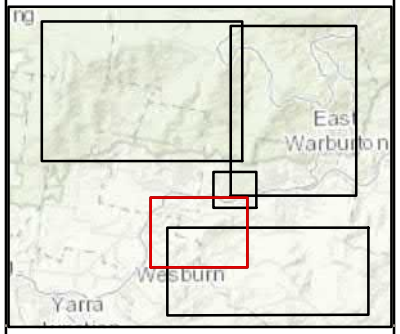
0 125 250 500

metres

1:13,650 (when printed at A4)

LEGEND

- Study Area
- Localities
- Roads
- Environmental Significance Overlay - Schedule 1 (SITE B47)
- Environmental Significance Overlay - Schedule 1 (SITE B64)
- Environmental Significance Overlay - Schedule 1 (SITE Z19)
- Environmental Significance Overlay - Schedule 1 (SITE Z2)
- Environmental Significance Overlay - Schedule 1 (SITE Z38)



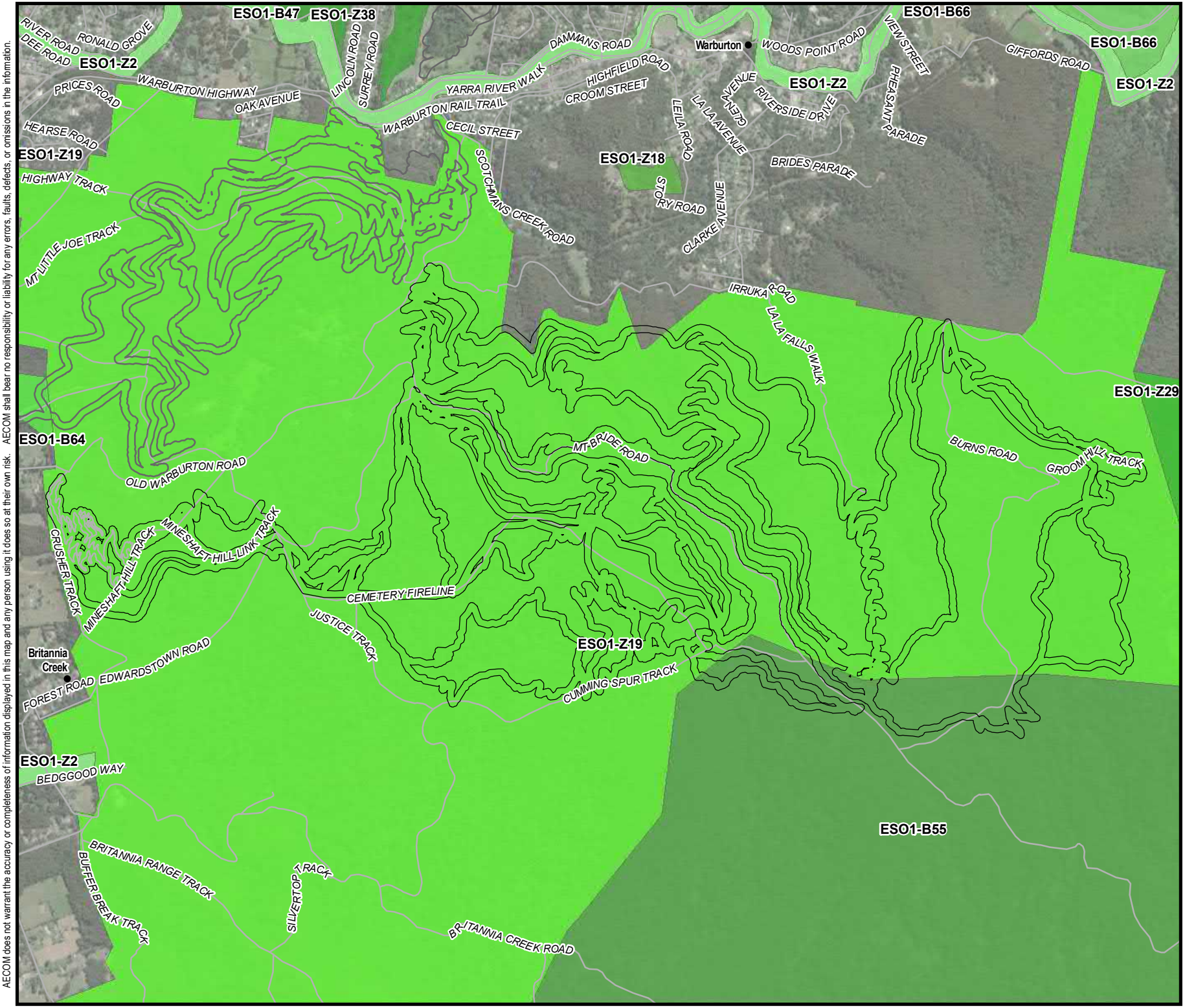
ESO Overlay
South Western Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A4c



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CREATED BY	brierej
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Coordinate System: GDA 1994 MGA Zone 55

0 260 520 1,040

metres

1:28,300 (when printed at A4)

LEGEND

- Study
- Localities
- Roads
- Environmental Significance Overlay - Schedule 1 (SITE B47)
- Environmental Significance Overlay - Schedule 1 (SITE B55)
- Environmental Significance Overlay - Schedule 1 (SITE B64)
- Environmental Significance Overlay - Schedule 1 (SITE B66)
- Environmental Significance Overlay - Schedule 1 (SITE Z18)
- Environmental Significance Overlay - Schedule 1 (SITE Z19)
- Environmental Significance Overlay - Schedule 1 (SITE Z2)
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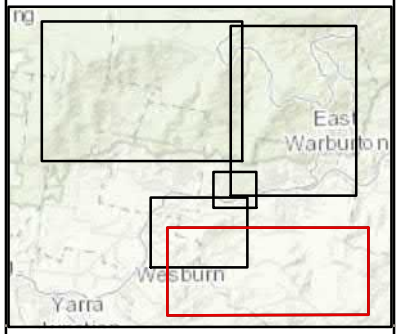

ESO Overlay
South Eastern Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A4d

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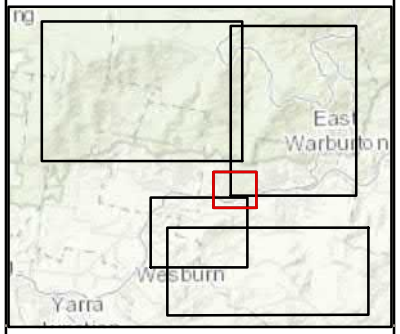
Coordinate System: GDA 1994 MGA Zone 55

0 55 110 220
metres

1:6,040 (when printed at A4)

LEGEND

- Roads
- Environmental Significance Overlay - Schedule 1 (SITE B47)
- Environmental Significance Overlay - Schedule 1 (SITE Z19)
- Environmental Significance Overlay - Schedule 1 (SITE Z2)
- Environmental Significance Overlay - Schedule 1 (SITE Z38)



ESO Overlay
Central Segment

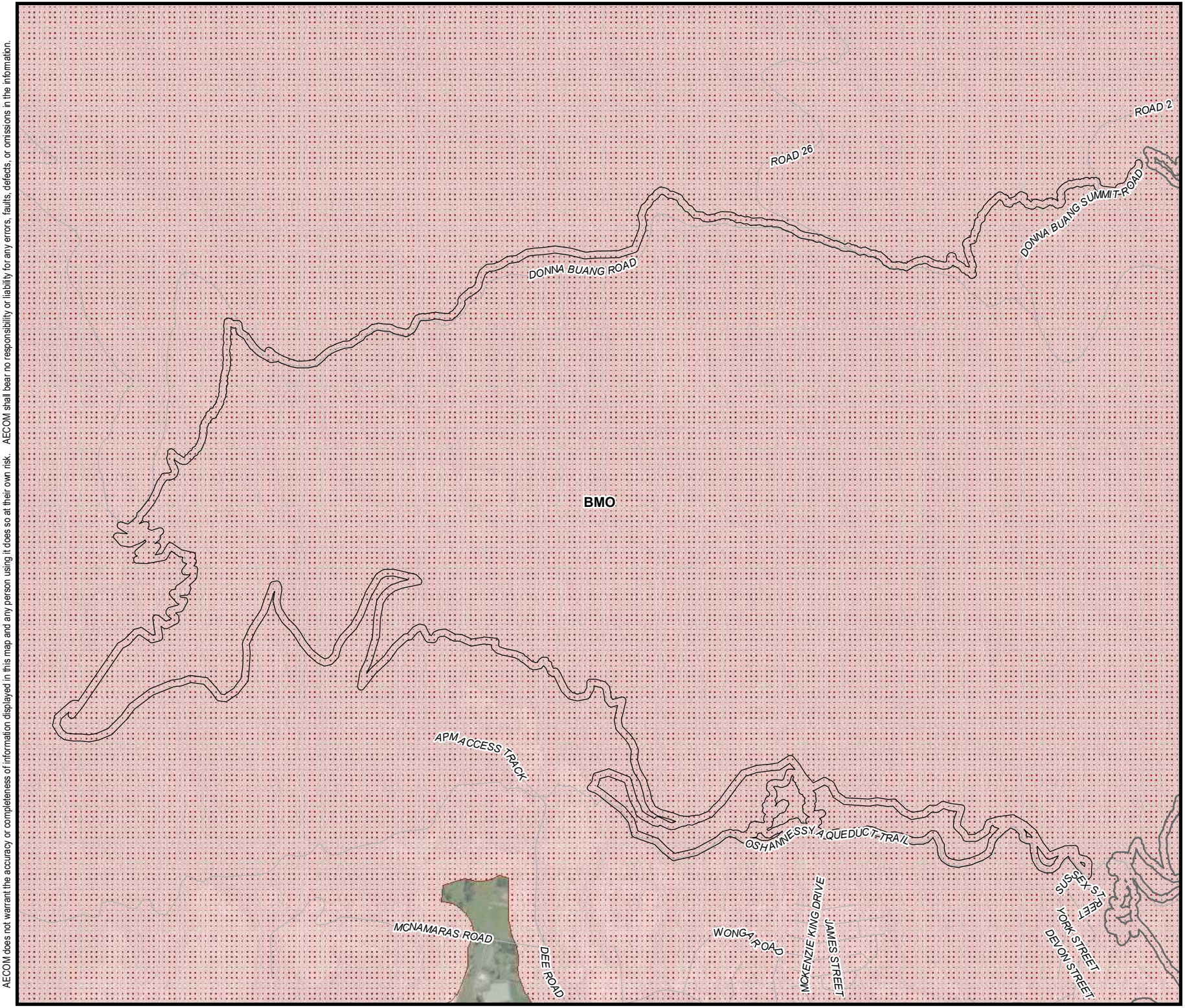
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A4e

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App4_ESO_Overlay.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 255 510 1,020

metres

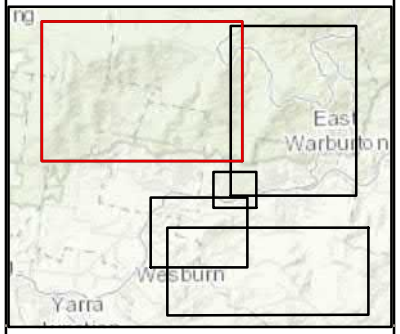
1:28,230 (when printed at A4)

LEGEND

- Study Area
- Roads

Planning Overlay

- BMO - Bushfire Management



BMO Overlay
Northern Segment A

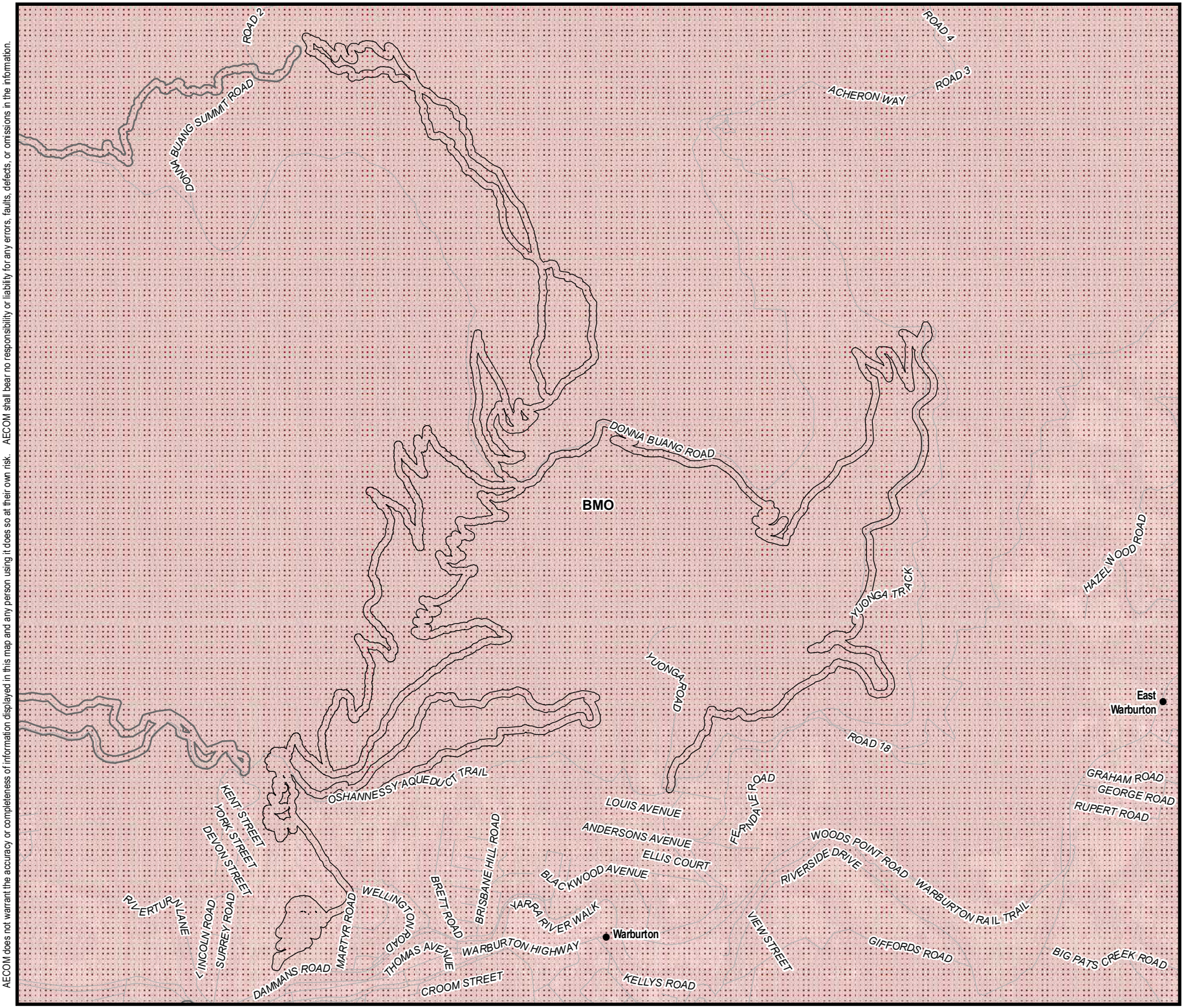
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A5a

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App5_BMO_Overlay.mxd)



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LAST MODIFIED brierej 14 SEP 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 255 510 1,020
metres

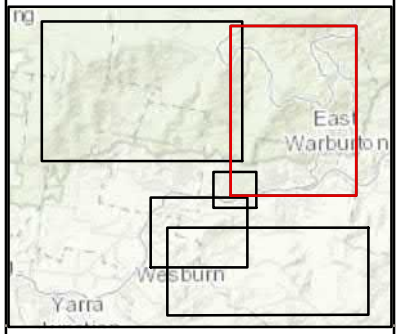
1:27,840 (when printed at A4)

LEGEND

- Study Area
- Localities
- Roads

Planning Overlay

- BMO - Bushfire Management



BMO Overlay
Northern Segment B

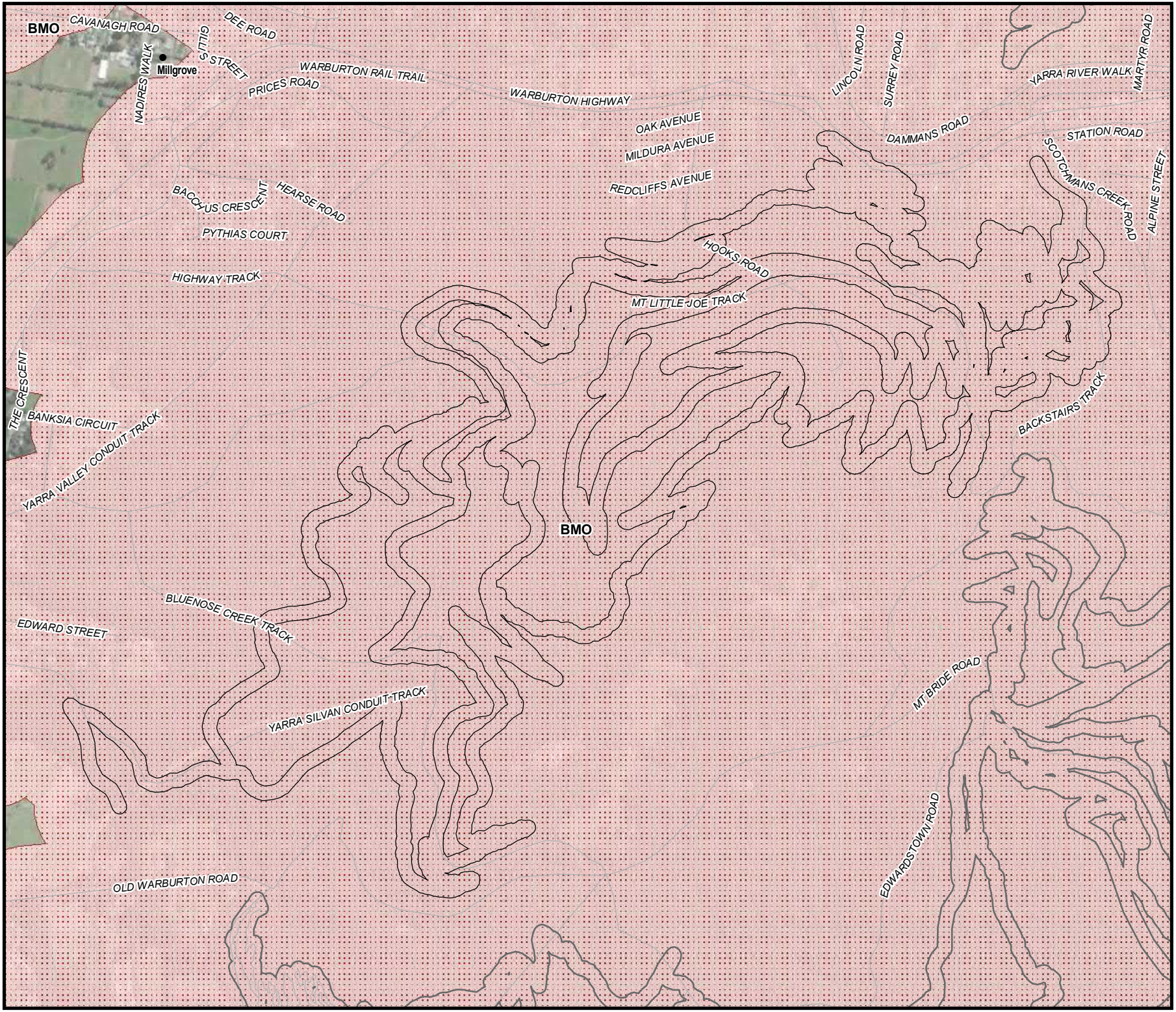
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A5b

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App5_BMO_Overlay.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

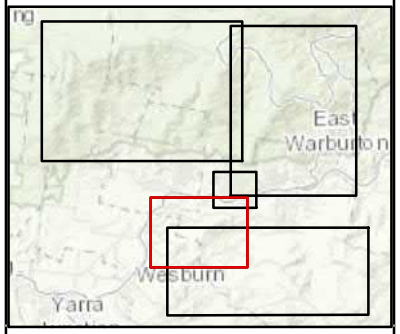
1:13,650 (when printed at A4)

LEGEND

- Study Area
- Localities
- Roads

Planning Overlay

- BMO - Bushfire Management



BMO Overlay
South Western Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A5c

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\08\App5_BMO_Overlay.mxd)

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Coordinate System: GDA 1994 MGA Zone 55

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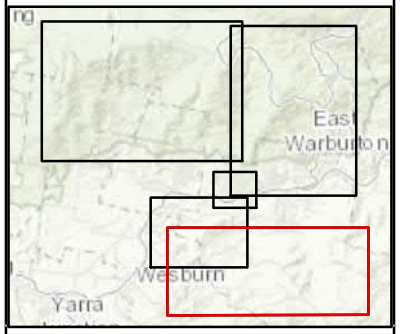
LEGEND

- Study Area
- Localities
- Roads

Planning Overlay

- BMO - Bushfire Management



BMO Overlay
South Eastern Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A5d

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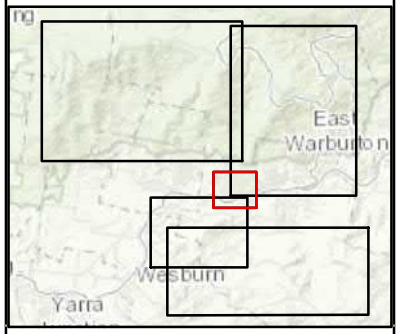
LEGEND

Roads

Planning Overlay

BMO - Bushfire Management



BMO Overlay
Central Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A5e

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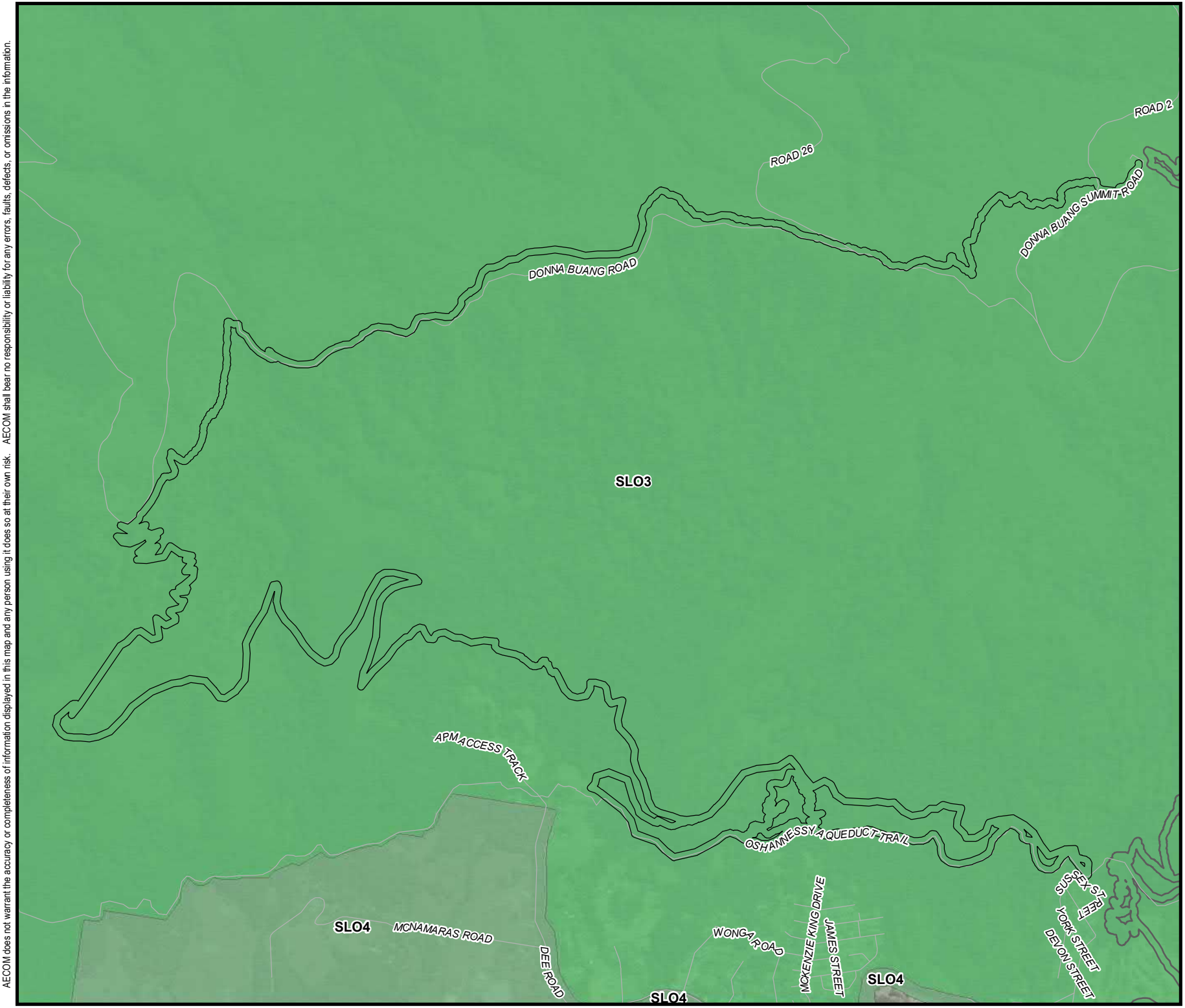

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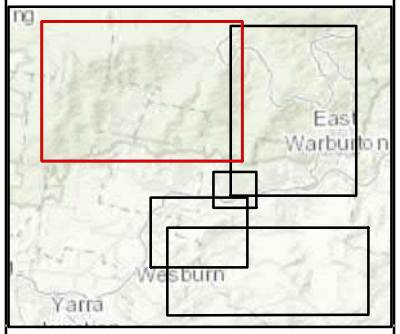
LEGEND

- Study Area
- Roads
- Significant Landscape Overlay-Schedule 3
- Significant Landscape Overlay-Schedule 4



SLO Overlay
Northern Segment A

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A6a

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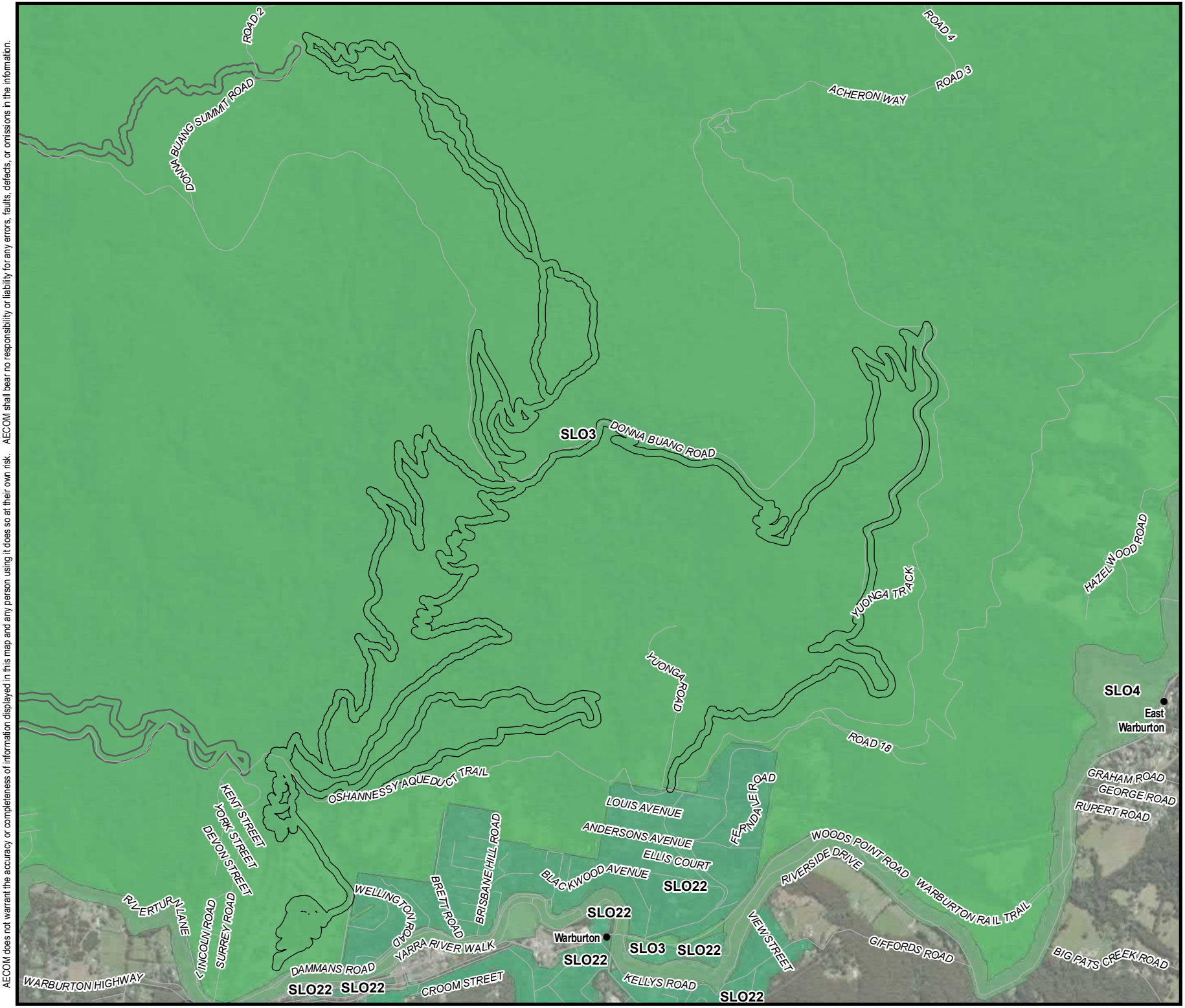

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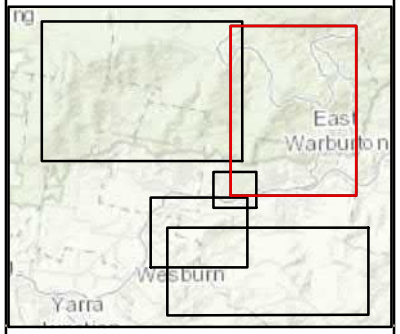
LEGEND

- Study Area
- Localities
- Roads
- Significant Landscape Overlay-Schedule 22
- Significant Landscape Overlay-Schedule 3
- Significant Landscape Overlay-Schedule 4



SLO Overlay
Northern Segment B

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A6b

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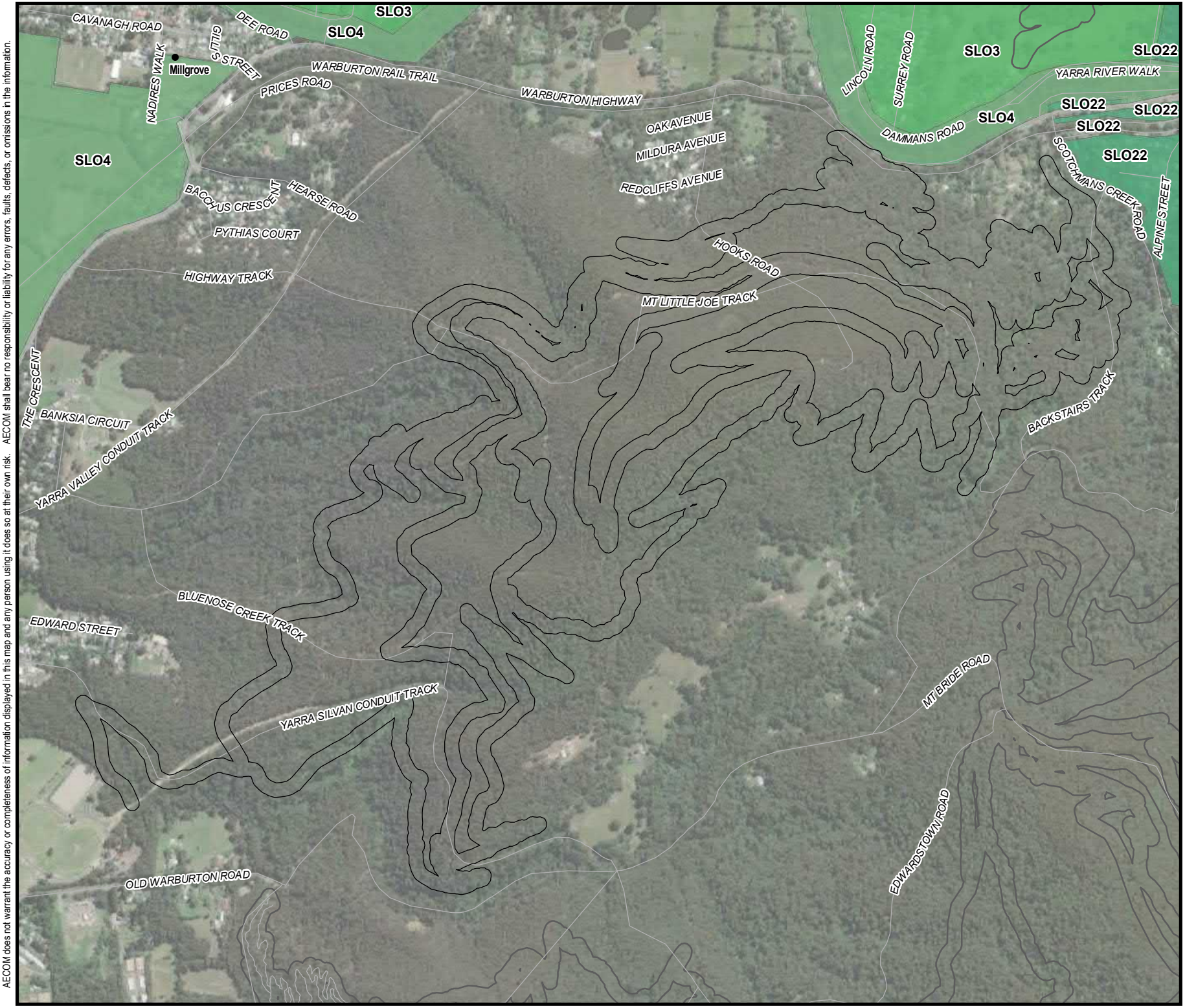

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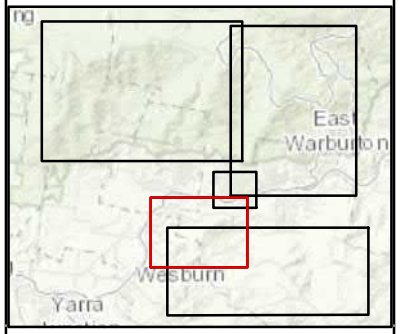
LEGEND

- Study Area
- Localities
- Roads
- Significant Landscape Overlay-Schedule 22
- Significant Landscape Overlay-Schedule 3
- Significant Landscape Overlay-Schedule 4



SLO Overlay
South Western Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A6c

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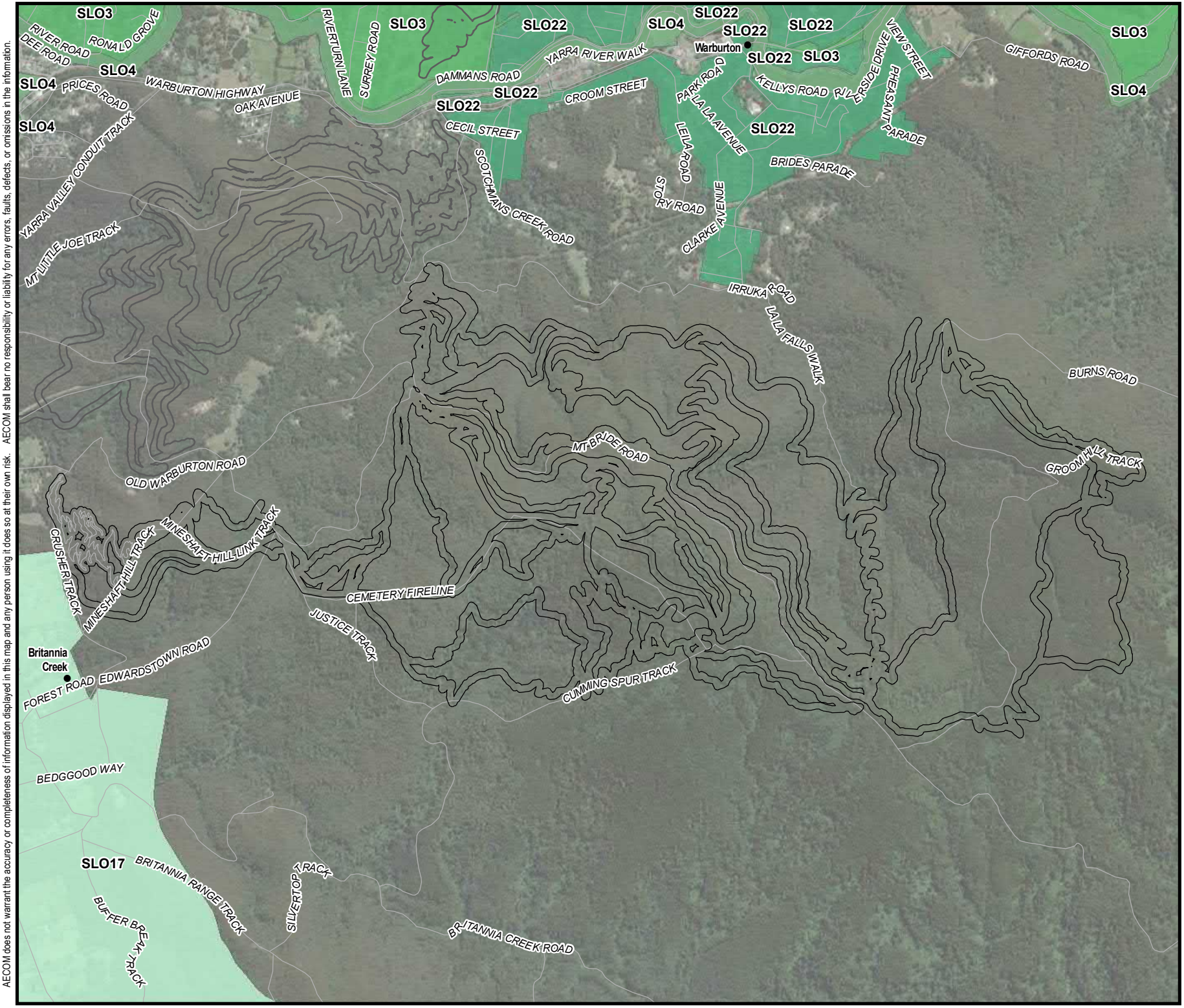

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Coordinate System: GDA 1994 MGA Zone 55

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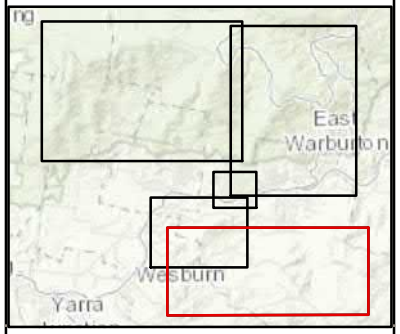
LEGEND

- Study Area
- Localities
- Roads
- Significant Landscape Overlay-Schedule 17
- Significant Landscape Overlay-Schedule 22
- Significant Landscape Overlay-Schedule 3
- Significant Landscape Overlay-Schedule 4



SLO Overlay
South Eastern Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
A6d

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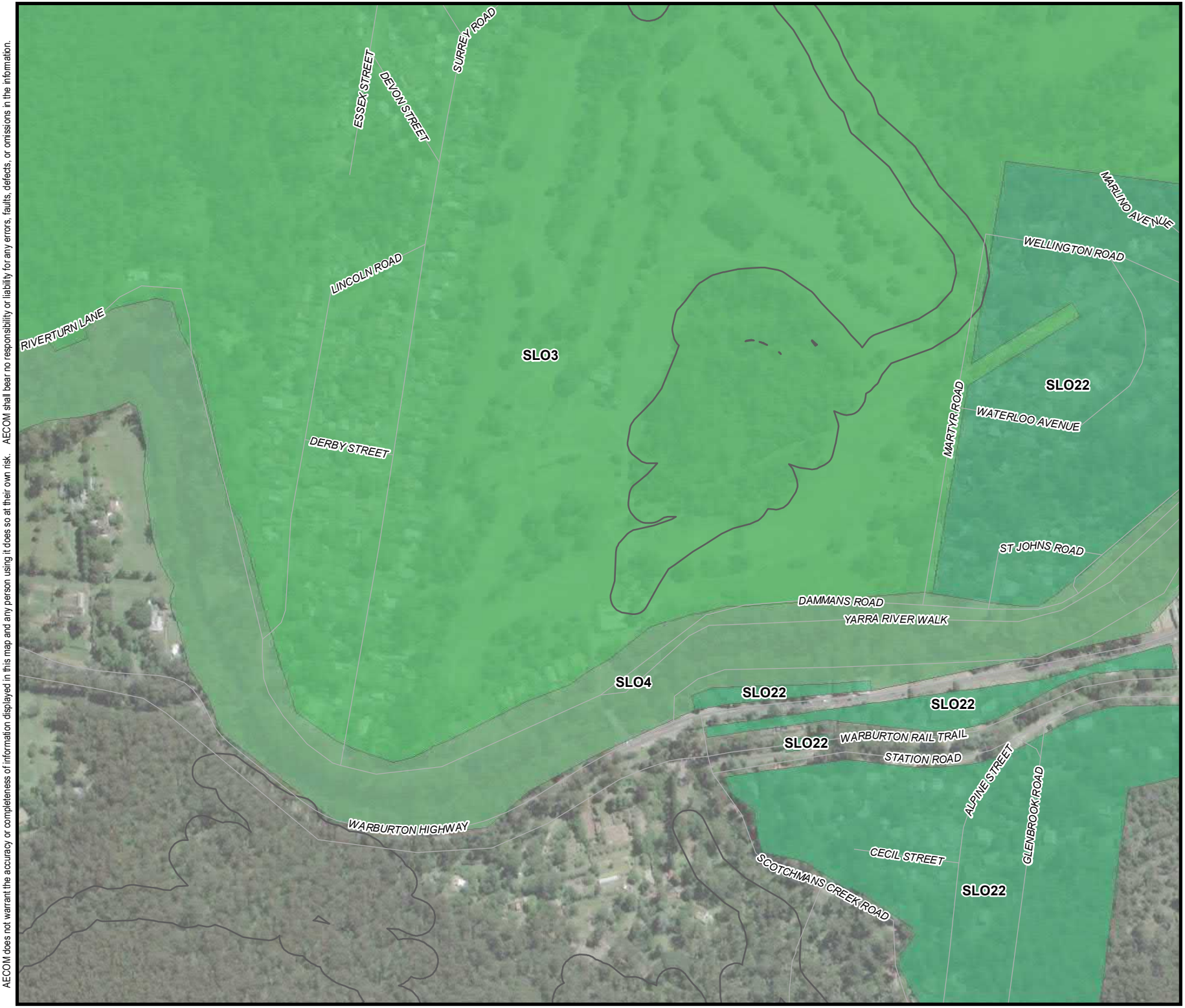

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LEGEND

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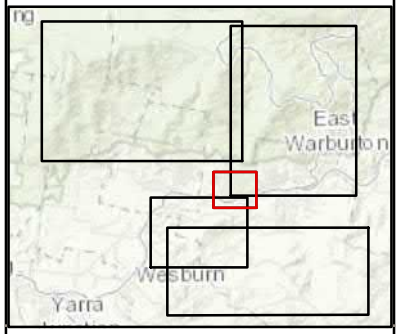
- Significant Landscape Overlay-Schedule 3
- Significant Landscape Overlay-Schedule 4



SLO Overlay Central Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure A6e

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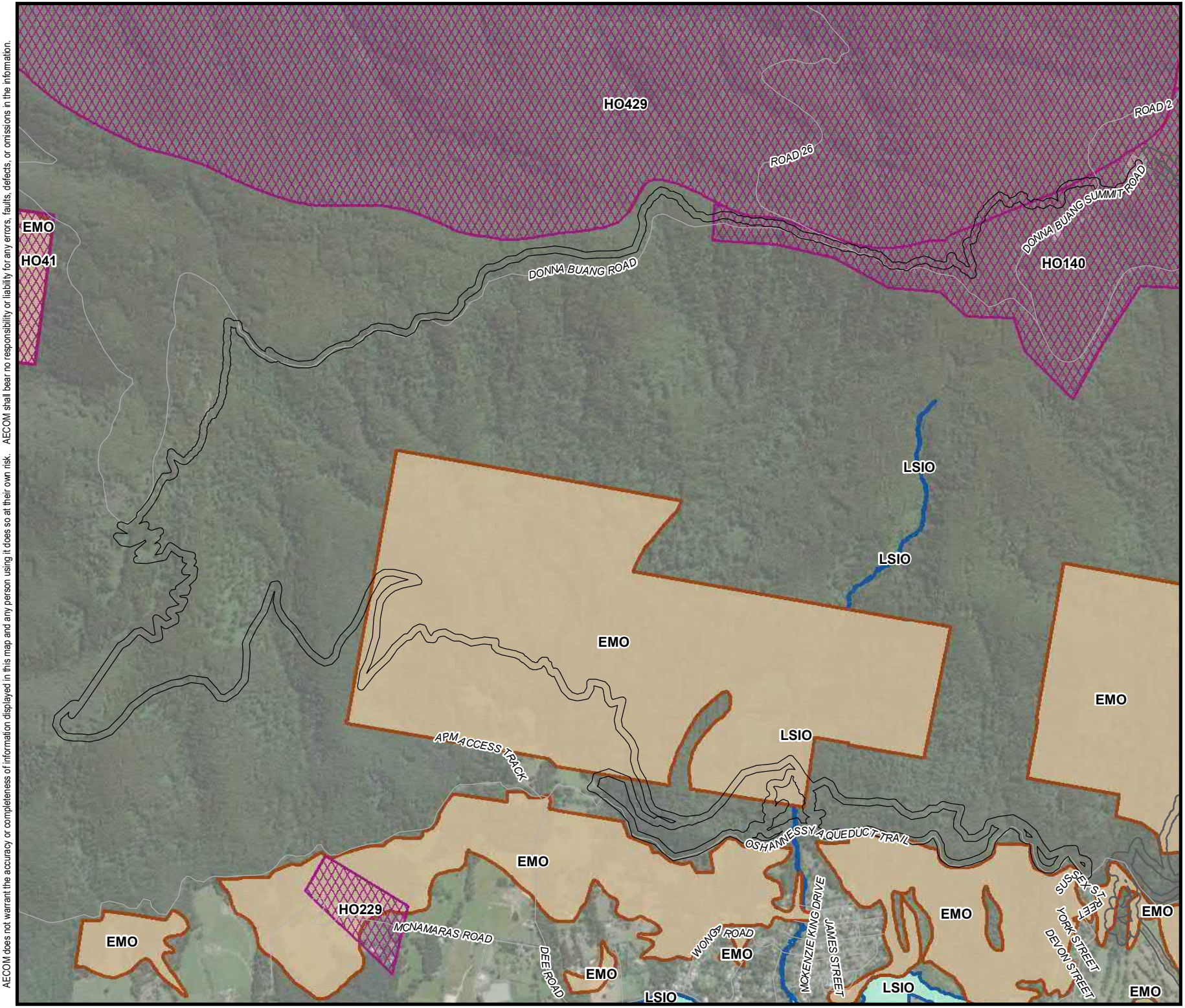

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Coordinate System: GDA 1994 MGA Zone 55

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metres

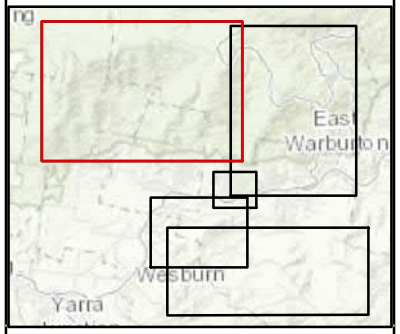
1:28,230 (when printed at A4)

LEGEND

- Study
- Roads

Planning Overlay

- EMO - Erosion Management
- HO - Heritage Overlay
- LSIO - Land Subject to



Planning Overlays
Northern Segment A

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
F7a

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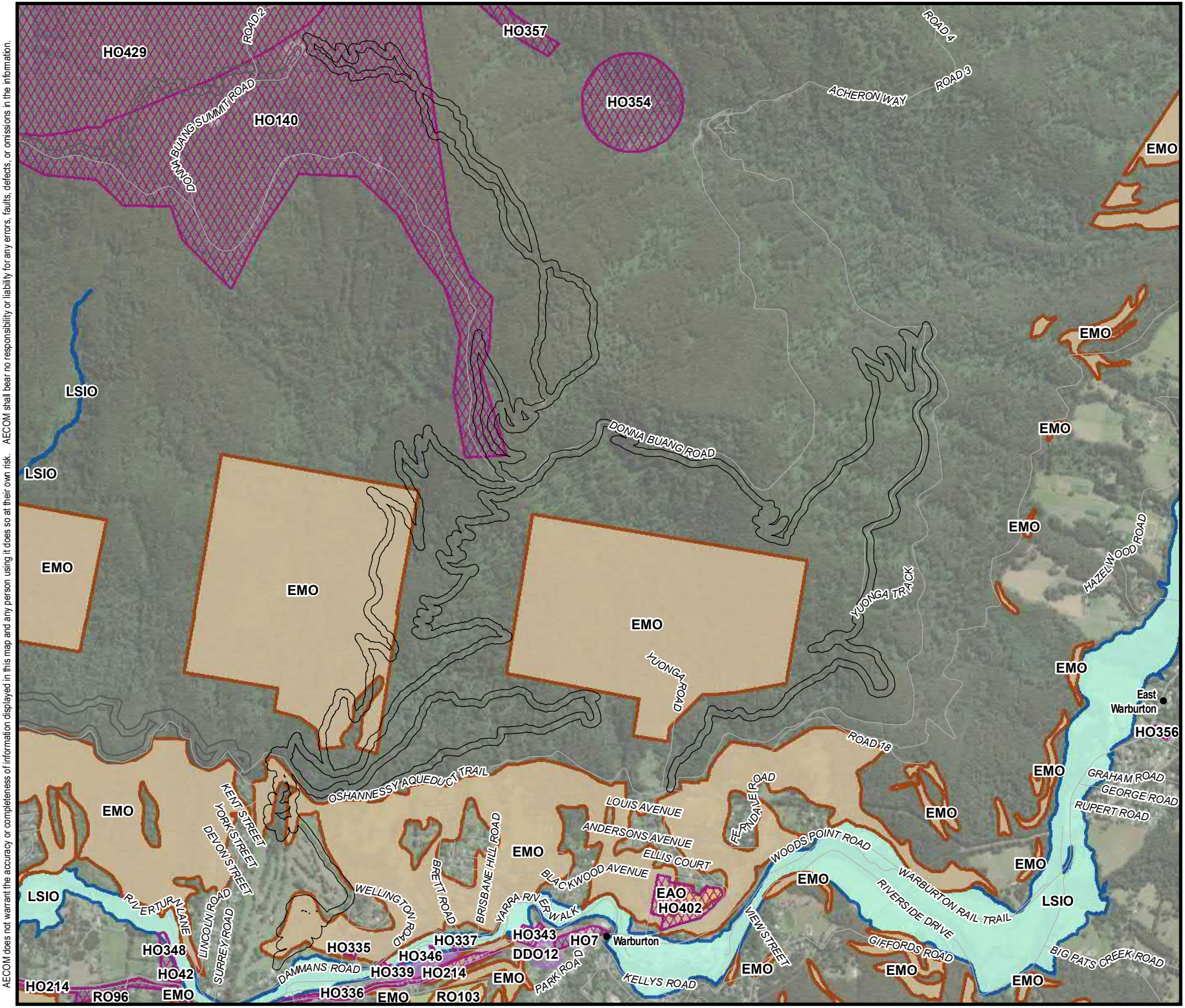

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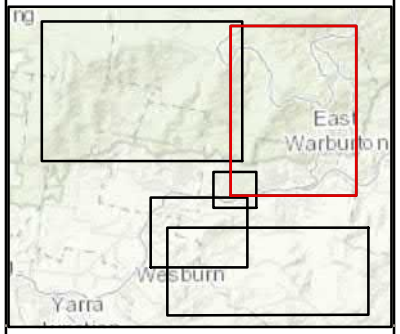
LEGEND

- Study
- Localities
- Roads

Planning Overlay

- DDO - Design & Development
- EAO - Environmental
- EMO - Erosion Management
- HO - Heritage Overlay
- LSIO - Land Subject to
- Restructure Overlay - Schedule
- Restructure Overlay - Schedule



Planning Overlays
Northern Segment B

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
F7b

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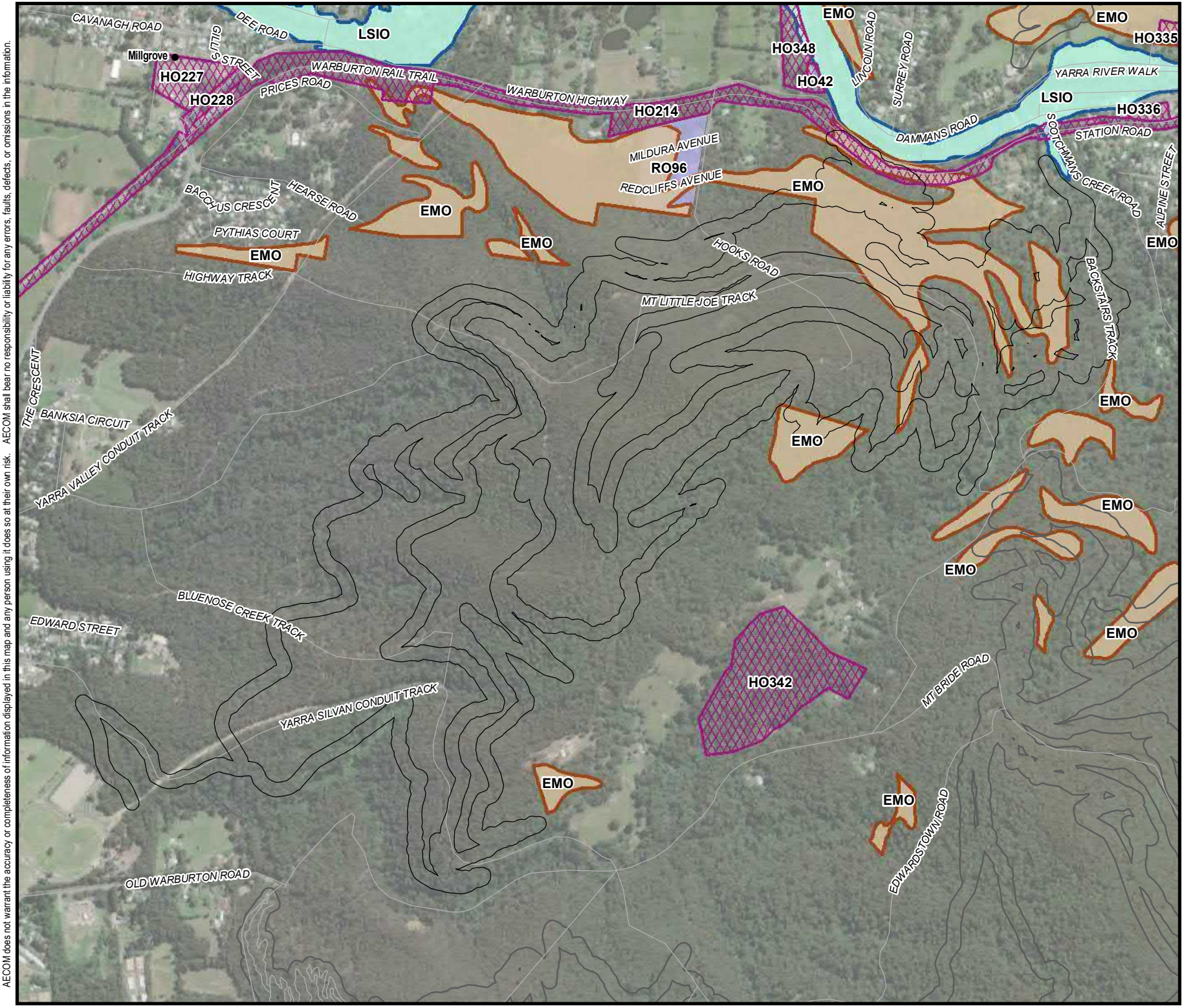

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Coordinate System: GDA 1994 MGA Zone 55

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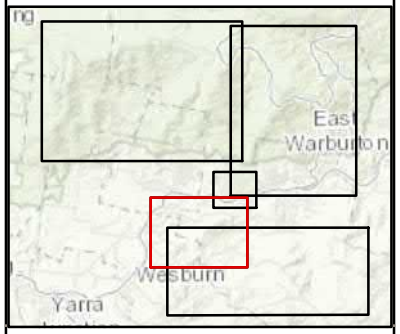
LEGEND

- Study Area
- Localities
- Roads

Planning Overlay

- EMO - Erosion Management
- HO - Heritage Overlay
- LSIO - Land Subject to Inundation
- Restructure Overlay - Schedule 96



Planning Overlays
South Western Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
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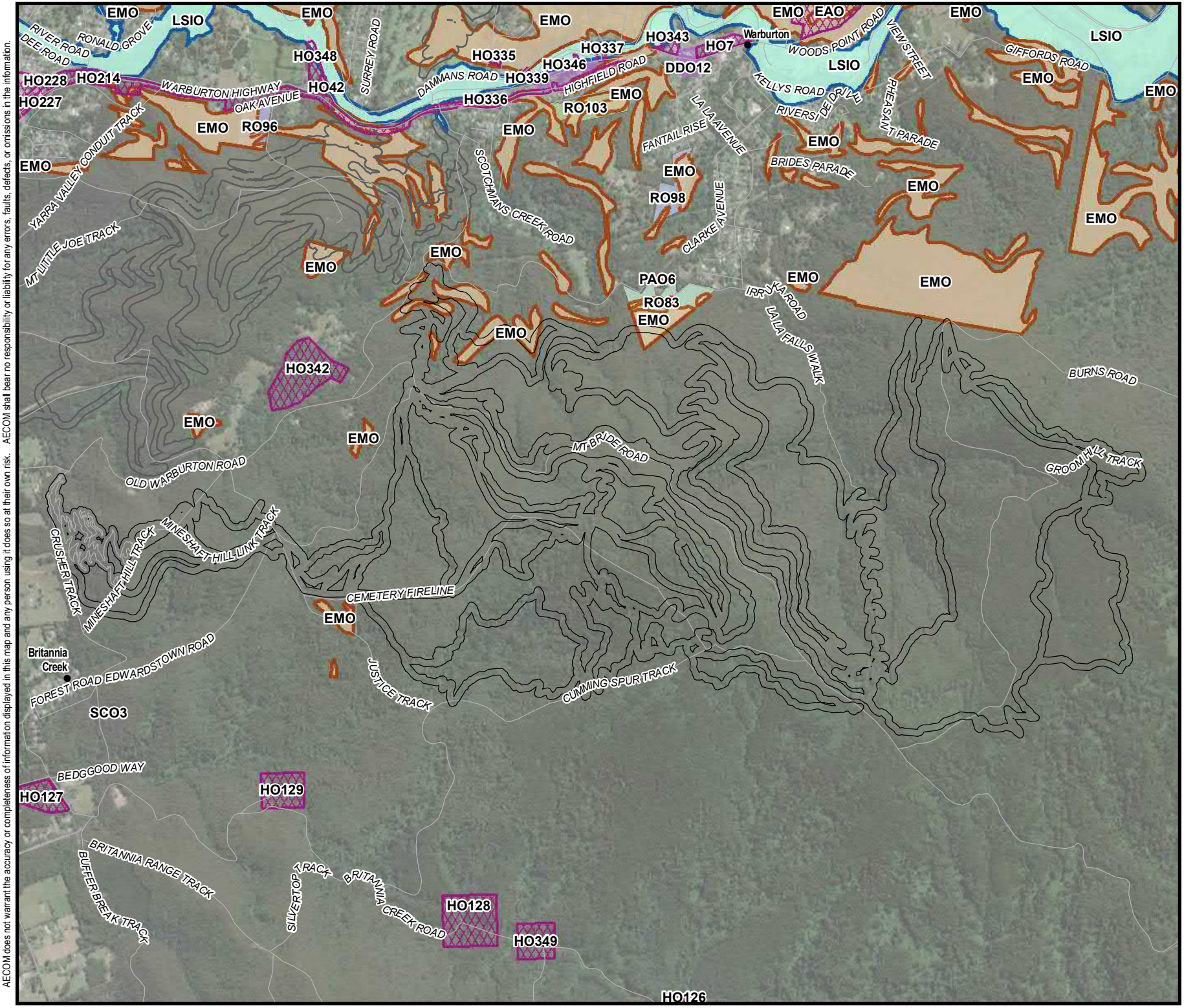

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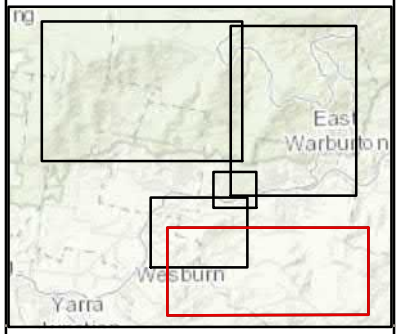
LEGEND

- Study Area
- Localities
- Roads

Planning Overlay

- DDO - Design & Development
- EAO - Environmental Audit
- EMO - Erosion Management
- HO - Heritage Overlay
- LSIO - Land Subject to Inundation
- PAO - Public Acquisition
- Restructure Overlay - Schedule 103
- Restructure Overlay - Schedule 83
- Restructure Overlay - Schedule 96
- Restructure Overlay - Schedule 98



Planning Overlays
South Eastern Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
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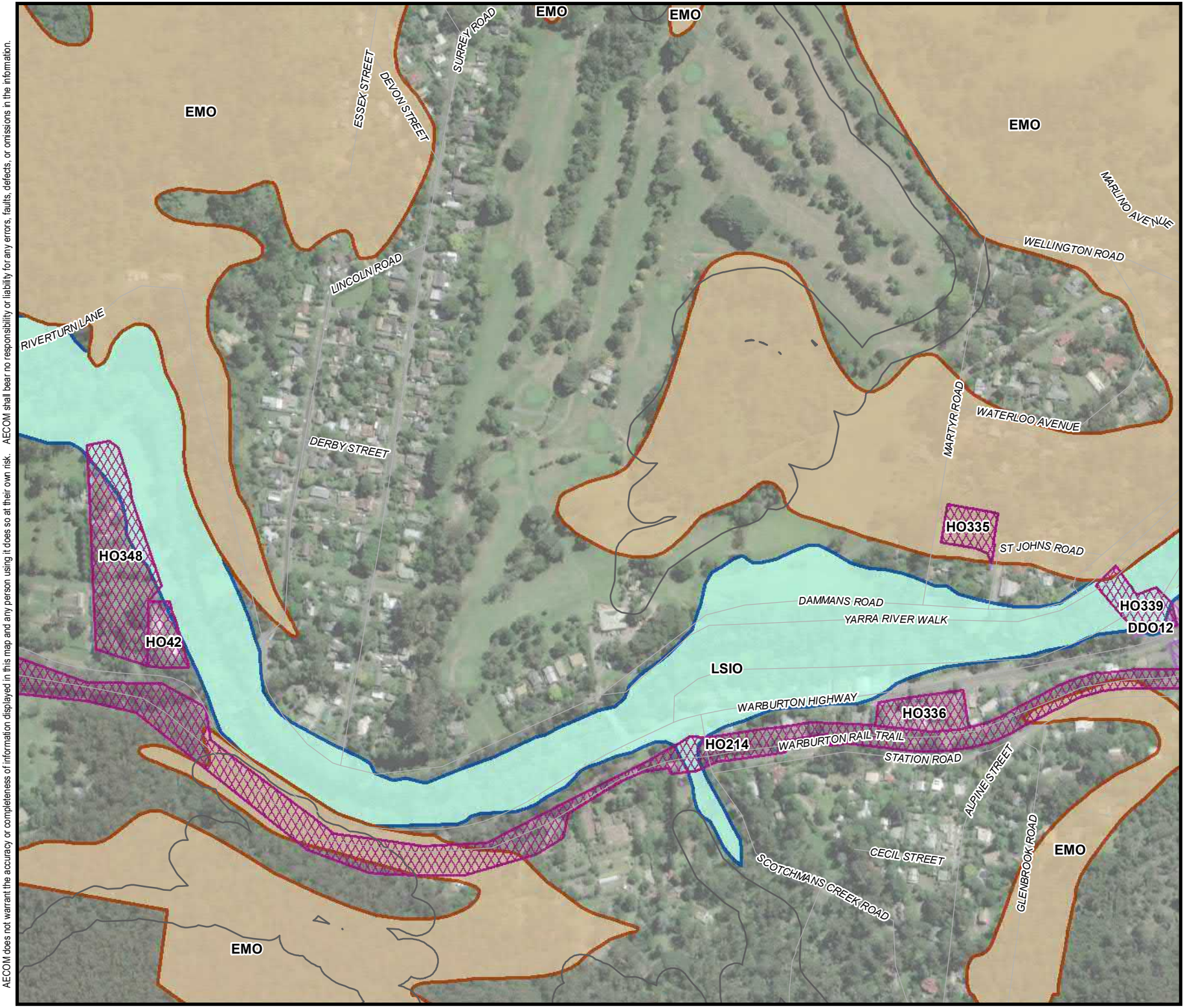

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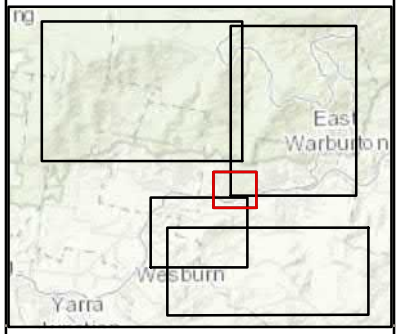
LEGEND

- Roads

Planning Overlay

- DDO - Design & Development
- EMO - Erosion Management
- HO - Heritage Overlay
- LSIO - Land Subject to Inundation



Planning Overlays
Central Segment

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure
F7e

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D R A F T

Appendix B

Risk Register

B Risk Register

Risk ID	Risk pathway	Initial mitigation	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Construction									
LR01 Land Use	The proposed construction activities result in temporary disturbance to existing land uses.	Minimise amenity impacts through CEMP and consultation with affected landowners and stakeholders.	Minor	Possible	Low	No project-specific mitigations are planned.	Minor	Possible	Low
LR02 Construction noise	Noise associated with construction activities results in amenity impacts to sensitive noise receptors, including residential and recreational land uses.	A plan would be developed to manage noise in accordance with EPA guidelines and in consultation with the EPA. The plan would be informed by noise monitoring.	Likely	Minor	Medium	Helicopter noise would be limited to normal working hours and the community would be consulted.	Unlikely	Minor	Low
LR03 Construction dust	Airborne dust from construction activities results in poor air quality affecting amenity at sensitive air quality receptors including residential and recreational land uses.	The CEMP would include mitigations for air quality management including dust suppression at constructed areas and weather monitoring. Vehicle movements would be limited, and vehicles	Unlikely	Insignificant	Very low	No project-specific mitigations are planned.	Unlikely	Insignificant	Very low

Risk ID	Risk pathway	Initial mitigation	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
		would be covered where required to mitigate loss of loads such as dust or litter.							
LR04 Construction emissions	Exhaust emissions from construction vehicles may result in poor air quality affecting amenity at sensitive air quality receptors including residential and recreational land uses.	Maintain vehicles and equipment as per manufacturer's specifications to ensure minimal exhaust emissions	Rare	Minor	Very low	No project-specific mitigations are planned.	Rare	Minor	Very low
LR05 Visual impacts	Construction activities temporarily change the visual amenity of sensitive areas of affected land (ie areas of landscape significance).	Construction equipment storage and material laydown would be located so as not to impact sensitive view receptors.	Unlikely	Minor	Low	No project-specific mitigations are planned.	Unlikely	Minor	Low
LR06 Construction traffic	Construction vehicles temporarily change access to public and/or private land or temporarily increase safety concerns for road users including pedestrians and cyclists.	Preparation of a Traffic Management Plan to manage temporary impacts to local roads during construction.	Possible	Minor	Low	No project-specific mitigations are planned.	Possible	Minor	Low

Risk ID	Risk pathway	Initial mitigation	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Operation									
LR07 Land Use	The proposed location and siting of the project results in land use changes that are inconsistent with existing land uses and policy (in the local or regional setting), or reasonably foreseeable future land use directions for public or private land.	Minimise amenity impacts through OEMP and consultation with affected landowners and stakeholders.	Rare	Minor	Very low	No project-specific mitigations are planned.	Rare	Minor	Very low
LR08 Event noise	Noise from events during operation results in noise affecting amenity at sensitive noise receptors.	A plan is to be developed to manage noise in accordance with EPA guidelines and in consultation with the EPA. The plan would be informed by noise monitoring.	Unlikely	Minor	Low	Noise from events would be managed by locating large crowds away from sensitive receptors and by briefing event staff and participating on potential noise impacts.	Rare	Minor	Very low
LR09 Bike pass-by noise	Noise from bike pass-bys during operation results in noise affecting amenity at sensitive noise receptors, specifically	Minimise amenity impacts through OEMP and consultation with affected landowners and stakeholders.	Possible	Minor	Low	Noise suppression barriers would be installed to the section of trails at Martyr Road, subject to consultation with	Possible	Minor	Low

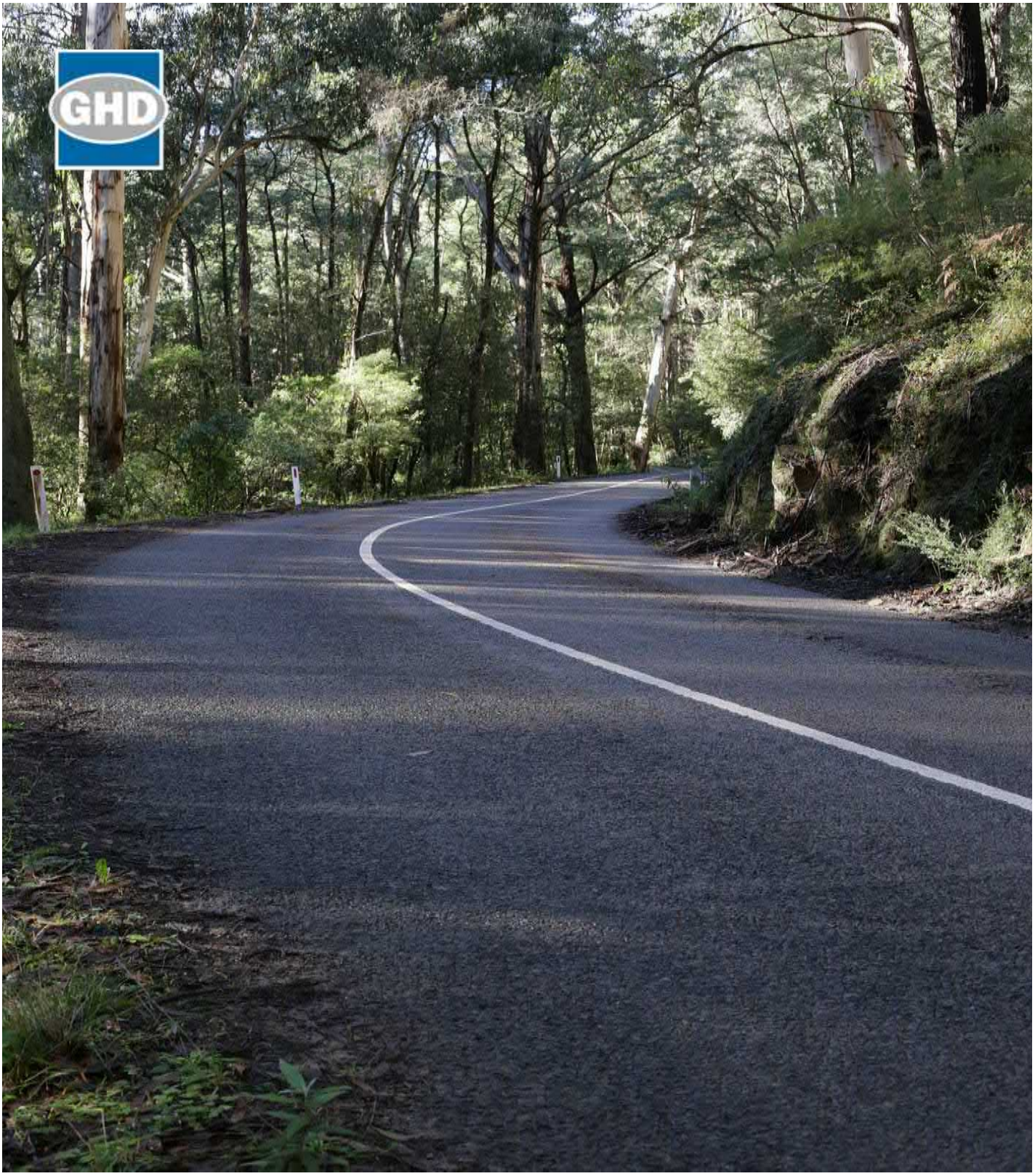
Risk ID	Risk pathway	Initial mitigation	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
	properties on Martyr Road.					the immediate landowners. Noise barriers must be built from a non-porous material with no gaps, including at the base and a surface density of at least 15 kg/ m2 at its thinnest point. Barriers should be at least 1.8 m higher than the trail surface and be located as near to the trail as possible.			
LR10 Visual impacts	New built form elements change the visual amenity at sensitive areas of land (ie areas of landscape significance, or areas of cleared land where new built form will be more prominent).	Project elements would be designed to mitigate tree removal and would be sited in existing clearings where possible.	Possible	Moderate	Medium	Site plans would be developed for the bridges, Visitor's Hub and trail heads. Native vegetation planting would be used to soften views of new built form elements. Materiality, lighting and colour palette at the Visitor's Hub and trail heads would respond sensitively to the environmental setting.	Possible	Minor	Low

Risk ID	Risk pathway	Initial mitigation	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
LR11 Traffic	Increased vehicles on local roads results in real or perceived changes to access to public and private land or increased safety concerns for road users including pedestrians and cyclists.	An emergency access plan would be developed and approved prior to the commencement of project operation.	Unlikely	Moderate	Medium	Upgrades to roads, pedestrian paths and cyclist routes may be undertaken to improve local transport efficiency and safety during project operation.	Unlikely	Minor	Low
LR12 Operation emissions	Exhaust emissions from increased vehicles resulting in queuing and congestion during major mountain biking events may result in poor air quality affecting amenity at sensitive air quality receptors including residential and recreational land uses.	A traffic management plan for major mountain biking events would be prepared.	Possible	Minor	Low	No project-specific mitigations are planned.	Unlikely	Minor	Low
LR13 Parking	Increased tourist and visitor numbers to Warburton results in parking congestion, impacting the ongoing use of land.	An operational parking management plan would be developed to ensure that parking congestion does not exceed acceptable	Unlikely	Minor	Low	No project-specific mitigations are planned.	Unlikely	Minor	Low

Risk ID	Risk pathway	Initial mitigation	Initial risk level			Final mitigation	Residual risk level		
			Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
		limits for visitors and residents.							
LR14 Bushfire	Use of land for mountain biking and associated tourist activities results in risk to life from threat of bushfire, impacting the ongoing use of land.	Preparation of an Emergency Management Plan to manage bushfire risks during project operation.	Rare	Moderate	Low	No project-specific mitigations are planned.	Rare	Moderate	Low

Appendix C

Landscape and Visual Impact Assessment



Warburton Mountain Bike Destination
Landscape and Visual Impact Assessment

May 2021

Table of contents

Table index

Figure index

Abbreviations

Abbreviations	Definition
DDO	Design and Development Overlay
EE ACT	Environment Effects Act
EES	Environment Effects Statement
EMF	Environmental Management Framework
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESO	Environmental Significance Overlay
HO	Heritage Overlay
LCT	Landscape character type
LVIA	Landscape and visual impact assessment
MNES	Matters of national environmental significance
SLO	Significant Landscape Overlay

Glossary

Terminology	Definition
Impact	The effect of a proposal, which can be adverse or beneficial, when measured against an existing condition.
Landscape	All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure.
Landscape character	The combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place.
Landscape character type	An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately nearby.
Magnitude	The measurement of the scale, form and character of a development proposal when compared to the existing condition. In the case of visual assessment this also relates to how far the proposal is from the viewer. Combines with sensitivity, magnitude provides a measurement of impact.
Sensitivity	The sensitivity of a landscape character zone or view and its capacity to absorb change of the nature of the proposal. In the case of visual impact this also relates to the type of viewer and number of viewers. Combined with magnitude, sensitivity provides a measurement of impact.
The project	Warburton Mountain Bike Destination
View	The sight or prospect of a landscape or scene.
Visibility	The state or fact of being visible or seen.
Visual impact	The impact on the views from residences, workplaces and public places.

1. Report context

This landscape and visual impact assessment technical report informs the land use and planning technical report (main report). In addition to the content provided in the subsequent sections, it utilises and is based on key project information of the following report sections:

- Introduction as outlined in Section 1 of the main report.
- Project overview as outlined in Section 3.1 of the main report.
- Project development as detailed in Section 3.2 of the main report.
- Project timing as provided in Section 3.5 of the main report.

1.1 Limitations

This report: has been prepared by GHD for AECOM Australia Pty Ltd and may only be used and relied on by AECOM Australia Pty Ltd for the purpose agreed between GHD and the AECOM Australia Pty Ltd as set out section 1 of this report.

GHD otherwise disclaims responsibility to any person other than AECOM Australia Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 6.3.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by AECOM Australia Pty Ltd and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Scoping requirements

2.1 EES evaluation objectives

The *Scoping Requirements for Warburton Mountain Bike Destination Environment Effects Statement* ('scoping requirements') by the Minister for Planning set out the specific environmental matters need to be addressed by Yarra Ranges Council in order to satisfy the Commonwealth and Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project in accordance with the *Ministerial guidelines for assessment of environmental effects* under the EE Act.

The following evaluation objective is relevant to this landscape and visual assessment:

- *4.3 Social, economic, amenity and land use: Minimise potential adverse social, economic, amenity and land use effects at local and regional scales*

2.2 EES scoping requirements

The aspects from the scoping requirements relevant to the evaluation objective are shown in Table 2-1, as well as the location where these items have been addressed in this report.

Table 2-1 Scoping requirements relevant to landscape and visual

Aspect	Scoping requirement	Section addressed
Key issues	Potential for adverse impacts on visual or landscape	Sections 8.2 and 8.5
Existing environment	Identify visual and landscape values near the project, including public and private vantage points from which elements of the project may be visible.	Sections 4, 7, 8.1 and 8.4
Mitigation measures	Identify measures for mitigating or managing visual or landscape impacts of the project.	Sections 9
Assessment of likely effects	Assess the potential for visual impacts at sensitive receptors adjacent to the project during project construction and operation (both with and in the absence of the proposed mitigation measures), with consideration of relevant standards. This needs to include consideration of changes to impacts during mountain biking events.	Sections 8.5
Approach to manage performance	Describe any further measures that are proposed to enhance social outcomes, and either manage risks to landscape and recreational values, or enhance visual amenity outcomes both for residents living near the project and for visitors to the locality, to form part of the EMF.	Sections 9

2.3 Linkages to other technical reports

This report has interdependencies with the Biodiversity and Habitats Technical Report in relation to the assessment of impacts associated with:

- impacts on vegetation within the study area.

The impacts identified within the Biodiversity and Habitats Technical Report on key ecological communities informed the assessment of landscape and visual impacts and development of the mitigation measures.

This report has been prepared as an appendix to the Land Use and Planning Technical report. The information presented within this report informs the Land Use and Planning Technical report.

3. Project description

3.1 Project overview

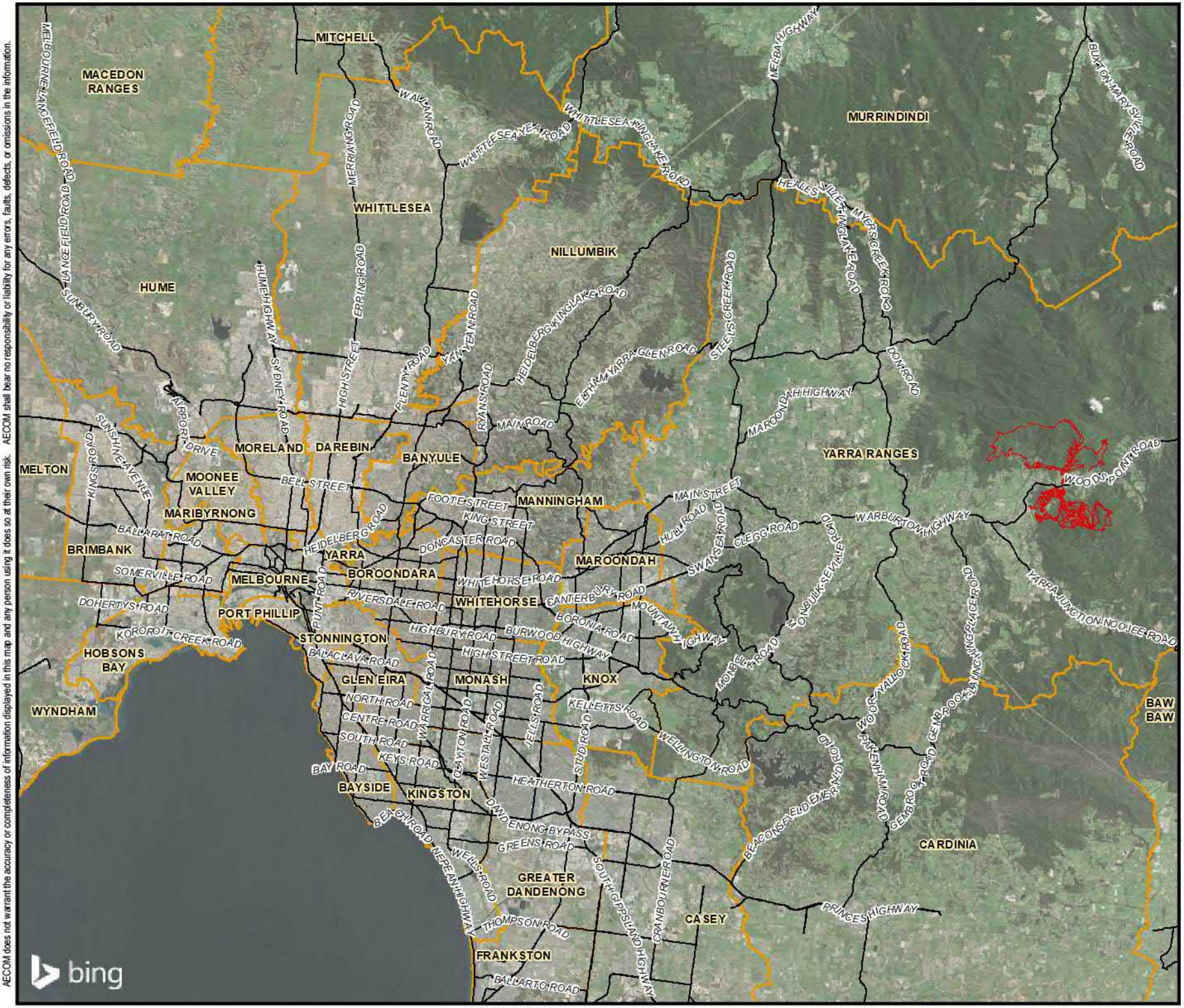
The project is a proposed world class mountain biking destination centred around Warburton, approximately 70 kilometres north-east of Melbourne as shown in Figure 3-1. A significant informal network of mountain bike trails exists within the region and there is evidence of increasing use of these trails by local and visiting riders. Mountain biking in this locality started around 15 years ago and was concentrated in the Yarra State Forest in the vicinity of Mount Tugwell.

Yarra Ranges Council has identified mountain biking as an opportunity for tourism growth within the region which would also support the region and the health and well-being of its residents. The project would create iconic trails eligible for International Mountain Bike Association Gold Level Ride Centre status which would position Warburton as an internationally significant mountain biking destination.

The project objectives are to:

- Facilitate tourism growth and associated positive economic and jobs growth in the Yarra Valley region
- Create iconic mountain bike trails eligible for International Mountain Bike Association Gold Ride Centre status
- Create spectacular riding experiences that have a competitive advantage over existing mountain bike destinations and leverage Warburton's beautiful township, rural valley and surrounding forested slopes
- Enhance the health and well-being of the community
- Maintain the significant biodiversity and heritage values within the project area and provide opportunities for the community to connect with and appreciate their importance.

The project would consist of approximately 192 kilometres of new mountain bike trails providing a range of mountain bike experience that would suit all levels of riding as shown in Figure 3-2. The project also includes a new Visitor's Hub and main trail head at the Warburton Golf Course and other trail heads at Mt Tugwell, Mt Donna Buang and Wesburn Park.



PROJECT ID	60636618
CREATED BY	brierej
LAST MODIFIED	brierej 22 MAR 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 3,750 7,500 15,000

metres

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LEGEND

- Project Tracks and Trails
- LGA Boundaries

Warburton Mountain Bike Destination Project in relation to Melbourne

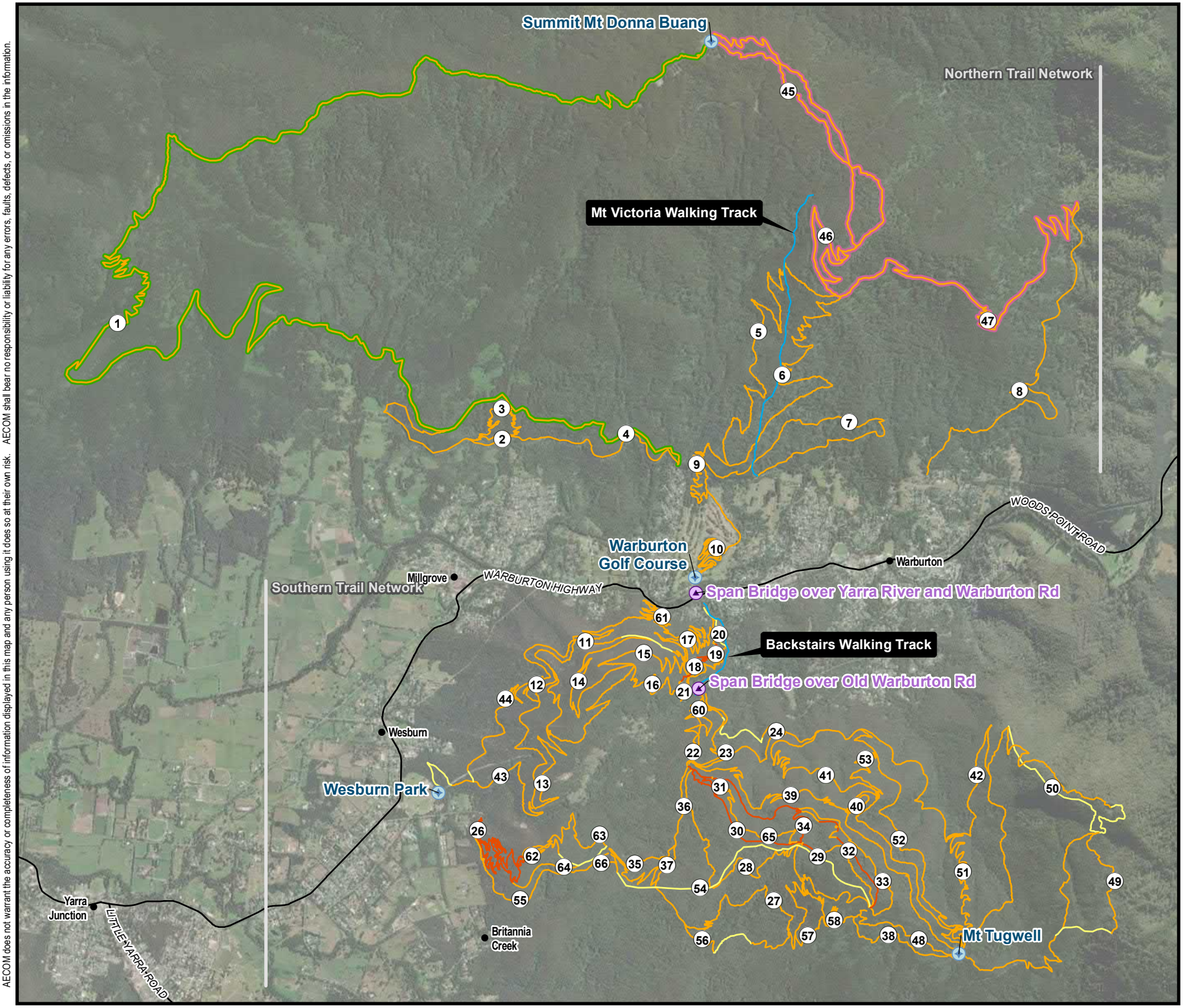
Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure F3-1

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\02\Overview\F1_Site_Location_A4.mxd)



PROJECT ID	60636618
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Coordinate System: GDA 1994 MGA Zone 55

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LEGEND

- Localities
- Trail Head
- Span Bridge Locations
- Access Track
- Proposed MTB Trail
- Existing MTB Trail
- Existing Walking Trail
- Trail 1
- Alternatives to Trail 1

Project Overview

Yarra Ranges Council

Warburton Mountain Bike Destination

Warburton, Victoria

Figure F3-2

Map Document: (\\aumel1fp001\Projects\606X\60636618\900_CAD_GIS\920_GIS\02_Maps\2021\02\Overview\F2_Project_Overview_A4.mxd)

3.1.1 Main project components

The main project components proposed are as follows:

- Upgrade of existing mountain bike trails - approximately nine kilometres (five per cent of project length)
- New mountain bike trails - approximately 180 kilometres (93 percent of project length)
- Upgrade of existing vehicle tracks - upgrade approximately three kilometres (two per cent of project length)
- New Visitor's hub and main trail head at the Warburton Golf Course and new trail head facilities at Mount Tugwell, Mount Donna Buang and Wesburn Park. An additional network access point to the network would be provided at Dee Road.

The network would comprise of 66 trails, each with a length of between 100 metres and 22 kilometres. Each trail has a trail difficulty rating assigned, ranging from easy over intermediate, to difficult and extreme. Some of the trails are returning loops, while others are point-to-point trails. All trails have also been categorised into six different styles including, adventure, air flow, downhill, flow country, gravity and wilderness, as described in the project description chapter of the EES.

The northern trail network (located on the north side of the valley) consists of around 35 per cent of the trails. The southern trail network (located on the south side of the valley) consists of around 65 per cent of the trails.

Mountain Bike Trails

The trails would have a bench width of approximately 1.2 metres, with a ride line of approximately 400-1200 millimetres except for the trail on Cemetery Track. The development footprint to be assessed is based on a maximum width of two metres (one metre for the trail corridor with a trail buffer of 0.5 metres on each side). A head-height clearance of 2.5 metres has been assumed.

The trail network would include built form elements such as bridges, platforms, culverts, rock armour, jumps and berms. Minimal signage is proposed to be associated with the trail and trail heads and this would consist of small maps at strategic intersections and along with safety and name signage. Some trail sections would include elevated structures and drainage works to avoid and minimise impacts to waterways and associated biodiversity values.

The grade of individual trail sections would vary according to the local topography. Typically, the maximum trail grade would be less than 15 per cent, with the majority of the trails under 10 per cent.

Figure 3-3 Existing mountain bike trail

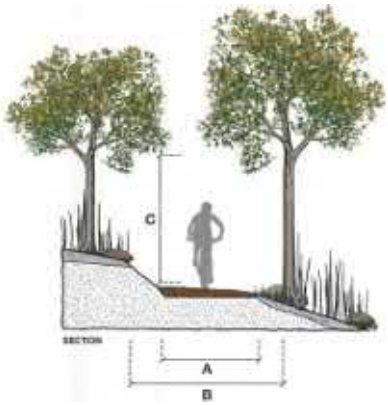


Figure 3-4 Typical trail section

Trail 1 and alternative to trail 1

Trails 45 and 46, as show in Figure 3-2 are proposed as an alternative to trail 1. Further details on the alternative to trail 1 are provided in section 3.4 of the main report. This report assesses the impacts of both options.

Visitor's Hub and main trail head

The new Visitor's Hub and main trail head is proposed to be developed at the south of Warburton Golf Course, where the existing carpark is to be upgraded and extended to accommodate around 180 cars with room for future expansion if required. A new shelter and a bike wash down station would be established for the use of mountain bike riders. Run-off from the wash bays would be captured by a sump and recirculated where practicable. Excess silt and soil would be captured by a silt retention system which would also serve the car park. This system would be designed to meet Melbourne Water requirements. The Visitor's Hub would be the main trail head and would allow direct access to the north and south trail zones.

Figure 3-5 Main trail head location at Warburton Golf Course.

Bridges

Two longer span shared use bridges are proposed crossing over significant roads and waterways, including the Old Warburton Road Bridge, and the Yarra River Bridge.

Old Warburton Road Bridge

The Old Warburton Road bridge is proposed to be located near the intersection of Old Warburton Road and Backstairs track. The bridge is proposed to be a truss-style bridge shared use bridge spanning approximately 23 metres across the Old Warburton Road and uphill ground slope. The bridge would have a curved exit ramp from the bridge on the north-western side to align with the road corridor, ramping down along the slope to meet the trail below. The bridge is proposed to have a total width of approximately two metres, with a minimum clearance above the road of five metres. Tree removal associated with this bridge is likely to include at least one small tree on the south-western bank, with likely additional trees in the location of the ramp, to be confirmed with refinement of the design. No large trees, with a diameter at breast height greater than 250 mm will be removed.

The below sketch (Figure 3-6) has been provided by Council to illustrate the design intent for the bridge.

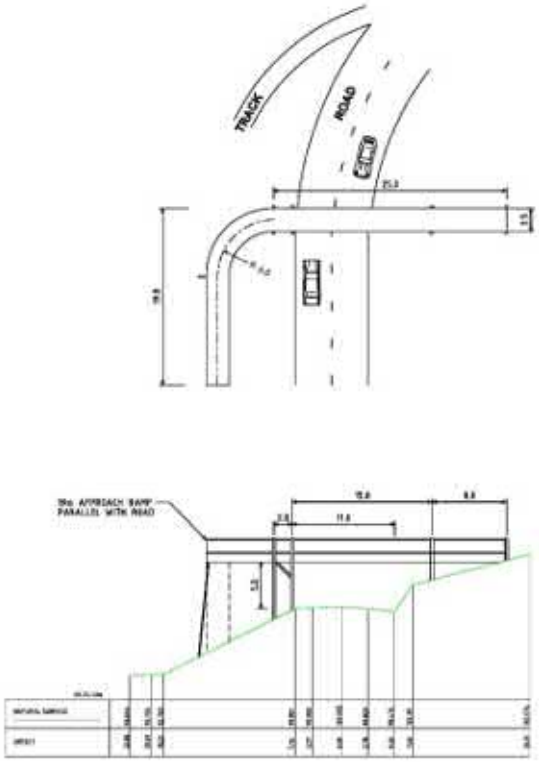


Image provided by Yarra Ranges Council

Figure 3-6 Concept sketch of proposed Old Warburton Road bridge

Yarra River Bridge

The Yarra River Bridge is proposed to be a combined suspension and truss bridge shared use bridge spanning approximately 121 metres across the Yarra River, Warburton Highway and Dammans Road, with bridge landings connecting to the Warburton Rail Trail and the entry to the Warburton Golf Club.

The sketch and bridge design example images below (Figure 3-7 to Figure 3-10), provided to GHD by Council, illustrate the design intent for this bridge.

Image provided by Yarra Ranges Council

Figure 3-7 Example of proposed bridge type

Image provided by Yarra Ranges Council

Figure 3-8 Example of proposed bridge type

Image provided by Yarra Ranges Council

Figure 3-9 Sketch of proposed bridge location

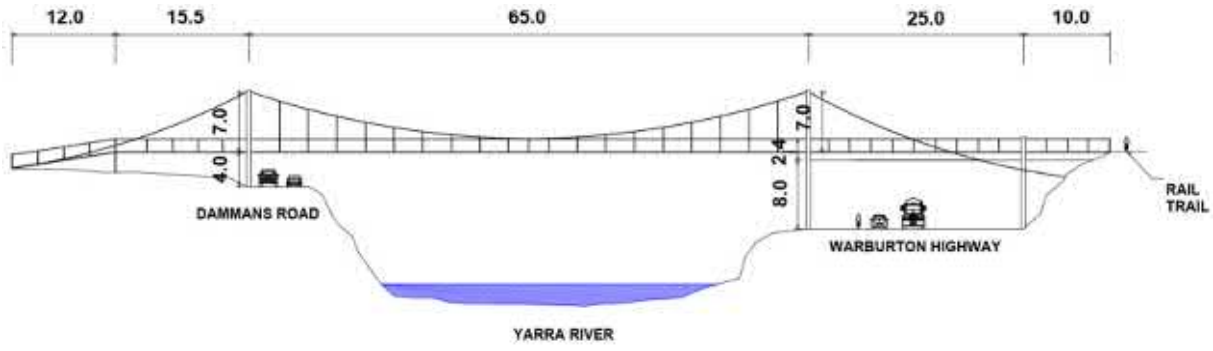


Image provided by Yarra Ranges Council

Figure 3-10 Concept sketch of proposed bridge

Other trail heads

Three other trail heads are proposed as part of the project. Drainage would be upgraded at these other trail head locations to meet current Melbourne Water requirements. The three other trail heads are as follows:

Mount Tugwell trail head

A new trail head is proposed to be located on top of Mount Tugwell (off Mount Bride Road). This would include formalised car parking including disabled access car parking, a bus turnaround, a bike wash down station, toilets and picnic area. Existing vegetation would be cleared to prepare the site for grading.

The below images (Figure 3-11) have been provided by Council to indicate the design intention for elements associated with the Mount Tugwell trail head.

Images provided by Yarra Ranges Council

Figure 3-11 Trail head precedent images

Image provided by Yarra Ranges Council

Figure 3-12 Mount Tugwell Trail Head concept plan

Mount Donna Buang trail head

The existing trail head at the top of Mount Donna Buang would be upgraded with improvements to the existing carpark, toilets and picnic area and the installation of a bike wash down station.

Wesburn Park

An additional 120 car parks would be established at Wesburn Park to facilitate access to connecting trails.

3.1.2 Project construction

Upgrades to existing mountain bike trails

The upgrades to the approximate nine kilometres of existing mountain bike trails would involve minor modifications to better manage stormwater and enhance the experience for the rider by improving the flow of the trail. These upgrades would typically involve:

- Removal of soil that has built up on the lower edge of the existing trail to fix drainage lines and recreate the outsole along the edging.
- Resurfacing of trails to remove puddles and drainage lines formed by erosion. This can be done by draining and drying the trail, filling in depressions and compacting and resmoothing the surface.

Many of these activities would be undertaken using hand tools. In some areas, an excavator would be used to make alignment changes or reshape the trail to meet current design standards for trails.

New mountain bike trails

Micro-siting

Prior to the construction of new mountain bike trails, an inspection would be undertaken to determine the exact alignment of the trail within the 20-metre corridor. The purpose of this would be to identify any specific environmental values to be protected and to discuss and agree on specific construction treatments and alignments. Where environmental values have been identified within the corridor for a proposed trail, the relevant experts would undertake a trail inspection (for example, a botanist would be present to help identify threatened flora sites). The environmental value would be visually identified and marked as an exclusion zone. The exact alignment would then be designed around the exclusion zone, including allowing for an adequate buffer between the mountain bike trail and environmental value.

The micro-siting stage would include the identification of a final route around large trees (greater than 200 millimetres diameter at breast height) so that these can be retained. It would also involve micro-siting in accordance with the existing contours, to make the most of the existing terrain and avoid the need for significant excavation or soil disturbance

Trail types

Trails would generally be constructed as one of the following four trail types: Standard excavation trail, elevated structures, rock armoured surfaces, or rock embankments. The construction technique for these can be found in the EES chapter 3 – Project description.

Vegetation clearance

The construction corridor is defined as the horizontal corridor from the top of the upslope batter to the toe of the downslope batter and the vertical corridor is about 2.5 m high. Clearing of the construction corridor would usually be undertaken manually using motorised tools such as brush cutters, chainsaws and hedge trimmers and hand tools like loppers, hand saws and secateurs. Large trees would not be removed, as the trail would be routed to avoid them; however, it is likely that small boughs and limbs may need to be removed. All vegetation that is removed would be cut into small pieces and dispersed throughout the surrounding area. At this stage, ground covers, herbs and grasses are left in place for later removal by the excavator.

Bridges

The construction of the Yarra River Bridge and the Old Warburton Road Bridge is anticipated to take up to approximately six months. Existing clearings on either side of the proposed bridges would be used as laydown areas, avoiding the need for vegetation clearing. Pre-fabrication of bridge components is anticipated to occur primarily offsite at the council's existing Yarra Junction Depot. These would be trucked to the adjacent bridge laydown areas, and then assembled into position on the bridge using a crane or helicopter. No works are proposed within the Yarra River. The Yarra River Bridge pylons would be constructed on the crest of the existing river channel. To allow for safe construction of the bridges overhead, road closures of Old Warburton Road, Warburton Highway and Dammans Road may be required for a few hours at a time. Road closures would be minimised to the extent possible to avoid disruption for the nearby community and are anticipated to be required on two or three occasions when craning large bridge elements overhead.

New visitor's hub and trail heads

The construction activities for the car park at the new Visitor's Hub and main trail head to the south of Warburton Golf Course would consist of site establishment (compound/fencing), geotechnical investigations, earthworks (topsoil strip and levelling), installation of drainage, car park surfacing and marking, and landscaping. Other facilities installed would include a shuttle bus shelter, toilet and shower facilities, picnic tables, comprehensive visitor information that is related to the mountain bike trails and bike wash bays.

At Mount Tugwell the area for the project would require clearing of existing vegetation to prepare for site grading. The gravel road surface and car parks would be installed. The toilet block and picnic area shelter would be assembled offsite and delivered to site via truck.

No significant works are proposed at Mount Donna Buang, where the existing facilities are expected to be utilised for shuttle bus drop of services.

Construction compounds

The main construction compound would be located at the council's Yarra Junction Depot (or at contractor yards where appropriate). The depot would be used to store equipment/materials, for the staging and preassembly of parts and as the project offices. The following principles would apply to the construction works to minimise impacts and disturbance:

- Any on-site storage and structure erection works would be minimised and undertaken at the existing council depot where possible.
- Structural components would be prefabricated off-site at the council depot whenever practicable to expedite site assembly works.
- An allowance has been made for helicopter delivery of critical components, and truck deliveries of strategic materials would be used only as required.
- Works would be conducted during daylight hours so lighting would not be required.
- Laydown areas for the two main bridges over Warburton Highway and Old Warburton Road already exist, and no vegetation clearing would be required.

3.1.3 Events

Local and regional scale events are anticipated to be regularly conducted throughout the year following construction of the project. Small-scale events would mainly attract participants with a very small number of spectators or assistants.

State and National events may require additional toilets and catering facilities which would be located at the trial heads. Shuttle buses would run more frequently during events and spectators would be allowed on the course in specific locations during these events in accordance with approved Event Management Plans. Further detail on the anticipated participants, spectator numbers and duration of the events can be found in EES chapter 3 – Project description. The events are generally short in duration, maximum of four days, and temporary in nature with all associated infrastructure being removed after the event.

4. Legislation, policy and guidelines

The legislation, policy and guidelines relevant to this assessment and are summarised in Table 4-1.

Table 4-1 Legislation, policy and guidelines relevant to the assessment

Document title	Summary	Relevance to the project
Victorian government		
Yarra River (Willip-gin Birrarung Murron) Protection Act 2017	The *Yarra River (Willip-gin Birrarung Murron) Protection Act 2017* (the Act) provides an overarching policy and planning framework to coordinate and harmonise planning for the use, development and protection of the Yarra River, its parklands and other land in its vicinity. A purpose of the Act is to protect the Yarra River and the surrounding parcels of public land as one living and integrated natural entity. The Act also recognises the importance of the Yarra River, and its parklands and associated public places, to the economic prosperity, vitality and liveability of Melbourne and the Yarra Valley.	The Yarra River runs through the study area and is subject to the policy and planning framework within the Act.
Heritage Rivers Act 1992 (Vic)	The *Heritage Rivers Act 1992 (Vic)* (the Act) provides for the protection of public land in particular parts of rivers and river catchment area in Victoria which have significant nature conservation, recreation, scenic or cultural heritage attributes. The Act recognises the importance of the landform, waterform and vegetation types of the rivers which contribute to people's enjoyment of scenic vistas or reflect particular landscape character types and river settings.	The Yarra River runs through the study area and the values recognised within the Act including the scenic vistas and landscape character types are relevant o this project.

Document title	Summary	Relevance to the project
Local government		
Yarra Ranges Planning Scheme (November 2020)	The study area includes land use zones comprising of Commercial, Green Wedge, Low Density Residential, Public Conservation and Resource, Public Park and Recreation, Public Use, Rural Conservation, Rural Living, and Special Use.	These land use zones assist in identifying key landscape values and characteristics to inform the existing conditions, and definition of the landscape character of the study area.
	Key Design and Development Overlays (DDO) include: • DDO12: Town Centres	A DDO is present within the study to outline specific requirements relating to the design and built form of new development. In this case, the DDO relates to Warburton town centre as outlined in DDO12: Town Centres. Relevant objectives include: *'To enhance the distinctive built form and streetscape characteristics of the town centre; To reinforce the main street as the focus of business and pedestrian activity in the town centre; To maintain visual links between the town centre and its rural hinterland; To protect and enhance the amenity of residential and public places within and adjoining the town centre'.*
	Key Environmental Significance Overlays (ESO) include: • ESO1-B1 to ESO1-B75: Sites of Botanical Significance • ESO-Z1 to ESO1-Z39: Sites f Zoological Significance	A large portion of the study area is protected by ESO, including extensive areas of remnant bushland which is intrinsic to the areas unique landscape and environmental character. The purpose of the ESOs are to ensure the long-term protection of wildlife habitat and other conservation values of sites of botanical and zoological significance and to ensure that any new development is sensitively designed and sited to reinforce the existing environmental characteristics of the area.
	Key Heritage Overlays (HO) within the study area include the following: • HO140: Mount Donna Buang Bridle Tracks & Road • HO214: Lilydale-Warburton Railway • HO342: Yarra Yarra Hydraulic Gold Sluicing Company • HO339: Warburton Swing Bridge, Tennis Courts, Club House and Rotunda.	A number of HOs are present within the study area. The purpose of these are to conserve and enhance heritage places of natural or cultural significance, and those elements that contribute to the significance of heritage places.

Document title	Summary	Relevance to the project
	Significant Landscape Overlays (SLO) within the study area include the following: • SLO3: Donna Buang Range • SLO4: Upper Yarra River & Environs • SLO17: Little Yarra Valley • SLO22: Foothills and Rural Townships. Relevant objectives of SLO3, SLO4 and SLO17 include: *'Protect and enhance the environmental, scenic, visual, cultural and scientific values of the significant landscapes which have been identified in the Shire; Conserve the flora and fauna and associated ecological processes that contribute to the significance of the identified landscapes; Ensure that any new development is located and designed to avoid inappropriate visual intrusion or other detrimental effects on the key characteristics of the identified landscapes'.* Relevant objectives of SLO22 include: *'To recognise and conserve the environmental and visual sensitivity of residential areas; To ensure development is sensitive to the natural characteristics of the land including slope, terrain and any existing vegetation'.*	A large proportion of the study area is protected with a SLO. The purpose of these are to preserve and enhance the special areas within the Yarra Ranges and ensure the retention of their unique character and appeal for residents, visitors and new businesses. The recognised values include spectacular mountain scenery, expansive rural plains, slopes and enclosed valleys with small townships where a harmonious balance of forest, farmland and development has been achieved.
Other		
Vision 2020 by Design (2008) Yarra Ranges Shire Council	This policy provides an assessment and recommendations to assist in preserving the character of built form, urban areas, towns and villages, and agricultural land within the Yarra Ranges Shire, for future generations. It includes general guidelines for the design, siting and style of new development so that the visual amenity of the Shire is not diminished by new development. The report identifies nine distinct urban and rural area types and presents guidelines for each, as well as for specific development types and landscape areas.	The urban and rural area types within these guidelines assist in informing the existing conditions, and definition of the landscape character of the study area.

Document title	Summary	Relevance to the project
Yarra Ranges National Park Management Plan (2002), Parks Victoria	This plan focuses on the management of the Yarra Ranges National Park with a focus on protection of the water resources within the catchment conservation, protection of ecological conservation values, including rare and threatened species such as the Leadbeater's Possum, and conservation of areas of Aboriginal and cultural heritage, whilst accommodating visitor activities. Key relevant management objectives for the park include: '*Preservation of significant conservation areas including old-growth forest; Protection of water resources in the water supply catchments…; Protection of the park from potentially damaging processes including wildfire, soil erosion and pest plants and animals; Provision of a range of nature-based visitor settings and activities, with a primary focus on day visitors…; Investigations for new short walks and long-distance trails; Improved orientation and information services to assist visitors to use and enjoy the park; Management of cultural and historical places for protection and appropriate visitor access and interpretation'.* Specific to landscape character, key aims are to: '*Protect natural landscape, particularly those of high scenic quality; Upgrade or rehabilitate sites and facilities that are visually unattractive'.* Key management strategies include: *'Improve visual quality by rehabilitating or upgrading sites that do not meet current visual standards, including Mount Donna Buang lower car parks…; Participate in planning processes and continue to liaise with the Forests Service and the Shires of Yarra Ranges and Murrindindi to maintain visual quality from high-use visitor destinations and viewing points in the park, including Mount Donna Buang…; Incorporate landscape protection measures into the siting and design of all facilities and utilities. Continually improve landscape values while planning and implementing management activities; Inventory and assess existing viewing points; Protect areas designated by the National Trust as 'Classified' landscapes; Maintain the scenic values of Mount Donna Buang Road including the Ben Cairn section…'*	A portion of the study area is within the Yarra Ranges National Park and is subject to the management objectives within the *Yarra Ranges National Park Management Plan.*

Document title	Summary	Relevance to the project
Draft Yarra River Strategic Plan, Melbourne Water Corporation (2020)	A 50-year integrated river corridor strategy, the Yarra River Strategic Plan, is currently underway, which will include waterway and land management. The project is within the Upper Rural reach character area. Specific to this reach, the community's top priorities from recent engagement were recreation, environmental protection, and sense of place.	The Yarra River runs through the study area and the character areas and priorities identified within the Plan assist in identifying key landscape values and characteristics to inform the existing conditions, and definition of the landscape character of the study area.

5. Consultation

Development of the project and preparation of the EES have been informed by consultation with stakeholders and the community. Table 5-1 lists specific community and stakeholder feedback and how this feedback has been considered by the project or in the LVIA.

Table 5-1 Stakeholder engagement undertaken for landscape and visual

Community and stakeholder feedback	Consideration in project design or impact assessment
Concerns about the project altering the amenity and peaceful environment of the area.	Assessment of the landscape and visual amenity and environment is presented in Section 8.

6. Methodology

This landscape and visual assessment implements a risk-based approach, prioritising the key issues for assessment and informing measures to avoid, minimise and offset potential effects.

The approach used in this assessment has been guided by the evaluation framework that applies to the project (that is, existing regulatory framework of relevant legislation and policy) as well as the scoping requirements, set by the Victorian Minister for Planning, incorporating input from the Commonwealth Department of Agriculture, Water and Environment in relation to matters of national environmental significance (MNES) .

This assessment is in alignment with the assessment approach parameters as outlined in the land use and planning main report, namely:

- Overview of method – Section 6.1
- Risk Assessment – Section 6.4
- Risk Overview and Purpose – Section 6.4.1
- Risk Assessment Process - Section 6.4.2
- Assigning a consequence level – Section 6.4.3
- Assigning a likelihood level – Section 6.4.4
- Assigning a level of risk – Section 6.4.5

The findings of the completed risk assessment are provided in Section 8 of the land use and planning main report with the risk register provided in Appendix A.

6.1 Standards and guidance

This landscape and visual impact assessment has been prepared in accordance with the following:

- *Guidelines for Landscape and Visual Impact Assessment, 3rd Edition* (Landscape Institute and Institute of Environmental Management & Assessment, 2013).

6.2 Existing conditions

A comprehensive assessment was undertaken to understand the existing conditions of the study area to inform the environmental impact assessment for the works

6.2.1 Study area

For the purposes of this report, the study area is defined as land generally within one kilometre of the project footprint.

6.2.2 Review of legislation and policy

A high-level review of planning zones and overlays, policies and guidance was undertaken in relation to the landscape and visual environment within the LVIA study area. The emphasis of the review was to identify key values relevant to the landscape character and visual qualities of the study area.

6.2.3 Desktop analysis of the project, landscape and visual resources

Existing data was gathered and reviewed, including project design information, background reports relating to the project, topography, land use, and vegetation information, Google Earth and Google Street View. Using this data, a desktop assessment of the landscape and visual environment was undertaken to inform the site inspection.

6.2.4 Site inspection

A site inspection was undertaken by three Landscape Architects on the 7th June 2019. An additional site inspection was undertaken by one Landscape Architect on the 18th September 2019. The purpose of the inspections were to inspect the study area and appreciate views to / from the project site, inspect publicly accessible locations identified in the desktop study as likely to provide views of the project, identify sensitive visual receptor locations, assess the landscape character of the study area, and undertake site photography suitable for photomontage preparation, if required. The Global Positioning System (GPS) coordinates of each viewpoint were recorded during the site inspection.

6.3 Avoidance and design

Relevant to this topic, the following measures have been adopted in relation to the design, construction and operation of the project to avoid and minimise impacts:

- Minimisation of trails near residences by focusing trails in natural areas.
- Building trails to follow land contours avoiding the need for significant excavations.
- Micro-siting of trails to minimise vegetation loss and avoid mature trees.
- Bridge design sympathetic to natural setting.

6.4 Impact assessment

6.4.1 Landscape impact assessment

Definition of existing landscape environment

A landscape character analysis was undertaken to determine the existing features within the study area, their character and value. Considerations include land use and built form, landform, topography and hydrology, vegetation.

Landscape character types

Landscape character considers common landscape types defined by typical features and characteristics identified during the desktop assessment and site inspection. Defining landscape character types identifies areas sharing the same homogenous environmental or cultural qualities or pattern such as topography, vegetation, hydrology, land use and settlement, built form scale and character, cultural and recreational characteristics. These types make each part of the landscape distinctive and give each its particular sense of place.

Existing landscape character types were established around the project site to provide a framework for discussion around potential effects from the project.

Landscape effects

Assessment of landscape effects deals with the effect of change and development on landscape as a resource. The concern is with how the project will affect the elements that make

up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

As part of this assessment, a discussion has been provided only, on the potential effects of the project on each landscape character type defined.

6.4.2 Visual impact assessment

Definition of existing visual environment

A visual analysis was undertaken to determine the existing features within the study area and their values. Considerations include topography and vegetation, key views, visual characteristics, and the project viewshed. This LVIA primarily focuses on impacts to existing views from surrounding sensitive receptor locations.

Viewpoint selection

Assessment of visual impacts deals with the effects of change and development on the views available to people and their visual environment. It assesses how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views as a result of the change or loss of existing elements of the landscape and/or the introduction of new elements.

Visual receptors have been considered in terms of the views they are likely to obtain from within the study area including consideration of any key vantage points, such as lookouts, where there is particular interest in the view. Visual receptors are identified based on:

- Proximity of the receptors to the project, as the most affected visual receptors are anticipated to be located closest to the project, unless located at an elevated vantage point
- Type of receptor, as different viewer types would have different perceptions of the change.

Based on the analysis of the existing landscape and visual environment, sensitive visual receptors were identified, and viewpoint locations selected as representative locations for discussion.

Visual effects

The evaluation of potential impacts on the visual environment is based on the sensitivity of the viewpoint (and the visual receptor it represents) to change, and the magnitude of change that is likely to occur.

As part of this assessment, a discussion will be provided only, on the potential effects of the project on each viewpoint location identified.

Panorama

All photographic images were captured using a 50 millimetre fixed focal length lens on a 35 millimetre full frame format camera at a camera height of 1.6 metres. All photograph locations were recorded and mapped.

Six viewpoint locations were chosen and existing views represented using a panorama technique. This technique involves the stitching together of a number of adjoining images using the Adobe Photoshop software program representative of a 60 degree field of view.

An additional two viewpoint locations have been included for discussion.

6.4.3 Assessment of alternative to trail 1

The assessment of the identified alternative to trail 1 (the combination of trail 45, trail 46 and trail 47) contained in this report included the following tasks:

- Describe the existing conditions relevant to trail 1 and the alternative to trail 1.
- Identify the residual environmental impacts determined for construction and operation of trail 1 and the alternative to trail 1.
- Undertake a comparative analysis of trail 1 and the alternative to trail 1.
- Identify the preferred trail for each discipline based on the comparative analysis.

6.4.4 Cumulative impacts

A cumulative impact assessment has been undertaken on a project level. No major projects where there is potential for impacts to overlap temporally and spatially have been identified. Accordingly, no cumulative impacts with other projects are anticipated.

6.4.5 Mitigation measures

Potential mitigation measures may include adopting alternative designs or revisions to the basic engineering and architectural design to prevent and/or minimise negative impacts; remedial measures such as colour and textural treatment of structural features; and compensatory measures such as landscape design to compensate for unavoidable negative impacts and to attempt to generate long-term positive impacts.

6.4.6 Assumptions and limitations

This assessment includes the following assumptions and limitations:

- There is no single guidance document on the assessment of landscape and visual impacts specific to Australia, however, the industry typically refers to the guidelines outlined in Section 6.1.
- The assessment aims to be objective and to describe any potential changes factually. While potential changes resulting from the project are defined, the significance of these changes requires qualitative (subjective) judgements. This assessment's conclusion therefore combine objective measurement and professional interpretation. While this assessment aims to be objective, it is recognised that visual assessment can be subjective and individuals are likely to associate different visual experiences to the study area.
- The assessment is based on the information provided to GHD at the time of writing.
- Existing conditions were assessed in the field on 7th June 2019 and 18th September 2019.

7. Existing conditions

The existing conditions of the landscape and visual environment being considered throughout this assessment are described in this section.

7.1 Existing landscape environment

The following section provides a landscape character analysis to determine the existing features within the study area, their character and value. Considerations include land use and built form, landform, topography and hydrology, vegetation.

7.1.1 Land use and built form

The project is situated within the Warburton valley, characterised by densely forested slopes to the north and south, with the township of Warburton nestled upon the valley floor. The urban development follows the flatter topography on either side of the Yarra River. Village-style small shops and cafes are situated along the Warburton Highway in the Warburton town centre, with the railways station and Visitor's Information Centre nearby. Residential areas are low density, filtering to rural towards the foothills of the ranges, with development not appearing to exceed two storeys. The forested slopes to the north are part of the Yarra Ranges National Park, with areas to the south, part of the Yarra State Forest.

7.1.2 Topography, hydrology and vegetation

The Warburton Valley is enclosed by the steep slopes of ridges to the north and south. Mount Donna Buang forms a continuous ridgeline to the north, reaching a high point of 1245 metres. To the south, Mount Little Joe rises to 510 metres, and Mount Tugwell to 790 metres, together forming the smaller valley on either side of Old Warburton Road. Warburton sits at 159 metres.

The Yarra River traverses the Warburton valley as part of the Upper Yarra Catchment, with smaller tributaries flowing from the ranges.

Vegetation within forested slopes surrounding the valley include Mountain Ash forest with an understorey of tree ferns and gullies of cool temperate rainforest, with some sub-alpine vegetation areas of higher elevation such as Mount Donna Buang summit.

7.2 Existing landscape environment comparison of trail 1 and the alternative to trail 1

The below sections outline a comparison of the existing landscape environment of trail 1 and the alternative to trail 1.

7.2.1 Land use and built form

The existing conditions for land use and built form for trail 1 and the alternative to trail 1 are the same. The forested slopes to the north are densely vegetated and form part of the Yarra Ranges National Park, and the Yarra State Forest.

7.2.2 Topography, hydrology, and vegetation

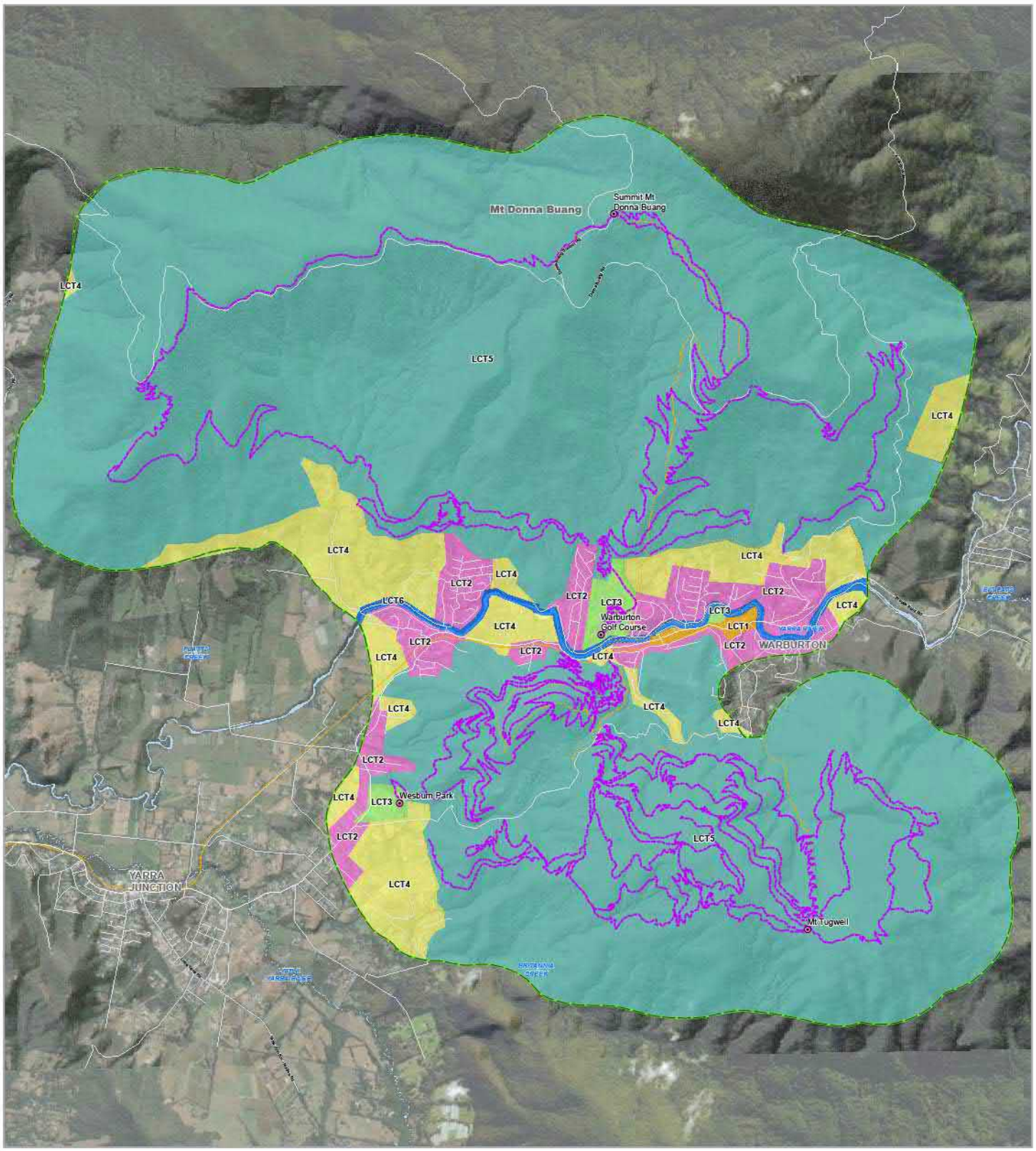
The existing conditions for topography, hydrology, and vegetation for trail 1 and the alternative to trail 1 are the same. The vegetation within the forested slopes includes Mountain Ash forest with and understorey of tree ferns and gullies of cool temperate rainforest, with some sub-alpine vegetation areas at higher elevation such as Mount Donna Buang summit.

8. Impact assessment

8.1 Landscape character types

Landscape character types (LCT) have been defined based on broadly homogenous environmental and cultural qualities and patterns in the landscape, such as topography, vegetation, hydrology, land use and settlement. The following landscape character types have been defined within the study area:

- LCT1: Township
- LCT2: Residential
- LCT3: Active Recreation
- LCT4: Rural Valley
- LCT5: Forested Slopes
- LCT6: Yarra River and Floodplain



Legend

- Trail Heads

LandscapeCharacter

- LCT 1 Township
- LCT 2 Residential
- LCT 3 Active Recreation
- LCT 4 Rural Valley
- LCT 5 Forested Slopes
- LCT 6 River
- Study Area (approx. 1 km)
- Proposed Mountain BikeTails
- Highway
- Arterial
- Collector
- Walking Tracks
- Watercourse
- Rail trail

Paper Size ISO A4

0 0.5 1 1.5 2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA94 MGA zone 55

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GHD

Yarra Ranges Council
Warburton Mountain Bike Destination

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Revision No. **C**
Date **23/02/2021**

Landscape Character Types

FIGURE 8-1

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8.2 Landscape character impact assessment

This section includes a description and assessment of impacts to landscape character from the project. An image is included as representative of the landscape characteristics of each type. Refer to Figure 8-1 for location of LCTs.

8.2.1 Landscape character type 1: Township

Criteria	Comments
Location and description	LCT1 is located in and around the commercial centre of Warburton, along the Warburton Highway, the riverfront, and inner-residential areas. Warburton is a small township within the narrow valley, with shops and restaurants clustered along the Warburton Highway. Building heights do not exceed two storeys. Vegetation comprises of predominantly exotic vegetation. Pedestrian paths link to the Yarra River foreshore and riverfront linear parkland.
Values and sensitivities	Relevant values include those associated with the historical settlement pattern, those associated with HO214: Lilydale-Warburton Railway heritage overlay, those associated with the SLO22: Foothills and Rural Townships, as identified in the Yarra Ranges Planning Scheme. Key valued elements near the project include the swing bridge and surrounding precinct, the linear rail trail railway reserve and associated historical remnants and social facilities, and views to the forested hills. SLO22 recognises the character values of the Warburton township, including the dominance of landscape over the buildings and the association of the area with a cottage or chalet style of design, as well as the visual dominance of vegetation, the hillsides appearing to be covered with trees, and the vistas through development to hills, canopy trees and the surrounding landscape.
Discussion of Potential Effects	The project is not likely to have a direct effect on the landscape character of LCT1 at this stage as the project footprint is not within the LCT1 area.

8.2.2 Landscape character type 2: Residential

Criteria	Comments
Location and description	LCT2 includes the residential areas within the Warburton Valley, on either side of the Yarra River and Warburton Highway. LCT2 includes predominantly single storey low density residential development. The road network stems from the Warburton Highway whilst following the natural landform. Vegetation comprises of street trees and private garden planting, typically including mature exotic deciduous and evergreen trees.
Values and sensitivities	Values include those associated with SLO3: Donna Buang Range, which includes Mount Donna Buang as a mountainous backdrop to many rural vistas in the area; the densely forested slopes of Mount Donna Buang forming a dominant visual feature in the area; the lack of visual intrusions on the forested slopes; and the management of land to preserve the forest cover of these hills.
Discussion of Potential Effects	The project is not likely to have a direct effect on LCT2 or its character. Proposed trails along the foothills of Mount Donna Buang ranges and the Wesburn Park trail head will be within relative proximity to LCT2, however at this stage, no changes are proposed within the LCT2 area, and the O'Shannessy Aqueduct Trail, a recreational walking trial, is already present in this location.

8.2.1 Landscape character type 3: Active Recreation

Criteria	Comments
Location and description	LCT3 includes the active recreation areas of Wesburn Park, the Warburton Golf Club, and the Warburton Recreation Reserve. This LCT is characterised by open grassed active recreation fields and associated amenity buildings. Trees within the golf course are mix of mature exotic evergreen and deciduous trees.
Values and sensitivities	Values associated with LCT3 include those identified within SLO4: Upper Yarra River & Environs (within Warburton Recreation Reserve), SLO3: Donna Buang Range and ESO1-Z38: Ythan Creek and Dirty Gully Warburton (within Warburton Golf Course). Mature exotic trees within the golf course also contribute positively to the distinctive character, forming pleasant vistas along fairways with Mount Donna Buang appearing as a dominant visual feature and distinctive mountainous backdrop.
Discussion of Potential Effects	Of the areas within LCT3, the Warburton Golf Course and Wesburn Park would be affected by the project. The Warburton Golf Course is the location of the proposed main trail head and Visitor's Hub. Proposed changes within and adjacent to the golf course include the upgrading and extension of the existing car park within the golf course for around 180 cars. A shuttle bus and trailer drop-off area is proposed between the existing picnic shelter and Dammans Road near the golf course entry. Other associated facilities include a new shelter, bike wash down station, and new trails on the golf course slope. The proposed changes within Wesburn Park would include the establishment of additional parking areas. The design development should respect those values highlighted within the Planning Overlays in section 4. In addition, the proposal should retain and protect mature characteristic trees within the golf course, along Dammans Road and surrounding Wesburn Park. Proposed structures and landscape treatment should be designed with sensitive consideration to the existing landform and golf course characteristics. Further recommendations have been provided in section 9 and provide guidance on the design of the proposal.

8.2.2 Landscape character type 4: Rural Valley

Criteria	Comments
Location and description	LCT4 includes the rural residential areas on the valley floor on the north and south of the valley, close to the mountain foothills. These areas are characterised by private residences set back from the road with adjoining open paddocks typically with a variety of native and exotic vegetation. The open fields reveal expansive views to the surrounding mountain ranges.
Values and sensitivities	Values associated with LCT4 include those identified within SLO4: Upper Yarra River & Environs, which include key aspects of the landscape character such as cleared floodplain areas used for broadscale grazing defining the open rural character dominated by the backdrop of mountains. A key objective is for the protection and enhancement of remnant vegetation and wetland features along the river to prevent visual intrusion from inappropriate development and ensure the long-term retention of the landscape values of this area. LCT4 also includes values associated with SLO17 Little Yarra Valley, which include landscape character components forming the broad pastoral landscape such as undulating farmland surrounded by forested hills narrowing into areas of tall mountain forest, which requires careful management of development to minimise visual impacts to this rural character.
Discussion of Potential Effects	LCT4 is not likely to be directly affected by the project. A number of trails are proposed within close proximity to areas on the western side of Mount Tugwell and the northern side of the Warburton Golf Course, however these areas currently have mountain bike trails (*Hey Hey My My)* and walking trails (O'Shannessy Aqueduct Trail) in these locations.

8.2.3 Landscape character type 5: Forested Slopes

Criteria	Comments
Location and description	LCT5 includes the forested slopes of Mount Donna Buang, Mount Little Joe and Mount Tugwell. This includes areas of the Yarra Ranges National Park, the Yarra State Forest, as well as rural residential properties on either side of Old Warburton Road. Roadways are limited to main public through-roads and gravel services roads. Walking trails and informal mountain bike trails area present, as well as other recreational features such as the Mount Donna Buang summit observation area. The forest areas primarily comprise of Mountain Ash forest with tree fern understorey, gullies of cool temperate rainforest, and some sub-alpine vegetation in elevated areas. Views experienced within LCT5 are generally enclosed due to dense vegetation.
Values and sensitivities	Relevant values include those associated with the natural values of the Yarra Ranges National Park, as identified in section 4. Values associated with SLO3: Donna Buang Range within LCT5 include the densely forested slopes of Mount Donna Buang forming a dominant visual feature and backdrop to views in the area; the lack of visual intrusions on the forested slopes; and the management of land to preserve of the forest cover of these hills. Values associated with HO140: Mount Donna Buang Bridle Tracks & Road within LCT5 include the areas recognition as an important place for locals and visitors to the region since the early nineteenth century, with a long history of use reflected in the lookout tower, picnic area, snow play and toboggan areas, and car park located at the summit, as well as the Ben Cairn lookout. HO342: Yarra Yarra Hydraulic Gold Sluicing Company is also within LCT5, valued as an important gold mining site associated with Old Warburton's history as a major gold township.
Discussion of Potential Effects	All proposed trails are within LCT5. Trail refinement is currently ongoing. A sensitive design approach is required to the detailed design and siting of trail infrastructure. However, the trails themselves are not expected to affect the key characteristics that define this landscape character type due to the proposed sensitive approach to construction and the minimal proposed tree removal associated with the trail construction. Further recommendations have been provided in section 9 and provide guidance on the design of the proposal.

8.2.4 Landscape character type 6: River

Criteria	Comments
Location and description	LCT6 includes the Yarra River and floodplain, riverfront amenities, bridges, and vegetated banks. The Yarra River in this location is approximately 30 metres wide, meandering through the valley with sections of pooling and running water over volcanic rock. The banks have dense native vegetation in rural and residential areas, with recreational parkland within the Warburton township. Native riparian trees and shrubs form a vegetation buffer to the river, with deciduous parkland trees situated alongside the banks within the Warburton township.
Values and sensitivities	Relevant values include those associated with the heritage value of the swing bridge, tennis courts, club house and rotunda precinct (HO339) which include their historical significance and function as landmark / focal points within the Warburton township. LCT6 also includes values associated with SLO4: Upper Yarra River & Environs, which include which include key aspects of the landscape character such as cleared floodplain areas used for broadscale grazing defining the open rural character dominated by the backdrop of mountains. A key objective is for the protection and enhancement of remnant vegetation and wetland features along the river to prevent visual intrusion from inappropriate development and ensure the long-term retention of the landscape values of this area. LCT6 also include values associated with ESO1-Z2: Yarra River and Little Yarra River Corridor.
Discussion of Potential Effects	The project will include a bridge crossing of the Yarra River above the Mayer Bridge. Any proposed development should be undertaken with respect to Yarra River environmental and landscape character values as identified within relevant policy and legislation. Further recommendations have been provided in section 9 and provide guidance on the design of the proposal.

8.3 Summary of landscape character impacts

Based on the landscape character impact assessment in Section 8.2 and the mitigation measures proposed in Section 9, including MM-LM01, MM-LM02, MM-LM03, MM-LM04 and MM-LM05, the residual impacts for LCT3, LCT5 and LCT6 would include minor changes to the vegetation coverage and built form within these LCT's, however the key landscape values and the existing landscape character retained. These impacts would be permanent, but localised and with the implementation of the replacement vegetation proposed in MM-LM01 and MM-LM02 the impacts would be softened and considered minimal. LCT1, LCT2 and LCT4 would continue to be unaffected by the project.

8.4 Existing visual environment and sensitive visual receptors

The following section provides a visual analysis to determine the existing features within the study area and their values. Considerations include topography and vegetation, key views, visual characteristics, and the project viewshed.

8.4.1 Visual analysis

The Warburton valley is quite incised, with steep slopes and tall forested vegetation with a deep narrow valley floor. The settlement is integrated with an abundance of tall native and exotic canopy trees, with limited clearings typically only associated with active recreation areas such as sports fields. Distant long open views from Warburton to the ranges are therefore relatively limited due to existing vegetation, and where these can be seen, often only the upper portion of hilltops are in view between foreground vegetation.

Project viewshed

The project viewshed is therefore largely limited to the immediate area surrounding built form infrastructure, including bridges and trail head locations. Although the proposed trail network itself affects a large extent of land, as the trails are not expected to result in large tree removal, the trail network is not likely to have any visual effect on sensitive visual receptors who are predominantly located within the Warburton township. The proposed trail network on the sloping terrain surrounding Warburton is not likely to be visually noticeable from Warburton and surrounds.

Key views

Key views identified within the study area include the following:

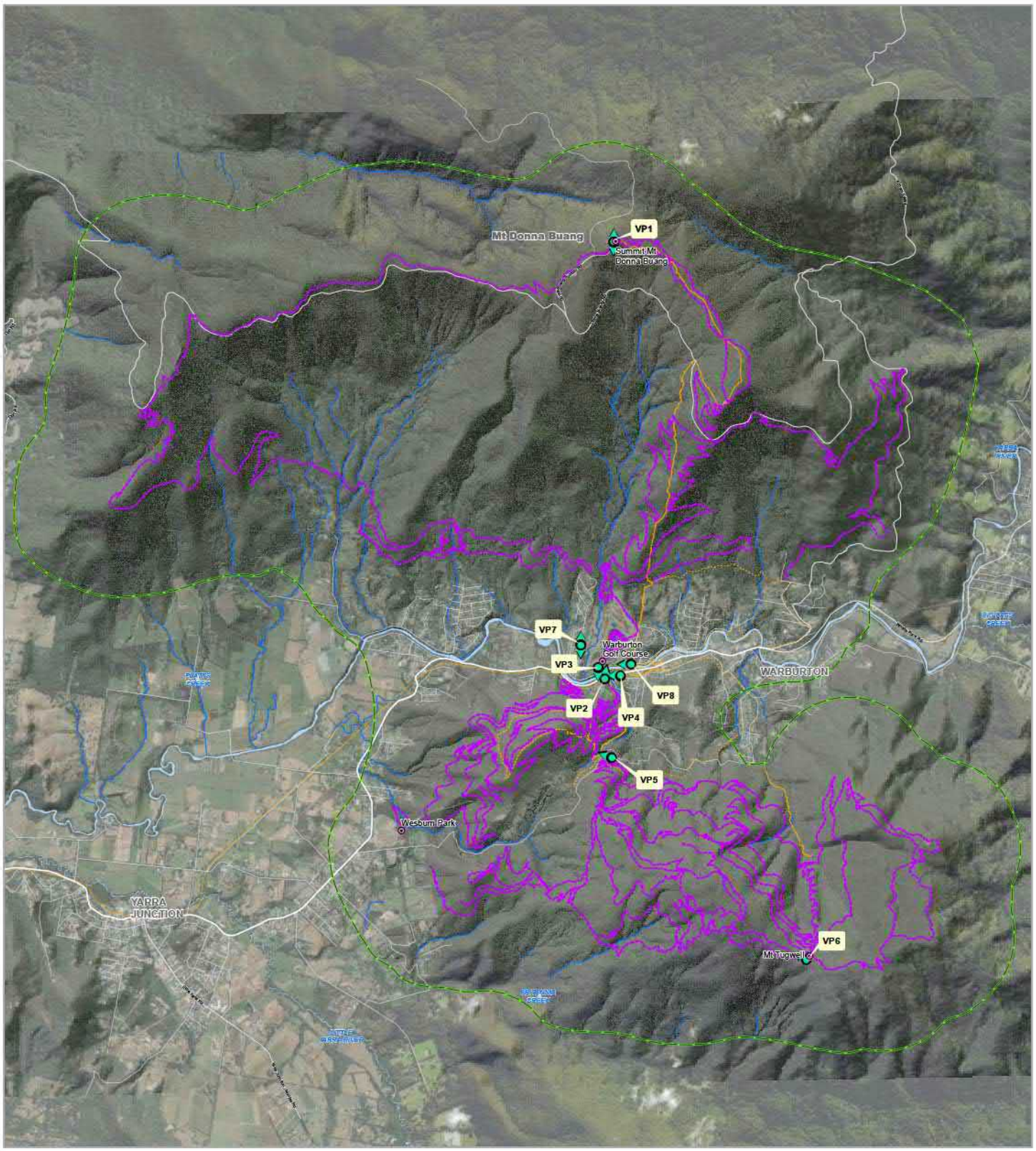
- Views generally north-south across the valley between ridgelines, particularly views north towards Mount Donna Buang from settlement area within the valley where Mount Donna Buang forms the backdrop to the views from Warburton and residential areas. These views are valued as recognised within the *Significant Landscape Overlay SLO3 Donna Buang Range* within the Yarra Ranges Planning Scheme.
- Vistas through settlement areas within the Warburton township to hills, canopy trees and the surrounding landscape, and are a recognised value within the *Significant Landscape Overlay SLO22 Foothills and Rural Townships* which includes Warburton.
- Distant ridgeline views from cleared or elevated recreation or community gathering areas in Warburton and surrounding, including from the Warburton to Lilydale Rail Trail, Wesburn Park, Warburton Recreation Reserve, and from the Warburton town centre.
- Panoramic views of surrounds from the Mount Donna Buang summit observation tower.

8.4.2 Sensitive visual receptors and viewpoint locations

Considering the project viewshed as described above, sensitive visual receptors selected for assessment are outlined in Table 8-1 below and shown on Figure 8-2.

Table 8-1 Viewpoint locations

Viewpoint	Location	Sensitive Visual Receptor
VP1	Mount Donna Buang Summit	View representative of visitor's to Mount Donna Buang Summit.
VP2	Lilydale to Warburton Rail Trail	View representative of walkers and cyclists using the Lilydale to Warburton Rail Trail.
VP3	Dammans Road Picnic Shelter	View representative of visitors to the public picnic shelter.
VP4	Warburton Highway	View representative of road users on the Warburton Highway and pedestrians using the bus stops and nearby amenities.
VP5	Old Warburton Road	View representative of road users on Warburton Road.
VP6	Mount Bride Road	View representative of road users on Mount Bride Road.
VP7	Surrey Road	View representative of surrounding residences and local road users.
VP8	Yarra River Walk	Pedestrians on the Yarra River Walk, and road users on Dammans Road.



Legend

- Trail Heads
- Viewpoints
- Study Area (approx. 1 km)
- Proposed Mountain BikeTails
- Highway
- Arterial
- Collector
- Walking Tracks
- Watercourse
- Stream
- Rail trail

Paper Size ISO A4

0 0.5 1 1.5 2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA94 MGA zone 55

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GHD

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Revision No. **C**
Date **22/02/2021**

Viewpoint Locations

FIGURE 8-2

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Print date: 22 Feb 2021 - 08:59

Data source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: morlanos

8.5 Visual impact assessment

The following section provides an assessment of the potential visual impact of the project from the following viewpoint locations as identified in Table 8-1 and Figure 8-2.

8.5.1 Viewpoint location 1 - Mount Donna Buang Summit

View looking north-east (above)

View looking south-west (above)

Criteria	Comments
Location and View Direction	VP1 is located at the summit of Mount Donna Buang, on the grass adjacent to Donna Buang Summit Road. Two view directions are shown for VP1, looking north-east towards the existing summit carpark, and looking south-west towards the extent of clearing.
Sensitive Visual Receptors	VP1 is representative of visitors to Mt Donna Buang Summit and picnic area. This is a popular visitor destination within the Yarra Ranges National Park, offering panoramic views from a lookout tower over the surrounding area from the 1245 metre summit. A number of walking trails also start from the picnic area. Values associated with this site are identified in HO140, relating to the sites historical importance for locals and visitors to the region, with a long history of use reflected in the lookout tower, picnic area, snow play and toboggan areas, and car park located at the summit.
Discussion of Potential Effects	A trail head is proposed at this location, including upgrades to the carpark, picnic area and toilet facilities, and the addition of a bike wash down station.

Criteria	Comments
	The trail head is proposed to enter the site from the south through the bushland. Changes to VP1 looking north-east are likely to include upgrades to the carpark as a minimum. Changes to VP1 looking south-west would include a new bike trail entry point which may continue through or around the clearing. Vegetation removal is unlikely, however some signage may be proposed. During large-scale events additional toilets and catering facilities may be located here for the duration of the event. These would be a temporary change in the view. Viewers in this location are primarily interested in views from the lookout tower, however the picnic area within the National Park setting is a valued amenity area for scenic drive visitors and walkers. Refer to Mitigation Measures (Section 9) for high level design guidance for this location. Further recommendations have been provided in section 9 and provide guidance on the design of the proposal.

8.5.2 Viewpoint location 2 - Lilydale to Warburton Rail Trail

Criteria	Comments
Location and View Direction	VP2 is located on the northern side of the Lilydale to Warburton Rail Trail shared use path. VP2 is looking north.
Sensitive Visual Receptors	VP2 is representative of pedestrian, cyclists, and horse riders using the rail trail shared use path. This path is a popular 38 kilometre recreational trail used by locals and tourists attracted to the recreational, historical and scenic amenity it provides, along with the amenities within the townships of Lilydale and Warburton. Visitors experiencing this view would likely be approaching or departing from the nearby Warburton town centre and associated amenities. This viewing location is a transition point where a path adjoins the trail, and between a section of the main trail that transitions from a forest-like setting to bridge. There is no formal seating however this is a location where people may stop to enjoy the open views towards the ranges from an elevated location.

Criteria	Comments
Discussion of Potential Effects	VP2 is orientated towards the location of the proposed shared use path bridge which would be above and to the right of the Mayer bridge, connecting the rail trail to the Warburton Golf Course. A number of trees are likely to be removed on either side of the new bridge. The existing view is dominated by foreground vegetation associated with the Yarra River riparian corridor, the Warburton Highway and Dammans Road. Mayer Bridge can be seen to the left of the view, crossing the Yarra River. The Warburton Golf Course, a residence and a picnic shelter on the far side of Dammans Road are largely obscured by vegetation. The undulating formations of Mt Donna Buang create a continuous backdrop to the view. Infrastructure to the foreground includes overhead wires. A public amenities building can be seen to the right foreground. The new shared use bridge would be visible from VP2, appearing across the centre of the view from the lower right foreground to centre left of view. The bridge connection on the far side of the river would appear to the left of the tall eucalypt tree in the centre of the view. The bridge clearance above Dammans Road in this location is approximately four metres. Tree removal would likely occur between the tall tree and the existing road bridge, therefore canopy is likely to be removed from this location revealing views to the golf course entry road behind. Bridge support structures and associated connecting elements would be the tallest bridge features, reaching a height of approximately fifteen metres above the Warburton Highway and eleven metres above Dammans Road. These would appear within the view, to the foreground and middle ground on either side of the river. It is proposed that the bridge support structures would align with the tall trees parallel to the Yarra River to limit visual impacts. The structures on the far side near Dammans Road would not exceed the height of existing trees already within the view, however the structure adjacent to the Warburton Highway may. Overall, there would be more built form and less vegetation within this view, and the new bridge would be visually prominent, partially screening existing features such as the Yarra River and Mt Donna Buang. The bridge design should give sensitive consideration to the height, materiality and colour of existing features within this view and the design should be responsive to these elements. Consideration should also be given to the replacement / introduction of additional tall trees on the northern side of the river to provide visual mitigation to the bridge. Further recommendations have been provided in section 9 and provide guidance on the design of the proposal.

8.5.3 Viewpoint location 3 - Dammans Road Picnic Shelter

Criteria	Comments
Location and View Direction	VP3 is located adjacent to the public picnic shelter located adjacent to the Warburton Golf Club entry on Dammans Road. VP3 is looking south-west.
Sensitive Visual Receptors	VP3 is representative of visitors to the public picnic shelter. This would likely include local residents, walkers, and groups gathering to share a meal together.
Discussion of Potential Effects	VP3 is looking towards the location of the proposed shared path bridge over the Warburton Highway, Yarra River and Dammans Road. Parking for shuttle bus and trailer drop-off area is also proposed between the shelter and Dammans Road. The existing view largely comprises of native vegetation along the riverfront on either side of the Mayer bridge. The forested slopes of Mt. Little Joe can be seen in the background. Dammans Road appears in the foreground across the view. Existing utility poles features within this view. The proposed bridge would extend horizontally across the view from left to right, with a clearance of approximately four metres above the roadway. Vertical structural supports would likely be located in the vicinity of the utility pole to the foreground. Vegetation removal is likely to the left of the bridge, revealing views to elements behind such as the bridge, Warburton Highway, and rail trail. The depth of the main bridge component is proposed to be 2.4 metres, which would appear to the front of all other elements within the view. Overall, the bridge would be a new built form element within the foreground of this view. The bridge would likely create a substantial change within the view due to its close proximity. The bridge design should give sensitive consideration to the height, materiality and colour of existing features within the view and the design should be responsive to these elements. Consideration should also be given to the replacement / introduction of additional tall trees on the northern side of the river to provide visual mitigation to the bridge. Further recommendations have been provided in section 9 and provide guidance on the design of the proposal.

8.5.4 Viewpoint location 4 – Warburton Highway

Criteria	Comments
Location and View Direction	VP4 is located on the northern side of Warburton Highway between the bus stop and the Patchwork Teahouse. VP4 is looking west.
Sensitive Visual Receptors	VP4 is representative of road users on the Warburton Highway and pedestrians using the bus stops and nearby amenities. There are limited formal footpaths along the roadside, however adjacent amenities include the public toilets, a bus stop, café, and riverside picnic area.
Discussion of Potential Effects	VP4 is looking towards the location of the proposed bridge over the Warburton Highway connecting the rail trail to the Warburton golf course. The existing view is looking along the highway. The forested slopes of Mt. Little Joe form a backdrop to the view to the left. Tall eucalypts feature in the centre of the view along the roadside. Large shrubs and trees on the left provide a buffer to the substation on the slope behind, as well as shielding views to the rail trail behind, which is at a higher elevation. To the right, the public toilets, temporary parking area and bus stop are visible. Overhead poles, wires and signage features within the view. The proposed bridge would have a clearance of approximately eight metres from the highway, emerging behind foreground vegetation and appearing above the bus shelter to the left of the roadside, extending across the view. Two vertical structural supports would be visible, one located in the vicinity of the bus shelter, and another to the right of the highway. These would reach a height of 15 metres. In the context of this view, these would be higher than the existing poles on the left, and a similar height to the pole in the foreground to the right. The horizontal portion of the bridge is proposed to be a consistent 2.4 metres across the view, which would appear to the front of the vegetated backdrop. Overall, the new bridge would be a noticeable new feature within the view, however against a backdrop of vegetation. The bridge design should give sensitive consideration to the height, materiality and colour of existing features within this view and the design should be responsive to these elements. Consideration should also be given to the landscape treatment to the slope, as additional vegetation in this location could assist with visual mitigation of the bridge. Further recommendations have been provided in section 9 and provide guidance on the design of the proposal.

8.5.5 Viewpoint location 5 - Old Warburton Road

Criteria	Comments
Location and View Direction	VP5 is located on Old Warburton Road, near the junction with a fire trail that connects to the existing Mount Little Joe Track to the south of Backstairs Creek. VP5 is looking south-west along Old Warburton Road.
Sensitive Visual Receptors	VP5 is representative of road users on Old Warburton Road, which may include visitors and local residents. Viewer interest may include travelling to their destination (ie. home), as well as enjoyment of the scenic drive through the area (for visitor's and local residents).
Discussion of Potential Effects	VP5 is the location of the proposed cycle bridge over Old Warburton Road and ramp connection from the bridge to the Mount Little Joe Track. The proposed bridge would be approximately 23 metres in length, with a minimum clearance of five metres above the road. The existing view includes Old Warburton Road to the centre with tall canopy trees and understorey vegetation to either side of the road. The landform slopes across the view from a higher elevation on the left, towards the Backstairs Creek gully to the right. Trees and lower height tree ferns form a dense background to the view. The proposed bridge would appear toward the centre of the view, crossing over the road within the upper third of the view. The visibility of the bridge would be most noticeable above the road, beyond which it would be partially shielded by existing canopy trees to the left and right. The depth of bridge structure would likely be approximately 2.5 metres. The bridge would be a new built feature in the view. Potential impacts may be somewhat mitigated with an environmentally sensitive design strategies recommended in Section 9

8.5.6 Viewpoint location 6 – Mt. Bride Road

Criteria	Comments
Location and View Direction	VP6 is located on Mt. Bride Road, approximately halfway between the intersections of Cumming Spur Track and Burns Road. VP6 is looking north-west.
Sensitive Visual Receptors	VP6 is representative of views from road users on Mt. Bride Road. This road is one of a connected network of public gravel roads through the Yarra State Forest. Viewers are likely to use this road for the purposes of park maintenance or recreation activities including to access local walking trails within the park.
Discussion of Potential Effects	This is the location of the proposed satellite trail head for Mt. Tugwell trails, which will include a car park, bus turn around, a bike wash down station, toilets and a picnic area. Some additional minor earthworks and clearing of understorey is likely. The existing view comprises of forest vegetation including dense tall understory shrubs and canopy trees. Mt. Bride Road is to the left of the view with road bollards to either side. A level clearing is present to the right of the view. The anticipated change to this view will be the new facilities to the right of the view on the existing level clearing. During large-scale events additional toilets and catering facilities may be located here for the duration of the event. These would be a temporary change in the view. As built form limited to one new shelter and toilet building, the potential impact to this view are likely to be mitigated with an environmentally sensitive approach to design as recommended in the Mitigation Measures (Section 9). The key aspects of the view, the understorey and canopy vegetation, are likely to largely remain, with the new features present to the foreground.

8.5.7 Other viewing locations

8.5.7.1 Viewpoint location 7 – Surrey Road

View looking north (above)

View looking south (above)

Viewpoint 7 is located on Surrey Road within a residential area north of the Warburton Highway and west of the Warburton Golf Club. This location has been included for discussion as it is one of relatively limited locations where open views can be achieved from the valley to the surrounding slopes. The view looking north features Mt Donna Buang as a backdrop, and the view looking south is towards Mt. Little Joe. New trails are proposed on these slopes, however as mentioned in section 3.1.2, due to no large tree removal proposed as part of the trail construction, no change would be noticeable to these views after construction of the project is complete. However, during the construction period, helicopters may be seen if flying within the viewshed of this viewpoint.

8.5.7.2 Viewpoint location 8 – Yarra River Walk

Viewpoint 8 is located on the Yarra River Walk, a riverfront pathway loop along connecting to the town centre. This location is on the northern side of the river adjacent to Dammans Road, between the town centre and Mayer Bridge. VP8 is looking west. This view has been included as the proposed Visitor's Hub carpark would be located along the roadside edge, within the golf course boundary. The carpark would appear to the right of the view beyond the fence. Consideration should be given to the sensitive treatment of this roadside edge in relation to views from the popular riverfront walking trail, the existing character of Dammans Road in this location particularly the interface with the golf course and existing characteristic mature trees along this edge. During large-scale events additional toilets and catering facilities maybe located here for the duration of the event. These would be a temporary change in the view.

Appropriate visual mitigation should be integrated into the design to retain the existing character and minimise any views to parked cars from the Yarra River Walk.

8.6 Summary of visual impacts

Based on the visual impact assessment in Section 8.5 and the mitigation measures proposed in Section 9, the residual impacts for VP1 VP2, VP3, VP4, VP5 and VP6 would be minimal with minor changes to vegetation or the addition of new built form or infrastructure associated with the proposed trail heads and visitor's hub. This impact would be permanent, but localised and with replacement vegetation softening the impacts of the proposed structures, and the visible elements of the project integrating into the surrounding environment through sensitive siting, materiality and design.

8.7 Assessment of alternative to trail 1

The assessment and comparison of trail 1 and the alternative to trail 1 is based on the existing conditions information provided in Section 7.

The comparison is based on the residual impact of these options assuming effective implementation of the proposed mitigation and contingency measures outlined in Sections 9.

Each of the impacts outlined in impact assessment are described in Table 4. No new impacts for this topic have been identified in relation to the alternative to trail 1.

Table 8-2 Comparison of impacts between trail 1 and the alternative to trail 1

Impact	Trail 1	Alternative	Conclusion
Location of new trail within LCT5	Natural vegetated character of the LCT would be retained.	Natural vegetated character of the LCT would be retained.	No change in impacts between trail 1 and the alternative.
Large tree removal	No large tree removal is proposed as part of the trail construction.	No large tree removal is proposed as part of the trail construction.	No change in impacts between trail 1 and the alternative.

The above comparison of impacts indicates that both trail 1 and the alternative to trail one would be equally preferred from a landscape and visual assessment perspective.

9. Mitigation and contingency measures

The following section recommends high-level mitigation measures that respond to issues arising within the assessment that have potential to adversely impact on landscape character and visual environment, refer to Table 9-1. Mitigation measures have been developed in accordance with the mitigation hierarchy and consideration of the level of potential impact. The focus of these mitigation measures is firstly avoiding impacts where possible (building upon the avoidance measures included in the design), and secondly, implementing project-specific measures to achieve acceptable outcomes for landscape and visual.

For landscape and visual, monitoring of environmental performance was not considered necessary since the evaluation objectives would be met with implementation of the below mitigation measures.

Table 9-1 Mitigation measures for landscape and visual

Mitigation ID	Mitigation measure	Stage
MM-LM01	**Mountain bike trail design** • Trails would be designed to avoid large tree removal, where trail interventions require more space (for example switchbacks) these should be sited within existing clearings where possible. • Trail alignment would make use of natural landform and minimise substantial earthworks that would cause landscape and visual impacts. • Materials selection, including rocks and timber, for the proposed trails would respond to the local environment and be locally sourced where possible. • Supplementary planting (where required) would use indigenous species appropriate to the setting, in consultation with an ecologist.	Design

Mitigation ID	Mitigation measure	Stage
MM-LM02	**Visitor's Hub design** • The design of Visitor's Hub and associated facilities would respond sensitively to its unique environmental setting (including materiality, lighting and colour). The design would retain views towards Mt. Donna Buang range and canopy vegetation within the golf course, when viewed from Dammans Road (proposed built form should not obstruct views). • Minimise visual clutter to the entrance to the Warburton Golf Club, and utilise planting to soften any potential new built form. • Minimise tree removal; any new landscape planting would be appropriate to the environmental and golf course setting and reflect the existing species palette within the surrounding context. • Permanent lighting will be in accordance with AS 4282-1997 Control of obtrusive effects of outdoor lighting to avoid light spill into adjacent residential properties and the Yarra River corridor. • Retain and enhance visual screening, such as buffer planting, to existing and proposed car parking area when viewed from Dammans Road / the Yarra River Walk.	Design

Mitigation ID	Mitigation measure	Stage
MM-LM03	**Bridge design** • The design of bridges would respond sensitively to their unique environmental setting, including the materiality, lighting and colours (giving consideration to the Yarra River, Warburton to Lilydale Rail Trail and context with the other existing bridges) and function within existing movement networks. • All bridge design and construction would be undertaken in accordance with relevant government and land managers. • The bridge design would minimise the requirement for additional road signage, particularly overhead signage on the bridge itself. • Lighting would be minimised and if required permanent lighting will be in accordance with AS 4282-1997 *Control of obtrusive effects of outdoor lighting* to avoid light spill into adjacent residential properties and the surrounding bush environment. <u>Warburton Highway / Yarra River Bridge:</u> • Minimise disturbance to the Yarra River and all replacement planting would use indigenous species and be selected in consultation with an ecologist. Incorporate new planting where appropriate to assist with visual mitigation of the bridge within its setting. • The bridge form and structure would be simple and visually transparent to allow the natural surroundings to take visual prominence; avoid obstructing views across the Yarra River from sensitive visual receptor locations. • The bridge design would not result in the requirement for roadside barriers or similar infrastructure. <u>Old Warburton Road Bridge</u> • Minimise tree removal, and replacement planting would use indigenous species, to be selected in consultation with an ecologist. • The bridge would be sited well within the existing landform with an aim to minimise changes to the natural topography. • Allow the natural features of site (the forest setting) to take visual precedence over the bridge design; and the bridge would be simple and visually transparent, with minimal visual clutter associated with the bridge design.	Design

Mitigation ID	Mitigation measure	Stage
MM-LM04	**Trail head design** • Minimise tree removal and use an indigenous landscape planting palette only of local provenance, in consultation with ecologist. • Proposed materiality and colour palette would be responsive to the sensitive landscape setting, and lighting would be minimised. <u>Mt Donna Buang Trail Head</u> • Ensure the site design minimises earthworks to retain the natural topographic characteristics of the summit location.	Design
MM-LM05	**Construction phase** • The approach to trail construction would be one that minimises the requirement for storage areas and new clearings within the National Park and Yarra State Forest not associated with the final trails themselves. The focus would be on non-intrusive methods of construction, use of small machinery that can utilise the mountain bike trails under construction, and material transfer via helicopter or on foot. • Construction equipment, stored materials and other visible elements would be located away from views from sensitive visual receptors. Should such equipment or stored materials be located in visually prominent locations for any reasonable period of time, screening measures such as hoarding or temporary plantings, and practices would be incorporated to ensure sites are kept tidy.	Construction

10. Conclusion

The purpose of this report is to assess the potential landscape and visual impacts associated with the Warburton Mountain Bike Destination to inform the preparation of the EES required for the project. The scope of the report is to review the landscape and visual sensitive receptors near the project, describe the existing landscape and visual character of the project area, provide a summary of relevant finding from previous studies, provide a assessment of landscape and visual impacts and mitigation measures.

The project is situated in the Warburton valley, with proposed trails extending across the forested slopes of Mt Donna Buang, Mt. Little Joe and Mt. Tugwell, and connecting to the township of Warburton. Landscape values include those associated with Mt Donna Buang and the Yarra Ranges National Park, the Yarra River, heritage aspects including the Warburton swing bridge and Warburton to Lilydale Rail Trail, and features defining the character of development on the valley floor such as views to Mt Donna Buang.

The study area extends approximately one kilometre from the project extents.

Landscape character

Six landscape character types were identified within this area, including LCT1 Township, LCT2 Residential, LCT3 Active Recreation, LCT4 Rural Valley, LCT5 Forested Slopes and LCT6 River. A discussion has been provided in relation to landscape values and sensitivities and potential effects from the project. The project is not likely to have a direct effect on the landscape character of LCT1, LCT2, and LCT4. Potential effects are within LCT3, LCT5 and LCT6.

Viewpoints

The landscape context characterises the visual environment within the study area, with intermittent views through the narrow valley to the tall forested mountain ranges to either side. The project viewshed is largely confined to areas surrounding proposed bridge structures and trail heads where clearings within forested vegetation are present or within an urban context. Six viewpoint locations were chosen in these locations and a discussion provided of potential visual effects of the project on identified sensitive receptors. An additional two viewpoint locations were included for discussion. Of these viewpoints, VP2, VP3 and VP4 will have the most visual effects associated with the proposed shared path over the Yarra River and Warburton Highway within the context of the Warburton township. The proposed trails are not considered to be a source of large visual impact due to the small scale of these elements, and their integrated design into the existing natural environment. The bridges and trail heads are in keeping with features typically seen in the vicinity of natural areas associated with tourism activities, and would not represent unexpected visual intrusion to visitors to this area who are there to explore the natural landscape.

Mitigation and contingency measures

Mitigation and contingency measures for key project components provide high-level design guidance for the minimisation of affects to existing landscape character and sensitive visual receptors, to be taken into consideration as the design progresses. Given the design of the key project components, including the bridges and trail heads, with the implementation of the mitigation recommendations within section 9 of this assessment, potential adverse impacts on the landscape and visual values and environment would be minimised.

Summary of residual impacts

With the implementation of the mitigation measures proposed in Section 9, the residual impacts for LCT3, LCT5 and LCT6 would be minimal, with the key landscape values and the existing landscape character retained. LCT1, LCT2 and LCT4 would continue to be unaffected by the project.

With the implementation of the mitigation measures proposed in Section 9, the residual impacts for VP1 VP2, VP3, VP4, VP5 and VP6 would be minimised, with replacement vegetation softening the impacts of the proposed structures, and the visible elements of the project integrating into the surrounding environment through sensitive siting, materiality and design.

11. References

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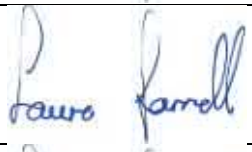
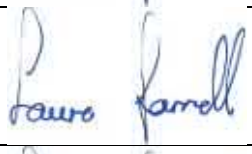
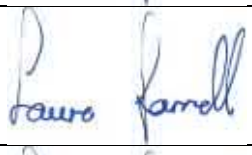
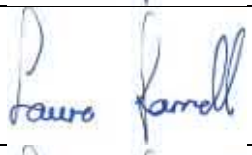
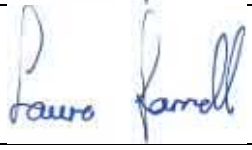
B	E.Davis	L.Farrell	*	L.Farrell		01/12/2020
C	E.Davis	L.Farrell	*	L.Farrell		02/12/2020
D	E.Davis	L.Farrell	*	L.Farrell		06/04/2021
E	E.Davis	L.Farrell		L.Farrell		16/4/2021
1	E.Davis	L.Farrell		L.Farrell		10/05/2021

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Appendix D

Air Quality Technical Report

Air Quality Technical Report

Warburton Mountain Bike Destination

Air Quality Technical Report

Warburton Mountain Bike Destination

Client: Yarra Ranges Council

ABN: 21 973 226 012

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1.1	05-May-2021	DRAFT incorporating TRG comments	Kristen Clarke Principal Air Quality Scientist	
1.2	06-Sep-2021	DRAFT incorporating TRG comments	Kristen Clarke Principal Air Quality Scientist	
2.0	13-Oct-2021	Final	Kristen Clarke Principal Air Quality Scientist	

Table of contents

Executive summary

Overview

Warburton Mountain Bike Destination ('the project') is a proposed world class mountain biking destination centred around Warburton, approximately 70 km east of Melbourne. The proponent for the project is Yarra Ranges Council.

In accordance with the *Environment Effects Act 1978* (EE Act), the project requires an environment effects statement (EES) to be prepared to allow stakeholders to understand the likely environmental impacts of the project and how they are proposed to be managed.

AECOM was commissioned to undertake an Air Quality impact assessment to inform the EES. This technical report presents the findings of the assessment and is an attachment to the EES.

Air quality context

The EES scoping requirements for the project set out the specific matters to be investigated and documented in the EES. The scoping requirements include draft evaluation objectives that identify the desired outcomes to be achieved in managing the potential impacts from construction and operation of the Project.

The following evaluation objective for *social, economic, amenity and land use* relevant to the air quality study is:

- Minimise potential adverse social, economic, amenity and land use effects at local and regional scales.

Key air quality issues listed in the scoping requirements are:

- Potential for project works and operations to affect business (including tourism) operations or other existing or approved land uses, including private and recreational land use (e.g. bushwalking)
- Potential for dust emissions resulting from construction works and activities
- Potential for project construction or operation to adversely affect local air quality.

Air Quality impacts to flora and fauna have not been assessed in this report but are covered in EES Chapter 8: Biodiversity and habitats.

Existing conditions

From an air quality perspective, the existing conditions of the study area are characterised by:

- the location of sensitive receptors (such as residences, schools and hospitals)
- concentrations of substances in the ambient air
- Meteorology.

The classification of sensitive receptors and estimation of the type and number of receptors was undertaken through a desktop study.

Air quality is expected to be good at the Project area with a low potential for pollution from nearby sources. A combination of a temperate climate, uniform rainfall over the year, low to moderate winds and no large unsealed areas of land nearby results in a low potential for dust impacts.

Bushfires and domestic fuel burning were identified as having the greatest potential impact to air quality in the Project area.

Impact assessment findings

An iterative assessment was undertaken to evaluate potential impacts associated with the project, considering the existing conditions within the study area and associated construction and operational activities.

Potential air quality impacts investigated included the following:

- Particulate emissions from construction activities, which may include mechanically generated dust due to vehicle movements and wind generated particulate matter from disturbed soil or stockpiles
- Combustion emissions from construction vehicles and machinery
- Combustion emission from visitor vehicle traffic of shuttle buses.

Key findings - Construction air quality impacts

There is the potential for construction works to have localised air quality impacts for a short duration, predominantly resulting from the generation of dust.

Potential impacts from dust generation during construction have been assessed using the Institute of Air Quality Management (IAQM) 2014 *Guidance on the assessment of dust from demolition and construction*. This document provides a semi-quantitative assessment process for the potential unmitigated impact of dust generated from demolition, earthmoving and construction activities.

The outcome of the air quality impact assessment based on the IAQM methodology showed that the unmitigated air emissions from construction pose a **negligible** to **low impact** for dust soiling and a **low impact** for human health.

Air Quality impacts from vehicles during construction of Visitor's Hub and trail heads is not expected to impact receptors beyond 20 meters from the work zone or roadways that the trucks travel along. The nearest receptors are within about 50m and air quality impacts at this distance are likely to be negligible.

Dust impacts during construction of the trails is expected to be negligible.

Key findings - Operational air quality impacts

The operation of the project will result in an increase to traffic movements to and around the project area.

A qualitative assessment of potential impacts on surrounding sensitive receptors was undertaken for the operational phase of the project. Operational impacts were assessed through the identification of potential air emission sources, factors influencing air dispersion of air pollutants and the proximity of sensitive receivers to potential sources.

Traffic as a result of the project is projected to increase by 194 daily one-way trips to the Visitor's Hub. Increases in traffic to the trail heads at Mount Tugwell, Mount Donna Buang and Wesburn Park will be fewer with less than 100 new one-way trips projected for each of the trail head locations.

Air emissions due to the increased traffic would be very localised and short in duration as vehicles move past receptors quickly and vehicle engines are switched off soon after arrival at the destinations. Pollutant concentrations due to vehicle traffic are likely to be negligible and are likely to remain well below relevant air quality standards for the duration of the project's operations.

Wheel generated dust from mountain bikes using the trails are not expected to cause dust emissions discernible at sensitive receptors.

Air quality impacts due to trail maintenance are expected to be negligible due to highly localised works, short duration and distance from receptors.

Widespread erosion that results in a significant source of dust is unlikely due to the narrow design of the trails and surrounding vegetations. Effective trail design and management will minimise erosion and any air quality impacts.

Management of potential impacts

Potential impacts on air quality due to the project would be avoided, mitigated or managed to required standards through the recommended mitigation measures.

The assessment found that potential air quality impacts from construction of the project could be appropriately managed through implementation of the recommended environmental management measures, including dust suppression measures and measures to ensure appropriate storage and transport of excavated material.

Recommended mitigation measures based on best practice to avoid, mitigate or manage air quality impacts include the following:

- Dust suppression would be used at construction areas as required using water sprays, water carts or other devices on unpaved work areas, spoil and aggregate stockpiles during the loading and unloading of dust generating materials
- Restricted vehicle movements. After arrival at the project site, vehicles, plant and equipment would remain within the construction footprint and on designated roads and tracks
- Construction vehicles with potential for loss of loads (such as dust or litter) would be covered when using public roads
- Weather conditions would be monitored for extreme heat and/or wind events using systems such as the Bureau of Meteorology forecasts and works would be modified if conditions are likely to result in air quality impacts at sensitive receptors.

Abbreviations

Abbreviation	Definition
AAQ NEPM	National Environment Protection (Ambient Air Quality) Measure
AADT	Annual average daily traffic
AECOM	AECOM Australia Pty Ltd
AQM	Air Quality Management
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CO	Carbon monoxide
EE Act	*Environmental Effects Act 1978* (Vic)
EES	Environment Effects Statement
EP Act	*Environment Protection Act 1970 (Vic)*
EPA	Environment Protection Authority Victoria
ERS	Environment Reference Standard
GED	General environmental duty
IAQM	Institute of Air Quality Management (UK)
m/s	Metres per second
mg/m^3	Milligrams per cubic metre
m	Metre
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
PAC	Protective Action Criteria
PAH	Polycyclic aromatic hydrocarbon
PM_{10}	Particulate matter 10 micrometres or less in diameter
$PM_{2.5}$	Particulate matter 2.5 micrometres or less in diameter
ppm	Parts per million
SEMP	Stakeholder Engagement Management Plan
SEPP	State Environment Protection Policy
SOx	Oxides of sulphur
TMP	Traffic management plan
TSP	Total suspended particulates
$\mu g/m^3$	Micrograms per cubic metre
µm	Micrometres
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound

Glossary

Term	Definition
Community	A group of people living in a specific geographical area or with mutual interests that could be affected by the project.
Construction	Includes all physical work required to construct the new structures of project, for example, laying pipe.
Demolition	Any activity involved with the removal of an existing structure (or structures).
Deposited dust/dust soiling	Dust that has fallen out of suspension in the air and which has settled onto a surface.
Dust	Solid particles that are suspended in air or have settled out onto a surface after having been suspended in air. The terms 'dust' and 'particulate matter' (PM) are often used interchangeably. In this report the term ‘dust’ has been used to include the particles that give rise to soiling, and to human health and ecological effects.
Earthworks	All operations involved in loosening, excavating, placing, shaping and compacting soil or rock.
Effects	The consequences of the changes in airborne concentrations and/or dust deposition for a sensitive receptor.
Erosion	A natural process where wind or water detaches a soil particle and provides energy to move the particle.
Impact	Influence or effect exerted by a or other activity on the natural, built and community environment.
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of less than 2.5 µm.
PM_{10}	Airborne particulate matter with an aerodynamic diameter of less than 10 µm.
Sensitive receiver/receptor	Includes residences, educational institutions (including preschools, schools, universities, TAFE colleges), health care facilities (including nursing homes, hospitals), religious facilities (including churches), child care centres, passive recreation areas (including outdoor grounds used for teaching), active recreation areas (including parks and sports grounds), commercial premises (including film and television studios, research facilities, entertainment spaces, temporary accommodation such as caravan parks and camping grounds, restaurants, office premises, retail spaces and industrial premises).
Trackout	The transport of soil and sediment from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

1.0 Report context

This technical report informs the land use and planning technical report. In addition to the content provided in the subsequent sections, it utilises and is based on key project information of the following report sections:

- Introduction as outlined in Section 1 of the main report.
- Project overview as outlined in Section 3.1 of the main report.
- Project development as detailed in Section 3.2 of the main report
- Main project components as detailed in Section 3.3 of the main report.
- Alternative to Trail 1 as detailed in Section 3.4 of the main report.
- Project timing as provided in Section 3.5 of the main report.

2.0 Scoping requirements

2.1 EES evaluation objectives

The *Scoping Requirements for Warburton Mountain Bike Destination Environment Effects Statement* ('scoping requirements') by the Minister for Planning set out the specific environmental matters need to be addressed by Yarra Ranges Council in order to satisfy the Commonwealth and Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project in accordance with the *Ministerial guidelines for assessment of environmental effects* under the *Environmental Effects Act 1978* (Vic) (EE Act).

The evaluation objective for *social, economic, amenity and land use* relevant to the air quality study is:

- Minimise potential adverse social, economic, amenity and land use effects at local and regional scales.

2.2 EES scoping requirements

The aspects from the scoping requirements relevant to the evaluation objective are shown in Table 2-1, as well as the location where these items have been addressed in this report.

Table 2-1 Scoping requirements relevant to air quality

Aspect	Scoping requirement	Section addressed
Key issues	Potential for project works and operations to affect business (including tourism) operations or other existing or approved land uses, including private and recreational land use (e.g. bushwalking).	Sections 5.0, 7.0 and 8.0
	Potential for dust emissions resulting from construction works and activities.	Section 7.0
Priorities for characterising the existing environment	Identify dwellings and any other potentially sensitive receptors (e.g. residential, commercial, industrial, recreational areas etc.) that could be affected by the project's potential effects on air quality, noise or vibration levels, especially vulnerable receptors including children and the elderly.	Section 6.1
	Appropriately characterise background levels of air quality (e.g. dust), noise and vibration near the project, including established residential areas and other sensitive receptors.	Section 6.2
Design and mitigation measures	Identify potential and proposed design responses and/or other mitigation measures to avoid, reduce and/or manage any significant effects for sensitive receptors during project construction and operation arising from air pollution, noise, vibration, traffic and lighting, in the context of applicable policy and standards.	Section 9.0
	Identify options for mitigating impacts from project construction or operation on any potentially affected private land, businesses and community facilities.	Section 9.0

Aspect	Scoping requirement	Section addressed
Assessment of likely effects	Describe the likely extent and duration of any temporary disruption to existing land uses arising from project construction.	Sections 7.0 and 8.0
	Assess the potential for dust, noise, vibration, traffic, lighting and visual impacts at sensitive receptors adjacent to the project during project construction and operation (both with and in the absence of the proposed mitigation measures), with consideration of relevant standards. This needs to include consideration of changes to impacts during mountain biking events.	Sections 7.0 and 8.0
	Assess the potential for cumulative impacts on social, economic, amenity and land use values in conjunction with any other existing or planned projects and land uses including tourism developments in the area.	Sections 7.0 and 8.0
Approach to manage performance	Outline measures to monitor the success of commitments to mitigate or manage effects on social, economic, amenity and land use values during all phases of the project.	Section 9.0
	Describe the approach to monitor effects and develop contingency measures to be implemented in the event of adverse residual effects on social, economic, amenity and land use values requiring further management.	Section 9.0

2.3 Linkages to other technical reports

This report has interdependencies with other technical reports prepared for the EES for this project including:

- Existing and proposed vehicle movements in the Transport Technical Report (AECOM 2021) as detailed in Appendix F of the EES.
- The potential for changes to the air environment to affect significant fauna species is considered in the Biodiversity and Habitats Technical Report (BIOSIS 2021) as detailed in Appendix A of the EES.

The specialists undertaking these assessments worked collaboratively to evaluate these potential impacts and design suitable mitigation measures to be adopted for the project.

3.0 Legislation, policy and guidelines

The legislation, policy and guidelines relevant to this assessment and are summarised in Table 3-1.

Table 3-1 Legislation, policy and guidelines relevant to the assessment

Document title	Summary	Relevance to the project
Commonwealth government		
National Environment Protection Council Act 1994	National Environment Protection (Ambient Air Quality) Measure	Standard and goal set to achieve equivalent population exposure that protects the beneficial uses of the ambient air environment.
Victorian government		
Environment Protection Act 2017 (Environment Protection Act)	The Environment Protection Act aims to protect Victoria's air, water and land by adopting a 'general environment duty' (GED) which imposes a broad obligation on entities and individuals to take proactive steps to minimise risks of harm to human health and the environment from pollution or waste. The Environment Protection Authority administers the Environment	A Development Licence will not be required for the project.
Environment Protection Regulations 2021 (Vic) (Environment Protection Regulations)	Schedule 1 of the Environment Protection Regulations lists activities that require a development and/or operational licence under the EP Act	Activities which exceed air emissions thresholds are included in the list of prescribed development or operating activities.
The environment reference standard (ERS)	The ERS sets out the environmental values of the ambient air that are sought to be achieved or maintained in Victoria and standards to support those values. The ERS generally adopts the objectives in the AAQ NEPM with some modifications. The ERS also contains other environmental values, indicators and/or objectives that are not in the AAQ NEPM.	A Development Licence will not be required for the project.

3.1 Legislation

3.1.1 Commonwealth legislation

The *National Environment Protection (Ambient Air Quality) Measure* (AAQ NEPM) was formed in 1998 under the *National Environment Protection Council Act 1994* (NEPC Act). It was designed to create a nationally consistent framework for monitoring and reporting on common ambient air pollutants. For the purpose of the operational assessment, pollutants of interest are carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and particulate matter with a diameter less than 10 micrometres (PM_{10}). The AAQ NEPM was varied in 2003 to include particulate matter with a diameter of less than 2.5 micrometres ($PM_{2.5}$) and is therefore also considered in this assessment.

A proposed variation to the AAQ NEPM has recently been drafted for public consultation. The variation proposes new standards for NO_2 and SO_2 which are based on the latest scientific knowledge on health impacts of these pollutants. The proposed changes to the NEPM are presented in Table 3-2. Note that this report references the legislation and policies current at the time of writing.

Table 3-2 Current and proposed AAQ NEPM NO_2 and SO_2 standards

Pollutant	Averaging Period	Current Standard (ppm)	Proposed Standard (ppm)
NO_2	1-hour 1-year	0.12 0.03	0.09 0.019
SO_2	1-hour 1-day 1-year	0.2 0.08 0.02	0.1 0.02 No standard

3.1.2 State legislation

3.1.3 Environment Protection Act 2017

Air quality in Victoria is managed primarily through the *Environment Protection Act 2017* (EP Act) and associated regulations. The EP Act applies to noise emissions and the air, water and land to protect the environment in the State of Victoria.

The EPA Act requires a development licence and operating licence for scheduled premises. The *Environment Protection Regulations 2021* classifies premises that discharge or emit to the atmosphere at least 100 kilograms per day of volatile organic compounds (VOC), particulates, SOx (oxides of sulfur) and NO_x (nitrogen oxides) or 500 kilograms per day of CO (carbon monoxide) as schedule premises. The project does not satisfy the definition of a scheduled premises and therefore these requirements do not apply.

3.2 State policy

3.2.1 Environmental Reference Standard objectives

The environment reference standard (ERS) sets out the environmental values of the ambient air that are sought to be achieved or maintained in Victoria. Environmental values are the uses, attributes and functions of the environment that Victorians value, such as being able to breathe clean air.

The ERS replaced *State Environment Protection Policy (Air Quality Management)* (SEPP AQM) on 1st July 2021 and generally adopts the objectives in the AAQ NEPM with some modifications. The ERS also contains other environmental values, indicators and/or objectives that are not in the AAQ NEPM.

The indicators and objectives provide a basis for assessment and reporting on environmental conditions in Victoria. Although it is not a compliance standard, the EP Act requires the Authority to consider this ERS when assessing development, operating and pilot licences. The ERS must also be taken into account by the Minister when recommending the making of regulations and compliance codes and deciding whether to declare an issue of environmental concern.

If not otherwise specified, the environmental values in this ERS apply to the whole of Victoria. The indicators and objectives relevant to the project are summarised in Table 3-3.

Table 3-3 Proposed ERS objective for relevant pollutant

Pollutant	Objective	Averaging period	Maximum exceedances	First introduced
Carbon monoxide (max. concentration)	9.0 ppm	8 hours	1 day a year	NEPM (AAQ) 1998
Nitrogen dioxide (max. concentration)	0.12 ppm	1 hour	1 day a year	NEPM (AAQ) 1998
	0.03 ppm	1 year	None	NEPM (AAQ) 1998
Particulate matter as PM_{10} (max. concentration)	50 µg/m^3	1 day	None	NEPM (AAQ) Variation 2015
	20 µg/m^3	1 year	None	SEPP (AAQ) Variation 2016
Particulate matter as $PM_{2.5}$ (max. concentration)	25 µg/m^3	1 day	None	NEPM (AAQ) Variation 2015
	8 µg/m^3	1 year	None	NEPM (AAQ) Variation 2015

3.2.2 Environmental Guidelines for Civil construction, building and demolition

EPA Victoria Publication No. 1834 *Civil construction, building and demolition guide* (EPA 2020) is designed to support the civil construction, building and demolition industries to eliminate or reduce the risk of harm to human health and the environment through good environmental practice. Measures described in the guideline includes identifying hazards, assessing the risks, implementing controls, and checking controls.

4.0 Consultation

Development of the project and preparation of the EES have been informed by consultation with stakeholders and the community. Table 4-1 lists specific community and stakeholder feedback and how this feedback has been considered by the project or in the air quality impact assessment.

Table 4-1 Stakeholder engagement undertaken for air quality

Community and stakeholder feedback	Consideration in project design or impact assessment
Concerns about the project altering the amenity and peaceful environment of the area	These concerns have been addressed in Section 7.0 and Section 8.0. Mitigation measures have been described in Section 9.0
Concerns about air quality impacts as a result of additional traffic in the project area and surrounds	Air quality due to traffic during construction and operation of the project has been considered in Section 7.0 and 8.0.

5.0 Method

5.1 Overview of method

This air quality assessment implements a risk based approach, prioritising the key issues for assessment and informing measures to avoid, minimise and offset potential effects.

The approach used in this assessment has been guided by the evaluation framework that applies to the project (that is, existing regulatory framework of relevant legislation and policy) as well as the scoping requirements, set by the Victorian Minister for Planning, incorporating input from the Commonwealth Department of Agriculture, Water and Environment in relation to Matters of National Environmental Significance (MNES) .

This assessment is in alignment with the assessment approach parameters as outlined in the land use and planning main report, namely:

- Overview of method – Section 6.1
- Risk Assessment – Section 6.4
    - Risk Overview and Purpose – Section 6.4.1
    - Risk Assessment Process - Section 6.4.2
    - Assigning a consequence level – Section 6.4.3
    - Assigning a likelihood level – Section 6.4.4
    - Assigning a level of risk – Section 6.4.5

The findings of the completed risk assessment are provided in Section 8 of the land use and planning main report with the risk register provided in Appendix A.

A cumulative impact assessment has been undertaken on a project level. No major projects where there is potential for impacts to overlap temporally and spatially have been identified. Accordingly, no cumulative impacts with other projects are anticipated.

5.2 Avoidance and design

Assessment of potential air quality impacts has considered the following measures adopted in relation to the design, construction and operation of the project to avoid and minimise impacts:

- Minimisation of trails near residences by focusing trails in natural areas
- Use of small construction teams and small plant and equipment for construction of trails

5.3 Existing conditions

From an air quality perspective, the existing conditions of the study area are characterised by:

- Location of sensitive receptors (such as residences, schools and hospitals)
- Concentrations of substances in the ambient air
- Meteorology
- Topography.

5.4 Potential Air Emissions of Concern

Given the expected sources of pollution during construction and operation, the pollutants considered for this assessment include the following dust and combustion products:

- Total suspended particulates (TSP).
- Particulate matter equal to or less than 10 microns in diameter (PM_{10}).
- Particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$).
- Oxides of Nitrogen (NO_x).
- Carbon Monoxide (CO).
- Sulphur Dioxide (SO_2)
- Volatile Organic Compounds (VOC)
- Polycyclic aromatic hydrocarbons (PAH).

The pollutants of interest pollutants are briefly described in Table 5-1.

Table 5-1 Pollutants of interest

Pollutant	Description	Potential Project Related Sources
Nitrogen dioxide	Nitrogen dioxide (NO_2) is a brownish gas with a pungent odour. It exists in the atmosphere in equilibrium with nitric oxide. The mixture of these two gases is commonly referred to as nitrogen oxides (NO_x). Nitrogen oxides are a product of combustion processes. In urban areas, motor vehicles and industrial combustion processes are the major sources of ambient nitrogen oxides. Nitrogen dioxide can cause damage to the human respiratory tract, increasing a person's susceptibility to respiratory infections and asthma. Sensitive populations, such as the elderly, children, and people with existing health conditions are most susceptible to the adverse effects of nitrogen dioxide exposure. Nitrogen dioxide can also cause damage to plants, especially in the presence of other pollutants such as ozone and sulphur dioxide. Nitrogen oxides are also primary ingredients in the reactions that lead to photochemical smog formation.	• Exhaust emissions from construction vehicles • Exhaust emissions from visitor vehicles and shuttle bus
Carbon monoxide	Carbon monoxide (CO) is a colourless, odourless gas produced by the incomplete combustion of fuels containing carbon (e.g. oil, gas, coal and wood). Carbon monoxide is absorbed through the lungs of humans, where it reacts to reduce the blood's oxygen-carrying capacity. In urban areas, motor vehicles account for up to 90% of all CO emissions. Exposure to carbon monoxide can cause carbon monoxide poisoning, which can be attributed to symptoms such as headache, dizziness, weakness, vomiting and confusion. Chronic exposure can cause memory loss, confusion and depression. Acute poisoning is not limited to but can cause cardiac arrhythmia, seizures and death.	• Exhaust emissions from construction vehicles • Exhaust emissions from visitor vehicles and shuttle bus

Pollutant	Description	Potential Project Related Sources
Particulate matter	Particulate matter refers to the many types and sizes of particles suspended in the air we breathe. The particle size fractions relevant to combustion emissions are PM_{10} and $PM_{2.5}$. Common sources of PM_{10} include dust from unsealed roads, sea salt, pollen and combustion activities such as motor vehicles and industrial processes. Motor vehicles, power plant emissions and bushfires are all major sources of $PM_{2.5}$. PM_{10} and $PM_{2.5}$ can remain suspended in the air for long periods and can penetrate human lungs. Exposure to particulate matter has been linked to a variety of adverse health effects, including respiratory problems (e.g. coughing, aggravated asthma, chronic bronchitis) and heart attacks.	• Exhaust emissions from construction vehicles • Exhaust emissions from visitor vehicles and shuttle bus • Site clearance including earthworks for ground levelling • Vehicle movements on paved and unpaved roads • Erosion of stockpiles and freshly exposed areas on-site • Handling, transfer and storage of materials • Landscaping
Sulphur dioxide	Sulphur dioxide (SO_2) is a strong-smelling, colourless gas that can irritate the lungs, and can be particularly harmful for people with asthma. In Victoria, coal-fired power stations are a major source of SO_2 in the air. Smaller sources of SO_2 emissions include industrial processes, locomotives, ships and other vehicles and heavy equipment that burn fuel with a high sulphur content. SO_2 and other sulphur oxides can react with compounds in the atmosphere to form fine particles that reduce visibility (haze).	• Exhaust emissions from construction vehicles • Exhaust emissions from visitor vehicles and shuttle bus
Volatile Organic Compounds	Volatile organic compounds (VOCs) are chemical compounds based on carbon with a vapour pressure of at least 0.01 kilopascals at 25˚C or having a corresponding volatility under the particular conditions of use. Emissions of VOCs may impact the beneficial uses of the local air environment due to their toxicity, bio-accumulation or odour characteristics. On a regional level, VOCs can be a major contributor to the formation of photochemical smog.	• Exhaust emissions from construction vehicles • Exhaust emissions from visitor vehicles and shuttle bus

5.5 Impact assessment

This study has assessed the impacts of construction works and operation of the project on local air quality and human sensitive receptors. The potential for changes to the air environment to affect significant fauna species is considered in the Biodiversity and Habitats Technical Report (BIOSIS 2021) located in Appendix A of the EES.

The following subsections provide a semi-quantitative (construction) and qualitative (operation) assessment of the potential ground level air quality impacts of the project. Potential construction impacts are assessed in Section 7.0 and operational impacts are assessed in Section 8.0.

5.5.1 Activities relevant to air quality

Potential air quality impacts associated with the project include:

- Particulate emissions from construction activities, which may include mechanically generated dust due to vehicle movements and wind generated particulate matter from disturbed soil or stockpiles
- Combustion emissions from construction vehicles and machinery
- Combustion emission from visitor vehicle traffic of shuttle buses.

5.5.2 Construction Impacts

Potential impacts from dust generation during construction have been assessed using the IAQM 2014 *Guidance on the assessment of dust from demolition and construction*. This document provides a semi-quantitative assessment process for the potential unmitigated impact of dust generated from demolition, earthmoving and construction activities. The IAQM approach has been widely used in Australia to assess emissions from construction projects and has been accepted by many regulatory authorities as a suitable approach in the absence of any Australian-based guidance.

The IAQM method specifically addresses potential impacts due to dust soiling and particulate matter (as PM_{10}), which are generally the primary pollutants of concern for construction activities. A limitation of the IAQM method is that it does not specifically address the other pollutants of interest that were identified in Table 5-1. To address this a qualitative assessment of combustion emissions from construction vehicle activities has been undertaken in Section 7.1.6.

It should be noted that the IAQM method provides a conservative assessment of construction dust and identifies activities where mitigation strategies should be applied. The mitigation strategies identified in Section 9.0 for the project not only minimise impacts from dust generating activities but also minimise potential impacts from combustion emissions. The mitigation strategies would ensure that both short term (1-hour or 24-hour) and long-term (annual) pollutant emissions would be reduced as far as reasonably practical during the lifetime of the project. On this basis, the outcome of the post-mitigation IAQM assessment can be considered valid for all pollutants of interest and all averaging times.

The potential of dust soiling and human health impacts due to particulate matter (PM_{10}) on surrounding areas were determined based on the scale of activities and proximity to sensitive receptors. The IAQM method uses a four-step process to assess dust impacts:

- Step 1: Screening based on distance to nearest sensitive receptors.
- Step 2: Assess potential of dust impacts from activities based on:
  - Scale and nature of the works, which determines the potential dust emission magnitude; and
  - Sensitivity of the area.
- Step 3: Determine site-specific mitigation for dust-emitting activities.
- Step 4: Reassess potential of dust impacts after mitigation has been considered.

5.5.2.1 Step 1 – screening assessment

Step 1 of the IAQM assessment requires the determination of whether there are any receptors close enough to warrant further assessment.

5.5.2.2 Step 2 – dust impact assessment

Step 2 in the IAQM is designed to appraise the potential for dust impacts due to unmitigated dust emissions. The key components of the assessment involve defining:

- Dust emission magnitudes (Step 2A),
- The surrounding area's sensitivity to dust emissions (Step 2B), and
- Combining these in a matrix (Step 2C) to determine the potential for dust impacts on surrounding receptors.

5.5.2.3 Step 2A – dust emission magnitude

Dust emission magnitudes are estimated according to the scale of works being undertaken classified as small, medium or large. The IAQM guidance provides examples of demolition, earthworks, construction and trackout to aid classification (refer Table 5-2).

Table 5-2 IAQM classification criteria for small, medium and large demolition and construction activities

Activity		Small	Medium	Large
Demolition	Total building volume (m^3)	<20,000	20,000–50,000	>50,000
Earthworks	Total site area (m^2)	<2,500	2,500–10,000	>10,000
	Number of heavy earth moving vehicles active at one time	<5	5-10	>10
	Total material moved (tonnes)	<20,000	20,000–100,000	>100,000
Construction	Total building volume (m^3)	<25,000	25,000–100,000	>100,000
Trackout	Number of heavy vehicle movements per day	<10	10-50	>50

5.5.2.4 Step 2B – sensitivity of surrounding area to dust soiling and human health effects

The IAQM methodology classifies the sensitivity of an area to dust soiling and human health impacts due to particulate matter effects as high, medium, or low. The classification is determined by a matrix for both dust soiling and human health impacts (refer Table 5-4 and Table 5-5, respectively). Factors used in the matrix tables to determine the sensitivity of an area are as follows:

- Receptor sensitivity for individual receptors in the area (summarised in Table 5-3)
- Number of receptors of each sensitivity type in the area
- Distance from source
- Annual mean PM_{10} concentration (only applicable to the human health impact matrix).

Table 5-3 Summary of IAQM receptor sensitivity definitions

Receptor Sensitivity	Effect	IAQM definition of sensitivity
High	Dust soiling	• Users can expect a high level of amenity • The appearance, aesthetics or value of their property would be diminished by soiling • People or property are expected to be present continuously, or at least regularly for extended periods
	Health Effects of PM_{10}	• Locations where people are exposed for eight hours or more a day • Examples include private residences, hospitals, schools and residential care homes
Medium	Dust soiling	• Users would expect a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home • The appearance, aesthetics or value of their property could be diminished by soiling • People or property are not expected to be present continuously, or regularly for extended periods • Examples include parks and places of work
	Health Effects of PM_{10}	• Locations where the people exposed are workers, and exposure is over eight hours or more a day • Example is a commercial property
Low	Dust soiling	• The enjoyment of amenity would not be expected • Property is not expected to be diminished in appearance, aesthetics or value by soiling • Exposure is transient, with people or property expected to be present for limited periods of time • Examples include playing fields, farmland, footpaths and roads
	Health Effects of PM_{10}	• Locations where human exposure is transient • Examples include public footpaths, playing fields, parks and shopping streets

Table 5-4 IAQM matrix for determining the sensitivity of an area to dust soiling (IAQM, 2014)

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

The IAQM guidance provides human health sensitivities for a range of annual average PM_{10} concentrations (i.e. >32, 28-32, 24-28 and <24 µg/m^3). It is noted in the IAQM guidance that the human health sensitivities are tied to criteria from different jurisdictions (UK and Scotland). The annual average PM_{10} criteria for Australia differ from the UK and Scotland and as such concentrations corresponding to the risk categories need to be modified to match Australian conditions.

The annual average criterion for PM_{10} chosen for the project site is the proposed ERS criteria of 20 µg/m^3 (refer to Table 3-3) and therefore the scaled IAQM categories for Victoria are

- >20 µg/m^3
- 17-20 µg/m^3
- 15-17 µg/m^3; and
- <15 µg/m^3.

The background PM_{10} concentrations in the region surrounding the project are outlined in Section 6.2 and fit within the 15-17µg/m^3 concentration range (refer to Table 6-1). Table 5-5 provides the IAQM guidance sensitivity levels for human health impacts for the ranges outlined above, annual average PM_{10} concentration has been conservatively adopted as 17-20 µg/m^3.

Table 5-5 Surrounding area sensitivity to human health impacts for annual average PM_{10} concentrations

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)				
		<20	<50	<100	<200	<350
High	>100	High	High	Medium	Low	Low
	10-100	High	Medium	Low	Low	Low
	1-10	High	Medium	Low	Low	Low
Medium	>10	Medium	Low	Low	Low	Low
	1-10	Low	Low	Low	Low	Low
Low	≤1	Low	Low	Low	Low	Low

Note: Annual average PM_{10} concentration has been conservatively adopted as 17-20 µg/m^3 (refer to Table 6-1)

The sensitivity for each construction activity defined by the IAQM guidance is assessed for the construction footprint. This results in a sensitivity rating. The ratings depend on the sensitivity of the receptors and the distance from the edge of the footprint. As shown in Table 5-4 and Table 5-5, the greater the distance from the construction footprint (the source), the lower the rating. The highest rating achieved is adopted as the final rating for that particular group of receptors.

5.5.2.5 Step 2C – Potential of unmitigated dust impacts

The dust emission magnitude as determined in Step 2A is combined with the sensitivity as determined in Step 2B to determine the potential dust impacts with no mitigation applied. Table 5-6 provides the ranking for dust impacts from construction activities for each scale of activity as listed in Table 5-2.

Table 5-6 Potential dust impacts (for dust soiling and human health)

Activity	Surrounding area sensitivity	Dust emission magnitude		
		Large	Medium	Small
Demolition	High	High	Medium	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Negligible
Earthworks	High	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Construction	High	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Trackout	High	High	Medium	Low
	Medium	Medium	Low	Negligible
	Low	Low	Low	Negligible

5.5.2.6 Step 3 – management strategies

The outcome of Step 2C is used to determine the level of management that is required to ensure that dust impacts on surrounding sensitive receptors are maintained at an acceptable level. A potential impact of high or medium level means that suitable management measures must be implemented during the project.

5.5.2.7 Step 4 – reassessment

The final step of the IAQM methodology is to determine whether there are significant residual impacts, post mitigation, arising from a proposed development. The guidance states:

For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be "not significant" (hereafter referred to as "negligible").

Based on this expectation, as well as experience in Australia, it can be demonstrated that construction activities with targeted mitigation measures can achieve high degrees of dust mitigation which significantly minimise dust impacts to a negligible level.

5.5.3 Operational pollutants of interest

A qualitative assessment of potential impacts on surrounding sensitive receptors was undertaken for the operational phase of the project. Operational impacts were assessed through the identification of potential air emission sources, factors influencing air dispersion of air pollutants and the proximity of sensitive receivers to potential sources.

Air emissions from vehicle movements to and from the project were considered in the Transport impact assessment. This report has relied upon the traffic numbers for consideration of the air quality impacts.

5.6 Assessment of alternative to Trail 1

The assessment of the identified alternative to Trail 1 (the combination of Trail 45, Trail 46 and Trail 47) contained in this report included the following tasks:

- Describe the existing conditions relevant to Trail 1 and the alternative to Trail 1
- Identify the residual environmental impacts determined for construction and operation of Trail 1 and the alternative to Trail 1
- Undertake a comparative analysis of Trail 1 and the alternative to Trail 1
- Identify the preferred trail for each discipline based on the comparative analysis.

5.7 Limitations, uncertainties, assumptions

This assessment adopted conservative input estimates that represent 'worst case' upper percentiles of parameter distribution during construction and operation peaks.

5.7.1 Limitations

The following limitations may impact the findings and conclusions of this air quality assessment:

- Existing air pollutant concentrations were estimated from observations at other locations around Victoria due to the unavailability of a representative monitoring station near the project. The adopted background concentrations have been chosen conservatively (stations are in and around Melbourne where pollutant sources are more prevalent), and therefore actual background concentrations at the project site may be lower than the adopted concentrations.
- It should be noted that this is not a quantitative human health assessment and impacts discussed in this context need to be understood in terms of the IAQM guidance. For a particular group of receptors, a risk rating indicates the risk that group of receptors may experience unmitigated dust concentrations above the Victorian criteria, with the associated potential health effects linked to that criterion.
- Air Quality impacts to flora and fauna have not been assessed in this report but are covered in EES Chapter 8: Biodiversity and habitats.

5.7.2 Assumptions

There have been multiple previous assessments and plans for the Warburton Mountain Bike Destination and as such there are assumptions which have been included from these studies. Assumptions have also been supplied by Yarra Ranges Council during requests for information and others developed by the AECOM team to use in this assessment. The assumptions are listed in Table 5-7 and a reference provided as to where these have been sourced from.

Table 5-7 Assumptions

Assumption	Reference
General	
Traffic volumes and assumptions are sourced from Transport Impact Assessment (AECOM 2020)	AECOM
Construction	
Construction workers will be staying in Warburton	Yarra Ranges Council
Construction compound will be at the Warburton Golf Course	Yarra Ranges Council
Total Construction Period - 18 months for stage 1, additional 12 months for stage 2	Yarra Ranges Council
Construction heavy vehicles will be coming from the west via Warburton Highway	Yarra Ranges Council
Assumed that all construction activity will occur concurrently as a worst case	AECOM
The trail head areas at Mount Donna Buang Road summit and Wesburn Park will undergo minor improvement works which will require light truck and trailer only. Mount Tugwell will require two heavy vehicle deliveries per day	Yarra Ranges Council
Operations	
In the peak hour of the daily operation is assumed to be 25% of the overall daily visitors arrive/depart	AECOM & SALT
The trails are used 40 weeks in the year, this is due to weather conditions or environmental conditions assumed to occur on the remaining 12 weeks	Economic Assessment
Shuttle buses will operate between the primary trail head at Warburton Golf Course to Mount Donna Buang and Mount Tugwell (with a drop off at Wesburn Park on the way to Mount Tugwell). 16 shuttle buses will operate per day over 8 hours to each of Mount Donna Buang and Mount Tugwell. Each shuttle bus carries 25 people.	Yarra Ranges Council Masterplan 2020
New parking spaces at the Golf course trail head is 216 and seven at Mount Tugwell. Car parking space numbers remain the same as existing at Mount Donna Buang (240) and Wesburn Park (220). Car parks will be unsealed pavements consisting of clean crushed rock with a clay content binder to reduce dust generation and sediment transport.	Yarra Ranges Council Masterplan 2020
Assumption for day visitors driving directly to the Golf Course Trail head is 60%, 7.5% to Mount Tugwell, 7.5% to Mount Donna Buang and 25% to Wesburn Park. This was based on the previous assumptions in the SALT TIA with the inclusion of Wesburn Park being agreed with Yarra Ranges Council.	Yarra Ranges Council & AECOM
Shuttle drop off points at Victoria Spur, Edwardstown Road and Donna Buang Road will consist of a gravelled roadside area in which the shuttles can pull into and drop riders and their bikes	Yarra Ranges Council

5.8 Inputs from other EES technical reports

- Traffic volumes and assumptions are sourced from *Transport Impact Assessment* (AECOM 2021)

6.0 Existing conditions

The existing conditions of the air quality environment being considered throughout this assessment are described in the following sections.

6.1 Sensitive receptors

Sensitive receptors in the context of an air quality impact assessment relate to locations where people may be affected by air pollutants emitted from a particular activity. These may include:

- Residential buildings, hospitals and schools
- Community buildings
- Outdoor recreation and public open spaces
- Commercial and industrial buildings.

In terms of the IAQM construction dust impact assessment method as outlined in Section 5.1, the locations of receptors are relevant where:

- A human receptor within:
  - 350 m from the boundary of a site, or
  - 50 m from the route used by construction vehicles on public roads up to 500 m from a site entrance.

The classification and number of receptors in the vicinity of the project was estimated using a combination of building data from Geoscape, planning zone information and aerial images. An overview of sensitive residential receptors is presented in Figure 6-1.

It is noted that receptors such as public footpaths, playing fields, parks and roads may be in the vicinity of the project. Exposure is expected to be transient in these areas with people present for limited periods of time (hours). IAQM guidance in Table 5-3 lists transient receptor sensitivity as ‘Low’. This air quality impact assessment has therefore focused on sensitive receptors where people are expected to be present for extended periods (such as residences, hospitals, schools, residential care homes and places of work)

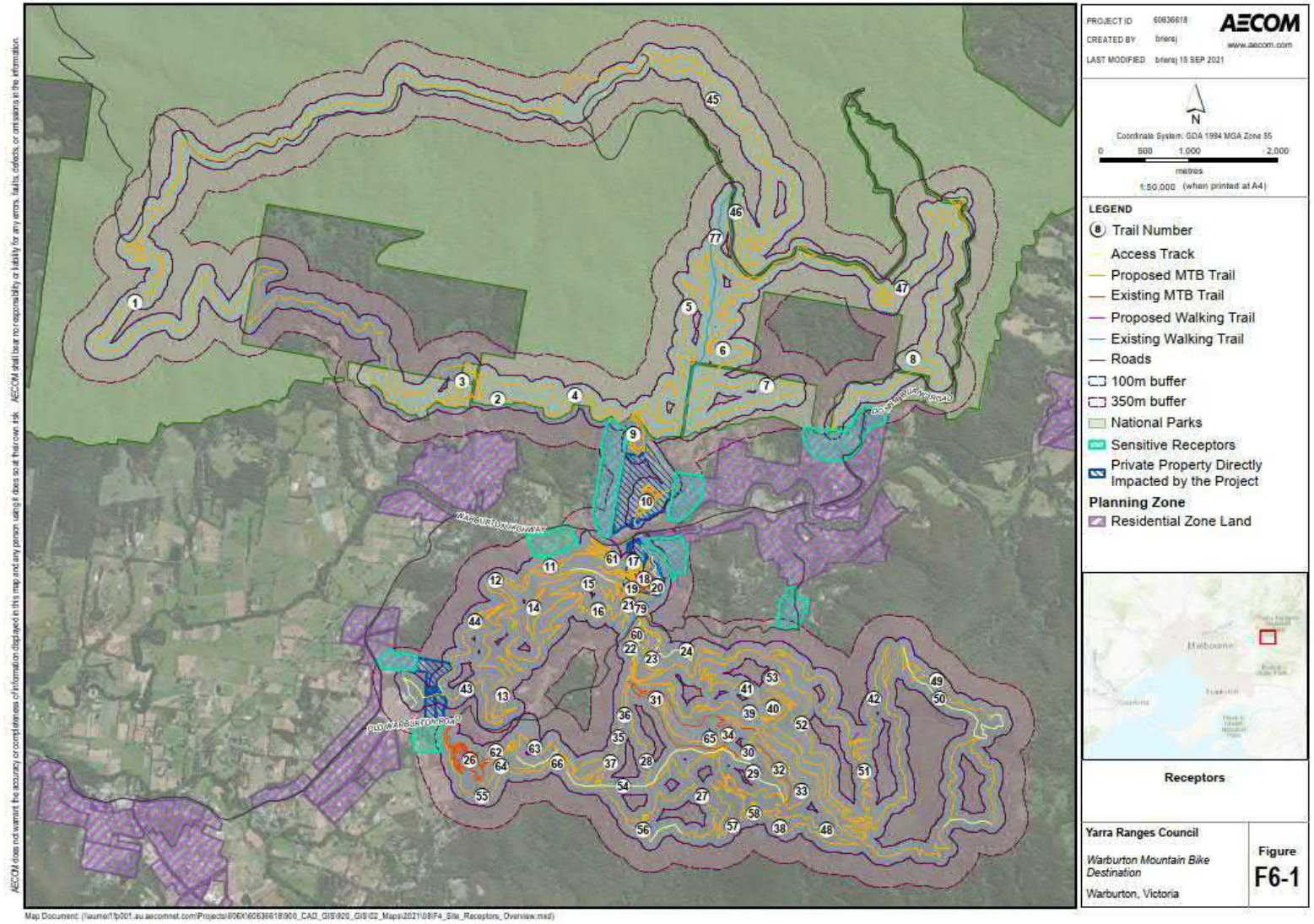

Figure 6-1 Sensitive receptor overview

The sensitive receptors closest to the construction works at the Visitor's Hub include:

- Six residential properties on Damman's Road immediately southwest of the proposed trail head car park
- Eight residential properties to the south of the trail head on Warburton Highway
- Birchwood Manor Hotel and a residential property to the east on Martyr Road
- Alpine Retreat Hotel on Warburton Highway to the southeast
- Warburton Golf Club.

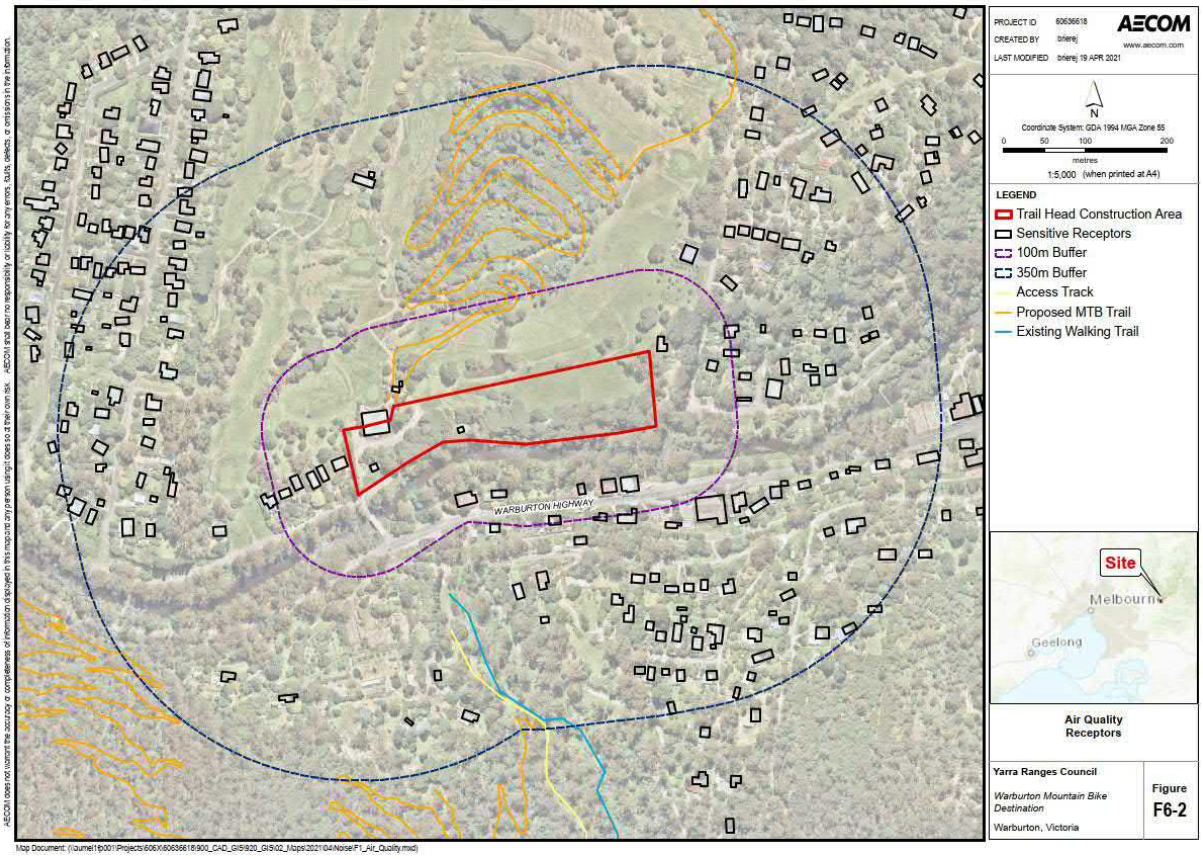

Figure 6-2 Location of sensitive receptors within 100m and 350m buffers from the Trail Head car park

A map of buildings in the vicinity of the Visitor's Hub construction works is presented in Figure 6-2. Note that building data is sourced from Geoscape.

Construction of three other trail heads are proposed as part of the project:

- A new trail head would be established on top of Mount Tugwell, off Mount Bride Road and would include a car park for seven cars, a bus turnaround bay, a bike wash down station, toilets and picnic area.
- The existing visitor node at Mount Donna Buang would be integrated into the network, with the existing car park to be used for shuttle bus drop-offs, and installation of a bike wash down station.
- Wesburn Park existing facilities will provide an additional access point to the network to accommodate mid-week visitation such as school groups or larger groups. Proposed redevelopment of Wesburn park is not assessed as part of the EES.

Sensitive receptors in the vicinity of the trail construction works are considered in Section 7.3.

The identified nearest sensitive residential receptors to each trail head are shown in Figure 6-3 to Figure 6-5.

Figure 6-3 Nearest identified sensitive receptors to the Mount Donna Buang trail head

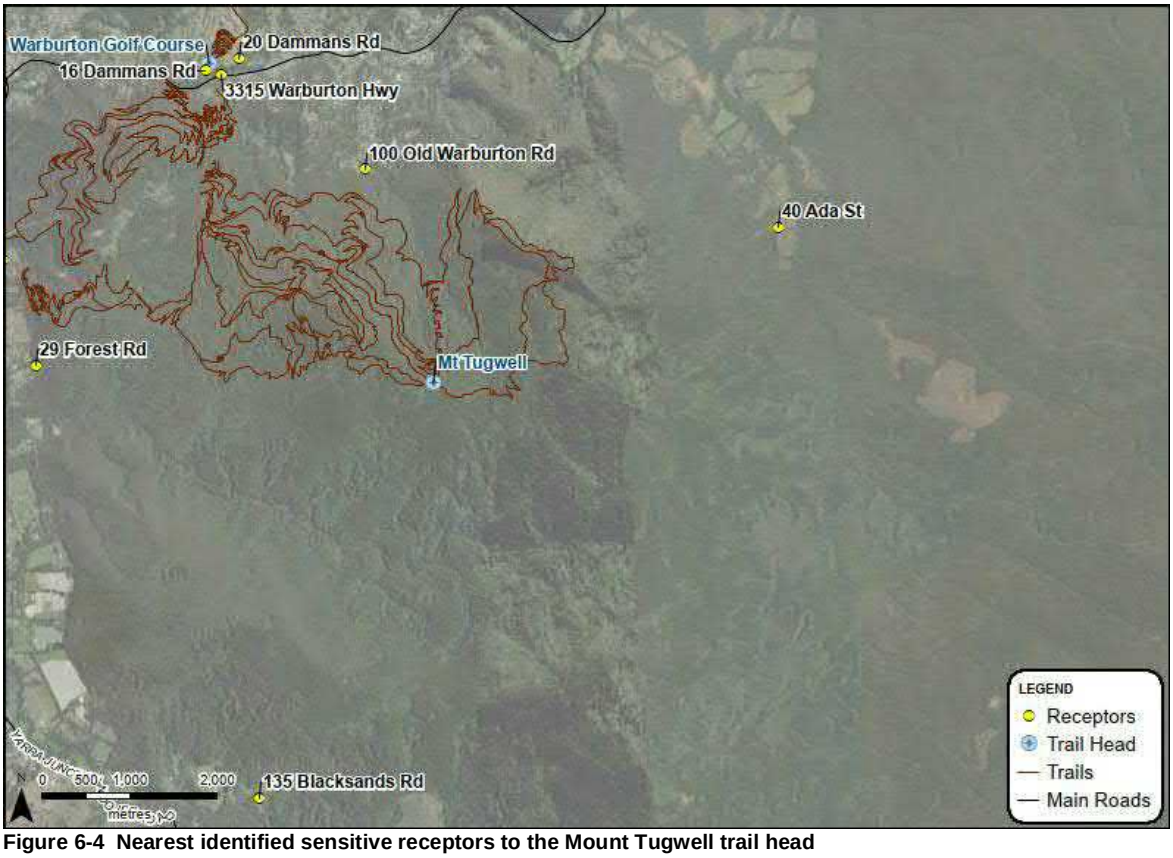

Figure 6-4 Nearest identified sensitive receptors to the Mount Tugwell trail head

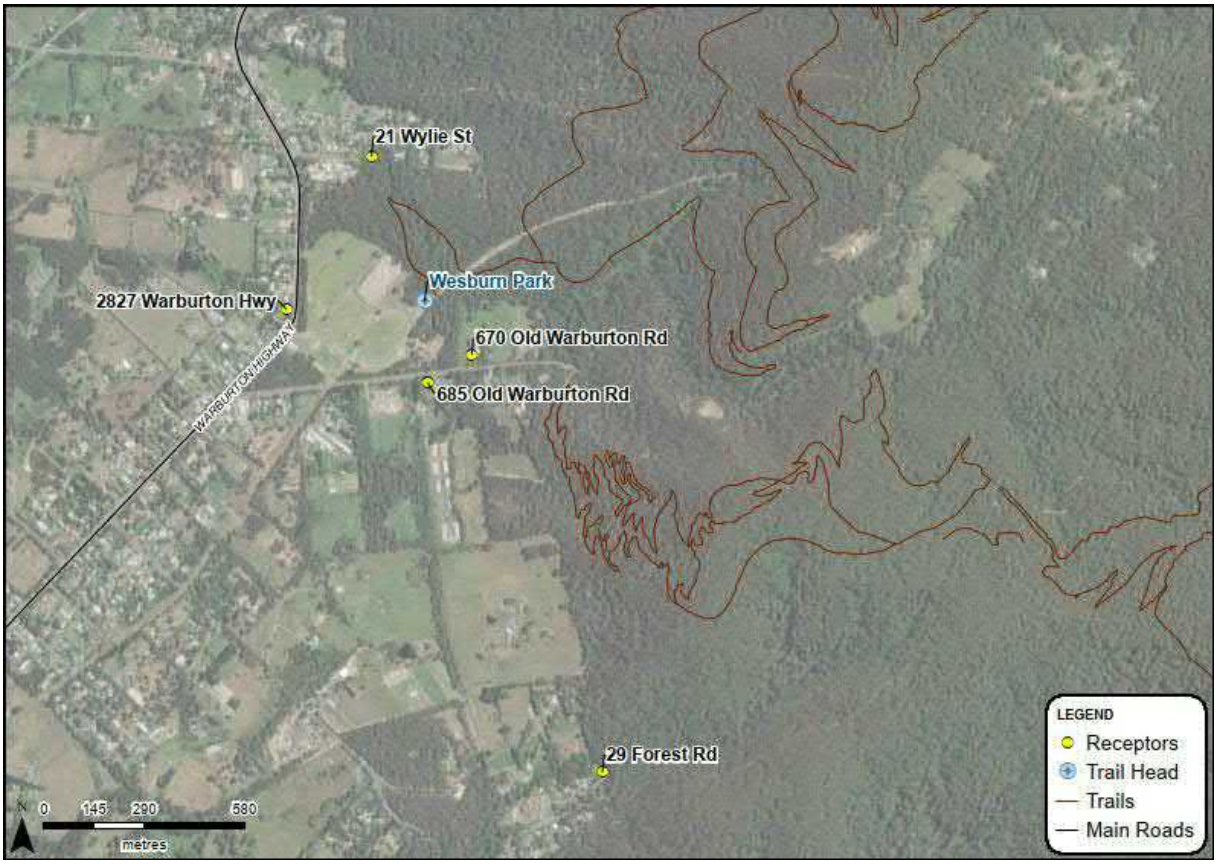

Figure 6-5 Nearest identified sensitive receptors to the Wesburn Park trail head

6.2 Background air quality

EPA Victoria operate several ambient air monitoring stations in the Port Phillip region to ensure compliance with the federally mandated AAQ NEPM. The air quality monitoring stations measure CO, NO_2, ozone (O_3), SO_2, PM_{10} and $PM_{2.5}$. Over the past five years, monitoring results show that Victoria's air quality is generally good although there were periods of poor air quality due mostly to smoke and urban pollution.

A review of the National Pollution Inventory Database for 2017-2018 identified no industrial sources that report emissions to air within five kilometres of the project site. The nearest air emission sources identified were the Reid Bros Sawmill and Upper Yarra Sewage Treatment Plant located over six and ten kilometres, respectively, to the west. Due to the distance of these sources, concentrations of air pollutants in the project area are not expected to be affected.

The project is located in a rural area with the main sources of air emissions expected to be:

- Domestic fuel burning
- Wind driven dust from unsealed areas
- Disturbance of material due to farming activities
- Wheel-generated dust from vehicles moving along sealed or unsealed roads
- Occasional smoke from bushfires or planned burns
- Combustion gases from vehicles.

Particulate emissions (PM_{10} and $PM_{2.5}$) were identified as the primary pollutants of concern for the project area as they have the greatest potential to impact air quality. Background PM_{10} and $PM_{2.5}$ concentrations were therefore assessed in more detail.

The nearest air quality monitoring station to the project site that measures PM_{10} is located within a residential area in Mooroolbark, approximately 33 km east of the project. The Mooroolbark AAQMS continuously measures PM_{10} and ozone. Over the past five years (2015-2019), PM_{10} concentrations at the Mooroolbark AAQMS indicated general compliance with the AAQ NEPM goals. There were a small number of exceedances associated with planned burns or bushfires. A summary of PM_{10} concentrations from 2015 to 2019 are presented in Table 6-1.

Table 6-1 PM_{10} concentrations at Mooroolbark (VIC EPA 2015-2019)

Year	PM_{10} ($\mu g/m^3$)	
	24-hour Average (99th[1] percentile)	Annual Average
2015	37.5	15.6
2016	32.4	12.5
2017	36.3	15.1
2018	34.6	15.7
2019	48.6	16.3
AAQ NEPM Objective	**50.0**	**20.0**

PM_{10} monitoring data is not available for the project area however, $PM_{2.5}$ was monitored by EPAV at Warburton and Healesville in 2020 during a period of planned burning. Portable monitors were deployed between April and November 2020 to provide indicative concentration measurements. Measured $PM_{2.5}$ concentrations were used to estimate PM_{10} concentrations in the project area based on the assumption that $PM_{2.5}$ and PM_{10} concentrations are typically correlated on a regional scale.

The 24-hour average data collected from the Warburton and Healesville $PM_{2.5}$ monitors are presented in Figure 6-6 for comparison to Alphington EPAV monitoring station located in suburban Melbourne.

[1] 99th percentile measure has been used as it is considered a conservative estimate of long-term background air quality

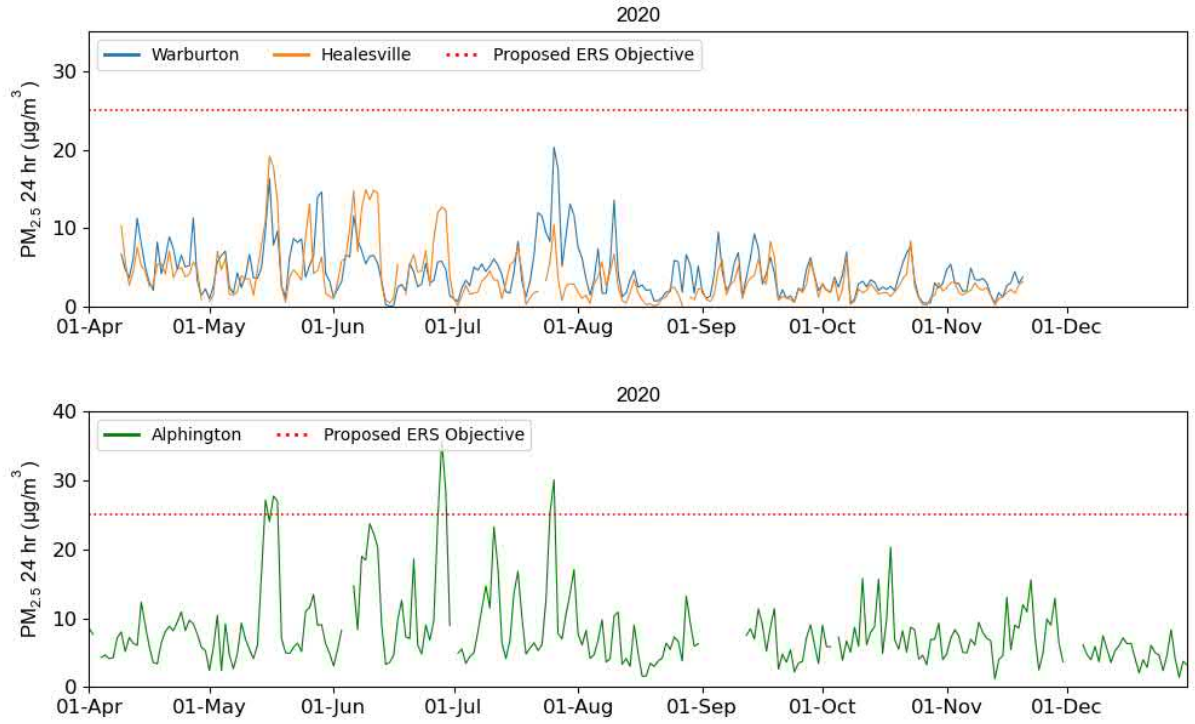

Figure 6-6 24-hour average $PM_{2.5}$ concentrations measured at Warburton and Healesville (top) compared with Alphington (bottom)

Alphington is the nearest station with validated Australian Standard $PM_{2.5}$ measurements during this period. The data shows that 24-hour average $PM_{2.5}$ concentrations at Warburton and Healesville were well below the proposed ERS objective of 25 µg/m^3 throughout the monitored period. As expected, concentrations at Alphington (where there are far more sources of $PM_{2.5}$) were slightly higher than those at Warburton or Healesville. Three exceedances of the ERS objective (up to about 28 µg/m^3) were measured at Alphington in May 2020. In comparison, the highest 24-hour average at Warburton in May was approximately 16 µg/m^3.

Average $PM_{2.5}$ concentrations over the April to June 2020 period for Warburton, Healesville and Alphington are presented in Table 6-2. Data indicates that $PM_{2.5}$ concentrations are considerably lower at Warburton (and Healesville) compared with Alphington.

Table 6-2 Average $PM_{2.5}$ concentrations measured at Warburton and Healesville and Alphington

Station	Warburton	Healesville	Alphington
Average $PM_{2.5}$ Concentration (µg/m^3) April – June 2020	4.5	3.8	7.8

The 24-hour average and average data shown in Figure 6-6 and Table 6-2 respectively show that particulate concentrations at Warburton (i.e. the project area) are typically lower than those measured at a suburban Melbourne location. This pattern would be expected to be true for annual average PM_{10} as well, and the data for Mooroolbark presented in Table 6-1 is therefore conservative for use in this assessment.

6.3 Meteorology and climate

The Bureau of Meteorology (BoM) operates a network of meteorological monitoring stations throughout Victoria. The closest Bureau of Meteorology (BoM) Stations to the project are located at Coldstream (Station number 086383) and Ferny Creek (Station number 086266) approximately 25 kilometres to the north-west and 30 kilometres to the south-west of Warburton, respectively.

Seasonal wind roses from the nearest station at Coldstream is presented in Figure 6-7. Summer winds blow predominantly from the south and southeast with northerlies blowing for around 10 % of the time. Winter winds blow predominantly form the north, with almost 30% of all winds blowing from that direction. Spring and autumn are transition seasons with winds almost equally from the north and south. Autumn and winter see a higher frequency of calm conditions (wind speeds less than < 0.2 m/s), with around 20% of hours calm. Summer and spring have a lower frequency of calm conditions at around 12-13 %. Most calm hours are during the night time or early morning as winds tends to pick up during the day.

It is noted that meteorology will vary between the project site and meteorology stations. The Coldstream BoM station is located in flat terrain and open airport grassland at low elevation (83 m). The project site is located in a valley running east-west, surrounded by mountain ranges and forest. It is expected that wind speed at the project site will generally be lighter than those measured at Coldsteam, and potentially have a slightly higher frequency of east or west winds as winds are squeezed along the axis of the valley. The dominant northerly winds during the cooler months however are still expected as they are generated by regional air pressure systems.

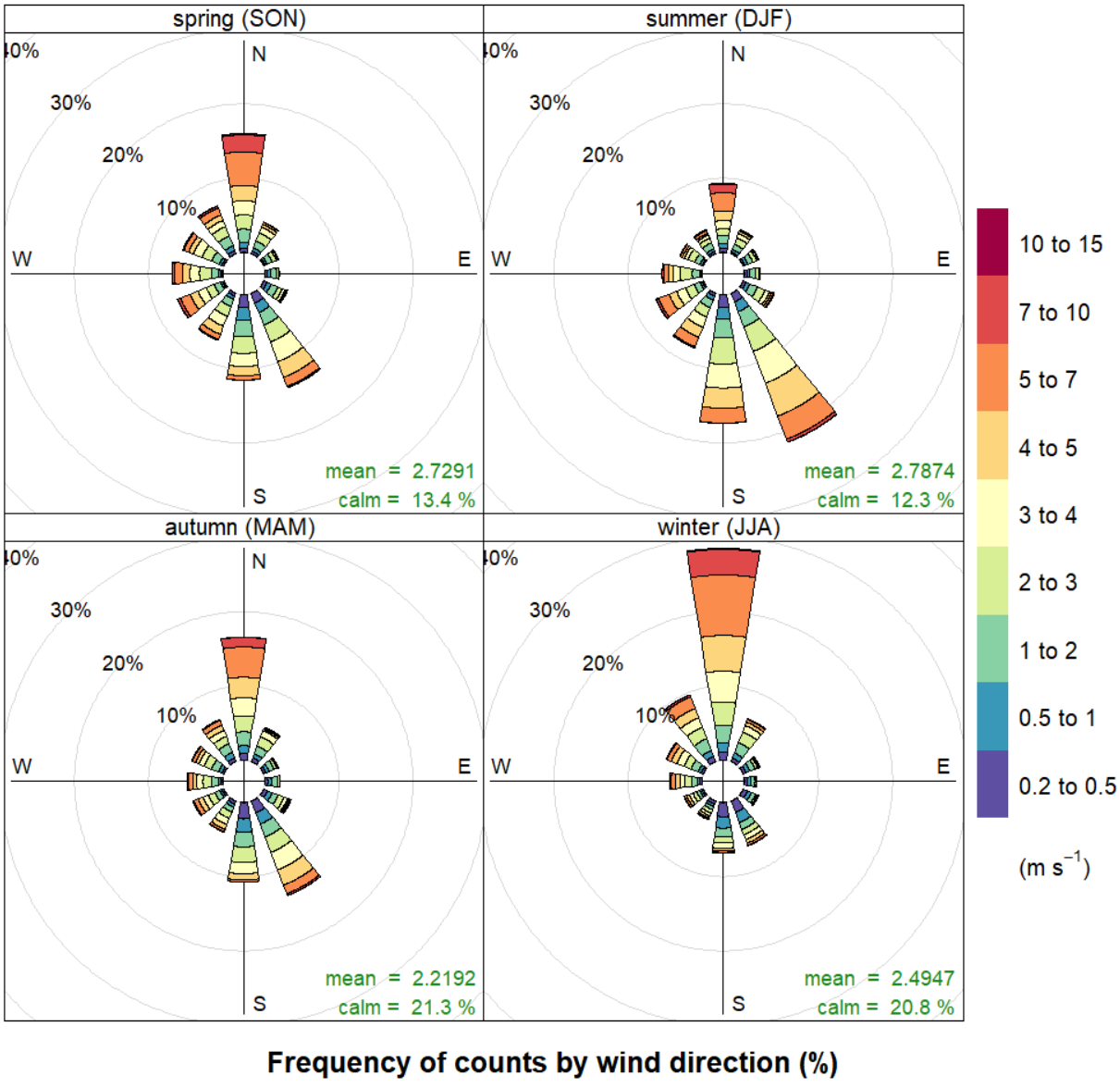

Figure 6-7 Seasonal wind roses for BoM Coldstream (2007 – 2019)

Long-term temperature and rainfall data recorded at the BoM Coldstream site since 1994 is presented in Figure 6-8. Average temperatures range from about 10 °C to 28 °C in summer and about 4 °C to 15 °C during winter. Rainfall is relatively uniform throughout the year, with November the wettest month and January the driest month.

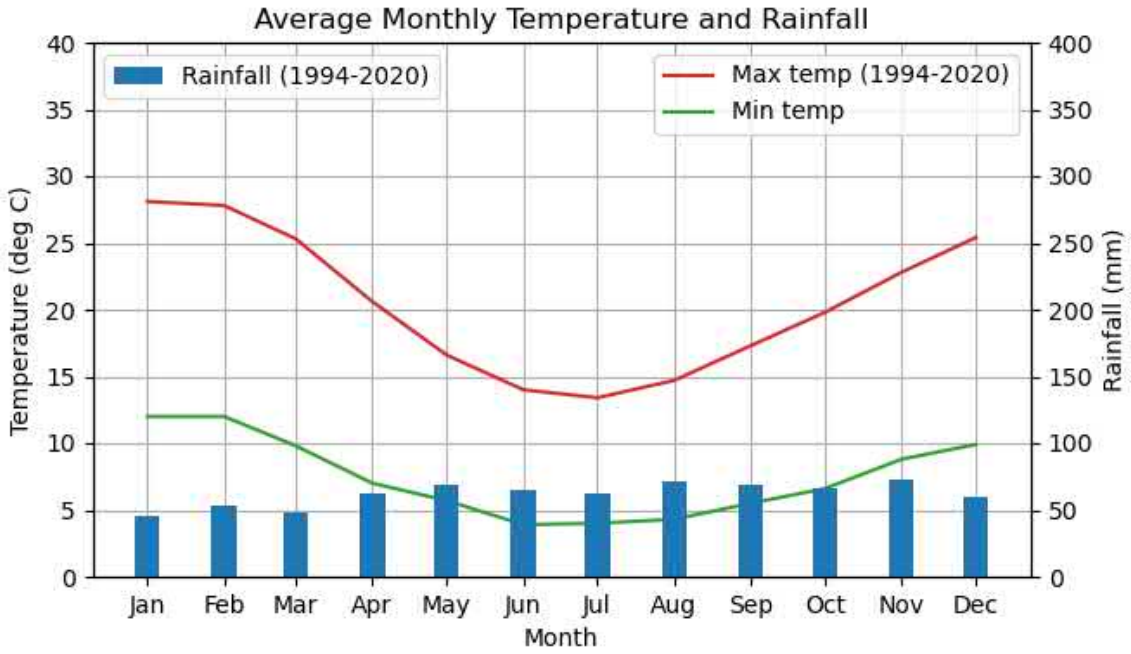

Figure 6-8 Long term average temperature and rainfall at BoM Coldstream

6.4 Topography

The project area is dominated by the east-west aligned Warburton Valley, Mount Donna Buang to the north and Mount Tugwell to the south. Mount Donna Buang and Mount Tugwell rise around 1000 m and 500 m above the valley floor respectively. The Visitor's Hub and trail heads are located at the base of the valley adjacent to Warburton township. Roads in and around the Visitor's Hub area are relatively flat, while the road leading up to the mountains will include relatively steep grades.

6.5 Existing conditions for comparison of Trail 1 and the alternative to Trail 1

For the purpose of comparing trail one and the alternative to Trail 1, the identified nearest sensitive residential receptors are shown in Figure 6-3.

In terms of background air quality, meteorology and climate, and topography very similar characteristics apply to Trail 1 and Trails 45, 46 and 47. Detailed information on these topics is provided in Section 6.2 to 6.4.

6.6 Existing conditions summary

Background air quality, climate and topography were reviewed to characterise the existing air quality conditions at the project site. Air quality is expected to be good at the project area with a low potential for pollution from nearby sources. A combination of a temperate climate, uniform rainfall over the year, low to moderate winds and no large unsealed areas of land nearby results in a low potential for dust impacts.

The greatest potential impact to air quality in the project area will be from bushfires and domestic fuel burning. Meteorological conditions such as calm winds and temperature inversions may reduce dispersion of smoke pollution in the project area.

7.0 Construction impact assessment

This section discusses the potential impacts of the project as a result of construction activities and the associated mitigation measures that aim to reduce impacts to as low a level as possible. Mitigation measures referred to are defined in Section 9.0.

7.1 Dust impacts during construction of Visitor's Hub and trail heads

Proposed project construction includes a new Visitor's Hub and main trail head located to the south of Warburton Golf Course, where the existing car park would be upgraded from the current capacity of approximately 30 to accommodate around 245 cars with room for future expansion if required. The Visitor's Hub would be collocated with the main trail head and would allow direct access to the northern and southern mountain bike trail networks. The layout of the facility is provided in Figure 7-1.

Construction of the main trail head is expected to take approximately three months, with works at other trail heads lasting a number of weeks.

During construction of the proposed visitors hub and trail heads, the following activities could generate dust emissions:

- Site and vegetation clearance including earthworks for ground levelling
- Construction of car park and trail head facilities e.g. toilets
- Vehicle movements on paved and unpaved roads
- Erosion of stockpiles and freshly exposed areas on-site
- Handling, transfer and storage of materials
- Movement of on-site machinery
- Re-contouring of land and soil exposure for reseeding (landscaping around the trail head car park).

Unmitigated dust emissions from these construction activities could result in dust soiling and human health impacts.

Dust suppression techniques such as the use of water sprays, water carts or other devices on unpaved works areas, spoil and stockpiles would be implemented to avoid, minimise and manage dust emissions during construction. In addition, vehicle movement would be restricted to designated roads and tracks within the construction footprint to avoid dust generation.

With the implementation of mitigation measures, dust emissions during construction would be minimised to the extent that impacts are localised and short in duration.

Figure 7-1 Main trail head location at Warburton Golf Course

7.1.1 Step 1 - Screening assessment

Step 1 of the IAQM method involves a screening assessment of the number of sensitive receptors located near the project (as discussed in Section 6.1). A summary of the approximate number of residential receptors that might experience air quality impacts due to construction works is presented in Table 7-1. As there are receptors located within 350 m of the site boundary, the assessment moves to Step 2.

Table 7-1 Approximate number of impacted residences during construction activities

Distance from site boundary	Number of Sensitive Receptors
	Trail Head Car Park
<20 m	0
20-49 m	~5
50-99 m	~15
100-350 m	~130
Total <350 m	**~150**

7.1.2 Step 2A – Dust Emission Magnitude

Potential dust emission magnitudes for the construction of the project were estimated based on the IAQM guidance. The dust emission magnitudes are based on the scale of the anticipated works and are classified as Small, Medium, or Large. Activities on construction sites have been divided into four types to reflect their different potential impacts. These are:

- Demolition
- Earthworks
- Construction
- Trackout.

The classification of potential dust magnitude of reach of these activities was based on the area or volume of the activity (for example the total cubic metres of earthworks) and/or the number of construction equipment that are required to perform the activity. The equipment expected to be used for the construction works are present in Table 7-2.

Table 7-2 Construction equipment considered for assessment

Equipment	Number of
Trucks	6
Excavators	2
Generator	1
Compaction equipment	1
Crane	1
Piling rig	1
Horizontal boring machine	1

Justification and the factors used in determining the dust emissions magnitudes are presented in Table 7-3.

Table 7-3 Dust emission magnitudes in accordance with IAQM guidance

Activity	Potential Dust Emission Magnitude*	Justification
Demolition	**Small** (Total building volume <20,000 m^3)	• No demolition proposed
Earthworks	**Small** (Site area <2,500 m^2 to 10,000 m^2, <5 heavy earth moving vehicles active at any one time, total material moved <20,000 tonnes)	• Minor levelling earthworks and ground preparation to be undertaken for the installation of the new car parking spaces
Construction	**Small** (Total building volume <25,000 m^3, construction material with low potential for dust release)	• Construction of new car parking spaces, main trail head bridge and bus shelters
Trackout	**Medium** 10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material, unpaved road length 50-100 m.	• Plant and spoil trucks leaving site • Total number of outward heavy truck movements is projected to be 13 per day during construction – ref Transport Impact Assessment Table 15

Note: * Definitions for potential dust emission magnitude are defined in IAQM guidance

7.1.3 Step 2B – Sensitivity of the Surrounding Area

According to the IAQM guidance, the overall sensitivity of the construction works for dust soiling is low and human health impacts are classified as medium. Justifications for the classifications are provided in Table 7-4.

Table 7-4 Sensitivity of the project area in accordance with IAQM guidance

Potential Impact	Sensitivity of the Area	Justification
Dust Soiling	Low	The number of receptors surrounding the trail head construction footprint are: • <1 within 20 m • 1-10 within 50 m • <100 within 100 m Refer to Table 5-4 and Table 7-1
Human Health (PM_{10})	Medium	The number of receptors surrounding the trail head construction footprint are: • <1 within 20 m • 1-10 within 50 m • <100 within 100 m Refer to Table 5-5 and Table 7-1

7.1.4 Step 2C – Unmitigated Impacts

The dust emission magnitudes for each construction activity in Table 7-3 were combined with the sensitivity of the construction works in Table 7-4 to determine the potential of construction dust air quality impacts, with no mitigation applied. The 'without mitigation' dust impacts for each IAQM activity have been calculated according to the methodology described in Section 5.5.2.5 and Table 5-6. Construction dust impacts according to IAQM methodology are summarised in Table 7-5.

Table 7-5 Summary of unmitigated construction dust impacts using IAQM methodology

Activity	Step 2A: Potential for dust emissions	Step 2B: Sensitivity of area		Step 2C: Potential unmitigated dust impacts	
		Dust soiling	Human health (PM_{10})	Dust soiling	Human health (PM_{10})
Demolition	Small	Low	Medium	Negligible	Low
Earthworks	Small	Low	Medium	Negligible	Low
Construction	Small	Low	Medium	Negligible	Low
Trackout	Medium	Low	Medium	Low	Low

The outcome of the air quality impact assessment based on the IAQM methodology in Table 7-5 shows that the unmitigated air emissions from construction pose a **negligible** to **low impact** for dust soiling and a **low impact** for human health.

7.1.5 Step 3 – Management Strategies

Measures to minimise environmental impacts and eliminate health risks and nuisance to receptors would be implemented with reference to the EPA Victoria Publication 1834, *Civil Construction, Building and Demolition Guide* EPA 2020). The guidelines recommend a dust prevention strategy be developed at the project planning stage and outlines a range of dust control and suppression measures. Implementing dust management measures such as water sprays, speed restrictions on unsealed roads and increased watering near sensitive receptors would maintain air quality to a standard which does not impact the health and amenity of nearby residents.

Management measures should be incorporated into the Construction Environmental Management Plan (CEMP) for the project to minimise off-site impacts. Recommended mitigation measures are summarised in Section 9.0.

7.1.6 Step 4 – Reassessment

With the mitigation measures outlined in Section 9.0 in place, the residual impact due to construction of the project are not expected to be significant in duration, extent and severity.

As discussed in Section 5.5.2, the IAQM only specifically addresses dust and PM_{10}. However, the management strategies that are listed in EPA Victoria Publication 1834 will by proxy also reduce emissions of $PM_{2.5}$ and other project pollutants of interest. The outcome of the IAQM assessment is considered valid for all pollutants of interest for all averaging periods.

7.2 Air Quality impacts from vehicles during construction of Visitor's Hub and trail heads

Material delivery trucks and mobile plant such as excavators and heavy rollers will be required to undertake the construction of the Visitor's Hub and trail heads. As shown in Table 7-3, the number of outward truck movement in a day is not expected to exceed thirteen. It is expected that inward trucks movement would also not exceed thirteen per day.

The number of mobile plant required is expected to be low, with a maximum of two or three mobile plant operating at any given time. Air quality impacts due to exhaust emissions from the trucks and mobile plant would not be expected to impact receptors beyond 20 meters from the work zone or roadways that the trucks travel along. The nearest receptors are within about 50m and air quality impacts at this distance are likely to be negligible.

The recommended mitigation measures based on best practice to avoid, mitigate or manage air quality impacts associated with construction vehicle emissions are provided in Section 9.0.

7.3 Air Quality impacts during construction of trails

The mountain bike trails would have a bench width of approximately 1.2 metres, within which the ride line would typically be approximately 400-1200 millimetres. At other locations, where constraints were not identified, the terrain offered unexpected opportunities, which encouraged the trail alignment to be modified to maximise the experience of the user by making the most of the existing terrain (and thereby avoiding the need for significant excavation or soil disturbance).

Up to eight teams would be dispersed across the different trail extents at any one time, each with a 1.6-tonne mini-excavator and dual cab ute with trailer. The mini excavator is left on-site, and crew transport tools and fuel into the works area by vehicle or power carrier.

A review of sensitive receptors within 350 m of the project found that the trail network is generally located a significant distance from residential receptors. The highest number of receptors for the project area are located near the Visitor's Hub. Construction of the Visitor's Hub also has the greatest potential for dust impacts due to the magnitude of work. The outcome of the air quality impact assessment in Section 7.1 shows that the unmitigated air emissions from construction of the Visitor's Hub poses a negligible to low impact for dust soiling and a low impact for human health.

Potential dust impacts during construction of the trails are expected to be much lower than during construction of the Visitor's Hub based on the following:

- Smaller dust emission magnitudes
    - no trucks or other large machinery
    - no importation of fill or removal of spoil
- Fewer nearby sensitive receptors
- Progressive linear method of construction
    - Trail construction works are expected to progress 60 to 100 metres per day
    - Works will be near receptors for a short period of time (days).

Dust impacts during construction of the trails are therefore expected to be negligible.

8.0 Operation impact assessment

This section discusses the potential impacts of the project as a result of operation of the project and the associated mitigation measures that aim to reduce impacts to as low a level as possible. Mitigation measures referred to are defined in Section 9.0.

8.1 Air emissions from vehicle traffic and shuttle buses

The operation of the project will result in an increase to traffic movements to and around the project area. Projected vehicle numbers were sourced from the project's *Transport Impact Assessment*. A summary of the total number of generated vehicle movements for the operation of the project are presented in Table 8-1.

Table 8-1 Traffic generation during operations – numbers taken from the project's Transport Impact Assessment

Location	Cars per day	Shuttle buses per day	Daily trips (one-way)	Daily trips (two-way)
Visitor's Hub	162	32	194	388
Mount Tugwell Trail Head	20	16	36	72
Mount Donna Buang Trail Head	20	16	36	72
Wesburn Park Trail Head	65	16	81	162

Most of the new traffic to the project will come to the Visitor's Hub where an increase in daily one-way trips of 194 is projected. Increases in traffic to the trail heads at Mount Tugwell, Mount Donna Buang and Wesburn Park will be fewer with less than 100 new one-way trips projected for each of the trail head locations.

As a comparison, existing vehicle numbers for Warburton Highway at Warburton are presented in Table 8-2. Existing annual average daily traffic (AADT) numbers for total vehicles on this section of road is approximately 6,200 vehicle movements per day. The project is estimated to add approximately 507 2-way vehicle trips to this section of Warburton Highway (cars only and 95% coming from the west along the Warburton Highway). This equates to an 8.2% increase in AADT. An increase of 507 vehicles daily equates to about one vehicle every 85 seconds (assuming all new vehicles travel between 6 am and 6 pm).

Table 8-2 Existing 2020 traffic on Warburton Highway, Warburton

Location	Existing total 2-way AADT – no project	Projected 2-way AADT – with project	Relative increase (num. vehicles)	Percentage Increase (%)
Warburton Highway (TS_ID: 7535) (source – Department of Transport 2020)	6,200	6,707	507	8.2

Vehicle exhaust emissions such as particulate matter (PM_{10} and $PM_{2.5}$), NO_2, SO_2 and polycyclic aromatic hydrocarbons (PAH) are expected to be a minor contributor to the environment. Air emissions due to the increased traffic would be very localised and short in duration as vehicles move past receptors quickly and vehicle engines are switched off soon after arrival at the destinations. Air quality impacts from most non-arterial roads are typically very low beyond the roadside kerb. At the distance of even the closet sensitive receptors to the project, pollutant concentrations due to vehicle traffic are likely to be negligible and are expected to remain well below relevant air quality standards for the duration of the project's operations.

Wheel generated dust from mountain bikes using the trails are not expected to cause dust emissions discernible at sensitive receptors.

8.2 Maintenance

The following maintenance activities would be undertaken proactively to maintain the trails:

- Vegetation pruning to remove vegetation that is encroaching on the trail
- Trail sweeping to remove surface deposits along the trail
- Trail edge mowing/brushcutting to keep grass from encroaching on the trail corridor
- Weed control (chipping or spraying) to prevent encroachment on the track
- Clearing of drains to ensure water flow is maintained
- Minor drainage measures to remove water that is pooling on the surface. Minor trail repairs, such as patching of depressions ore removing protrusions from the trail surface
- Remedy user-created shortcuts/detours by blocking alternative routes with sticks, branches, leaf litter or rocks
- Remove any litter

Further maintenance works are likely to be required as a result of routine trail inspections and/or for urgent repairs where issues have been identified. Maintenance works would generally undertaken by a small team of two to three people with the appropriate skills, equipment and qualifications to undertake the required works. Temporary closure of trails may be required to undertake maintenance works.

Scheduled maintenance days will be planned on a regular basis for non-urgent works to ensure suitable resources are allocated to the works required.

Air quality impacts due to trail maintenance are expected to be negligible due to highly localised works, short duration and distance from receptors.

8.3 Mountain Biking Events

A specific Traffic Management Plan (TMP) would be required during major mountain biking events. The TMP would be developed in consultation with key stakeholders to minimise excessive queueing and congestion which could cause an increase in vehicle emissions near the project area.

With the implementation of event specific TMPs residual vehicle emission impacts are expected to be negligible in duration, extent and severity.

8.4 Erosion

Widespread erosion that results in a significant source of dust is unlikely due to the narrow design of the trails and surrounding vegetations. It is assumed that effective trail design and management will minimise erosion and any air quality impacts. Refer to Surface water, groundwater and geotechnical hazards technical report for further details and the CEMP for mitigation measures.

With the implementation of the mitigation measures, erosion related dust impacts are expected to be minimal, in duration, extent and severity.

9.0 Assessment of alternative to Trail 1

The assessment and comparison of Trail 1 and the alternative to Trail 1 is based on the existing conditions information provided in Section 6.0.

The comparison is based on the residual impact of these options assuming effective implementation of the proposed mitigation and contingency measures outlined in Section 10.0.

Each of the impacts outlined in impact assessment are described in Table 9-1. No new potential impacts have been identified in relation to the alternative to Trail 1.

Table 9-1 Comparison of impacts between Trail 1 and the alternative to Trail 1

Impact	Trail 1	Alternative	Conclusion
Dust impacts during construction of Visitor's Hub and trail heads	Air emissions from construction pose a negligible to low impact for dust soiling and a low impact for human health. Given the distance of Trail 1 from the trail heads, impacts are considered to be negligible	Similar level of impact	No considerable difference in level of impact.
Air Quality impacts from vehicles during construction of Visitor's Hub and trail heads	Air quality impacts within about 50m of work sites are likely to be negligible. Given the distance of Trail 1 from the trail heads, impacts are considered to be negligible	Similar level of impact	No considerable difference in level of impact.
Air Quality impacts during construction of trails	Dust impacts during construction of the trails are expected to be negligible	Similar level of impact	No considerable difference in level of impact.
Air emissions from vehicle traffic and shuttle buses	At the distance of even the closest sensitive receptors to the project, pollutant concentrations due to vehicle traffic are likely to be negligible. Wheel generated dust from mountain bikes using the trails are not expected to cause dust emissions discernible at sensitive receptors	Similar level of impact	No considerable difference in level of impact.
Maintenance	Air quality impacts due to trail maintenance are expected to be negligible due to highly localised works, short duration and distance from receptors	Similar level of impact	No considerable difference in level of impact.
Mountain Biking Events	Traffic Management Plan (TMP) will be required during major mountain biking events to minimise excessive queueing and congestion which could cause an increase in vehicle emissions near the project area	Similar level of impact	No considerable difference in level of impact.
Erosion	Widespread erosion that results in a significant source of dust is unlikely due to the narrow design of the trails and surrounding vegetations and effective trail design and management	Similar level of impact	No considerable difference in level of impact.

The above comparison of impacts indicates that both Trail 1 and the alternative to trail one would be equally preferred from an air quality assessment perspective.

10.0 Mitigation and contingency measures

A Construction Environmental Management Plan (CEMP) provides information to minimise impacts and disturbance from construction of the project. The CEMP contains various environmental management practices, including works related to air quality. Impacts will be managed in accordance with the CEMP.

Mitigation measures have been developed in accordance with the mitigation hierarchy and consideration of the level of potential impact. The focus of these mitigation measures is firstly avoiding impacts where possible (building upon the avoidance measures included in the design), and secondly, implementing project-specific measures to achieve acceptable outcomes for traffic and transport.

The recommended mitigation measures based on best practice to avoid, mitigate or manage air quality impacts associated with the project are defined in Table 10-1.

Table 10-1 Management measures relevant to air quality

Mitigation ID	Mitigation measure	Stage	Type
AM01	Dust suppression would be used at construction areas as required using water sprays, water carts or other devices on unpaved work areas, spoil and aggregate stockpiles during the loading and unloading of dust generating materials	Construction	Mitigation
AM02	Restricted vehicle movements. After arrival at the project site, vehicles, plant and equipment would remain within the construction footprint and on designated roads and tracks	Construction	Design
AM03	Construction vehicles with potential for loss of loads (such as dust or litter) would be covered when using public roads	Construction	Mitigation
AM04	Weather conditions would be monitored for extreme heat and/or wind events using systems such as the Bureau of Meteorology forecasts and works would be modified if conditions are likely to result in air quality impacts at sensitive receptors	Construction	Mitigation
AM05	Vehicles and equipment would be maintained as per manufacturer's specifications to ensure minimal exhaust emissions	Construction	Mitigation
AM06	Land clearance would be minimised during construction to reduce the likelihood of wind-blown dust. Rehabilitate as soon as practicable	Construction	Avoidance/ mitigation
AM07	A traffic management plan would be developed for major mountain biking events which considers the reduction of exhaust emissions related to queuing and congestion.	Operation	Avoidance

11.0 Conclusion

The purpose of this report is to assess the potential air quality impacts associated with the Warburton Mountain Bike Destination to inform the preparation of the EES required for the project. A summary of the key assets, values or uses potentially affected by the project, and an associated assessment of air quality impacts and recommended mitigation measures, are summarised below.

Existing conditions

Existing conditions in the Project area were investigated and discussed in terms of meteorology and air quality, terrain and location of sensitive receptors. The existing meteorology was described in reference to the nearest Bureau of Meteorology station at Coldstream, about 25 km to the west of the

Impact assessment findings

A semi-quantitative and qualitative Air Quality Impact Assessment was undertaken to determine the potential impacts associated with the project. This assessment addresses the potential air quality impacts associated with the construction and operation of the project, in particular with the construction of the Visitor's Hub and car parking facilities adjacent to the Warburton Gold Club.

Dust impacts from construction works associated with the construction of the Visitor's Hub were assessed using the semi-quantitative assessment methodology provided in the UK Institute of Air Quality Management (IAQM) document, *Guidance on the assessment of dust from demolition and construction*. A pre-mitigation dust impact rating of "low" was determined for dust soiling and human health impacts due to potential dust emissions from the project. This rating was based on the potential dust emission magnitude from the project, sensitivity of nearby receptors, proximity of receptors, and the sensitivity of the area as a whole to both dust soiling and human health impacts. Residual impacts once appropriate dust mitigation measures are implemented were considered to be "negligible", in accordance with the post-mitigation reassessment guidance provided in the IAQM.

Air quality impacts due to operation of the project were discussed in terms of increased traffic volumes to the area and also ongoing maintenance activities associated with the upkeep of the trails. Air quality impacts due to operational activities were found to be negligible.

Mitigation and contingency measures

Mitigation strategies for managing potential air quality impacts during the construction of the Project were identified. These strategies were primarily aimed at reducing the potential for dust generation during construction of the Visitor's Hub, but would also assist in reducing emissions of $PM_{2.5}$ and other pollutants of interest.

With the implementation of the mitigation measures recommended throughout this assessment, potential adverse impacts on sensitive receptors associated with air quality changes have been minimised.

Summary of residual impacts

Based on the implementation of the mitigation measures described above, the following residual impacts on air quality have been identified:

- Dust impacts during construction of Visitor's Hub and trail heads - The residual impact due to construction of the Project are not expected to be significant.
- Mountain Biking Events - With the implementation of event specific TMPs residual vehicle emission impacts are expected to be negligible in duration, extent and severity.
- Erosion - With the implementation of the mitigation measures, erosion related dust impacts are expected to be minimal, in duration, extent and severity.

12.0 References

Department of Transport (2020) https://vicroadsopendata-vicroadsmaps.opendata.arcgis.com/datasets/traffic-volume/data?geometry=145.387%2C-37.780%2C146.260%2C-37.685 Accessed on 13 April 2021

EPA (2020). *Civil Construction, Building and Demolition Guide*, EPA Publication 1834, 2020.IAQM (2014). *Guidance on the assessment of dust from demolition and construction*, Version 1.1, Institute of Air Quality Management, London

Appendix E

Noise Technical Report

Noise Technical Report

Warburton Mountain Bike Destination

Noise Technical Report

Warburton Mountain Bike Destination

Client: Yarra Ranges Council

ABN: 21 973 226 012

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Quality information

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Reviewed by	Simon McHugh

Revision History

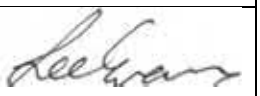
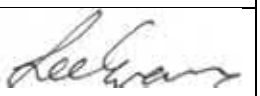
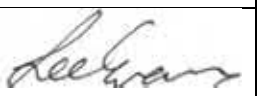
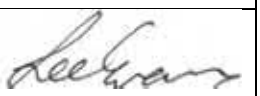
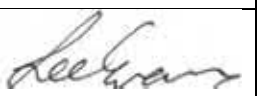
Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
1.0	03-Dec-2020	Draft	Lee Evans Principal Acoustic Engineer	
2.0	07-May-2021	Post TRG draft	Lee Evans Principal Acoustic Engineer	
3.0	14-Sep-2021	Second Post TRG draft	Lee Evans Principal Acoustic Engineer	
4.0	01-Oct-2021	For authorisation	Lee Evans Principal Acoustic Engineer	
5.0	13-Oct-2021	For exhibition	Lee Evans Principal Acoustic Engineer	

Table of contents

Executive summary

Overview

Warburton Mountain Bike Destination ('the project') is a proposed world class mountain biking destination centred around Warburton, approximately 70 km east of Melbourne. The proponent for the project is Yarra Ranges Council.

In accordance with the *Environment Effects Act 1978* (EE Act), the project requires an environment effects statement (EES) to be prepared to allow stakeholders to understand the likely environmental impacts of the project and how they are proposed to be managed.

AECOM was commissioned to undertake a noise impact assessment to inform the EES. This technical report presents the findings of the assessment and is an attachment to the EES.

Noise context

Noise produced during the construction and operation the project has the potential to impact nearby noise sensitive receptors if not adequately understood and subsequently managed in accordance relevant legislation and guidelines. Impacts from noise can reduce human amenity when produced at levels that are annoying, disruptive or, in some cases, physically harmful to people.

Without proper assessment and appropriate mitigation, the proposed activities and operations for this project risk producing noise that could result in adverse environmental impacts. This assessment addresses these specific environmental matters in response to the scoping requirements for this EES and by providing evidence that the potential impacts of the project can be managed to achieve the desired outcomes outlined by the Minister for Planning.

Noise impacts to flora and fauna have not been assessed in this report but are covered in EES Chapter 8: Biodiversity and habitats.

Existing conditions

Baseline noise levels were measured to establish the existing noise environment throughout the project study area. This information is used to explain the existing noise environment, including the presence of existing industry or other environmental noise sources, support the development of the project criteria and assess the potential change to the noise environment if the project was constructed.

The measured background levels were considered typical of rural areas with no audible noise from transportation and industrial sources.

Impact assessment findings

An iterative assessment was undertaken to evaluate potential impacts associated with the project, considering the existing conditions within the study area and associated construction and operational activities.

Potential impacts investigated included the following:

- Construction noise
- Operational noise.

The outcomes of each stage of the investigation are described in the following sections.

Key findings - Construction noise

Construction noise should be reduced as far as is reasonably practicable to avoid unnecessary noise impacts upon sensitive receptors during EPA normal working hours in accordance with the EPA Publication 1834. This intention has been captured in the application of the practices included within the mitigation measures listed in **NM01**.

If works are to be conducted outside of EPA normal working hours, then noise monitoring would be required in accordance with **NM02**.

A helicopter may be employed during bridge assembly if a crane is not suitable. In this case noise control at source is not possible and the mitigation measures detailed in **NM03** should be employed.

Key findings - Construction vibration

Vibration due to construction and operation has not been considered in detail. Given the proposed equipment and activities, in combination with the distances to the various nearest sensitive receptors, vibration due to the project is likely to be insignificant.

Any works that are required to be undertaken within the safe working distances presented in Table 19 should be assessed further in accordance with **NM01.**

Key findings - Operational noise

Noise from fixed equipment would be limited to bike washing stations located at each trail head.

Based on the assumed sound power level for the activity, bike wash stations should be sited at least 200 metres from the nearest residential premises at the main trail head, and at least 50 metres from the nearest residential premises at Wesburn Park (**NM04**).

If the bike wash stations are to be located closer than 200 metres from the nearest resident at the main trail hub then shielding in the form of noise barriers around the wash area and the orientation of the bike washes would be given consideration at the detailed design stage.

Noise due to mountain bikes on the trails and patrons throughout the precinct under normal operating conditions (i.e. not at events) was assessed on the basis of a controlled measurement survey arranged with Yarra Ranges Council and is not expected to be intrusive for the majority of residences close to the trails.

However, noise from the trails could be audible and intrusive at properties on Martyr Road in Warburton under normal operating conditions. A noise barrier has been recommended in this location; however, further design work would be required to define whether this approach is reasonable or feasible.

The potential for large events to be undertaken at the mountain bike destination has been considered. Noise from public address systems shall comply with EPA 1254 and music shall comply with EPA 1826. Compliance with the EP Regulations will also be required.

Events would be considered under the relevant council permits and noise guidelines on a case by case basis and this is captured in **NM06**.

Key findings - Traffic noise

Increased road traffic activity has the potential to increase noise levels by 3 dB at residential receptors located near Myers Bridge, just south of the main trail head and Warburton Golf Club. This is a moderate increase in and may be noticeable to local residents.

There is a predicted 1 dB increase in noise levels due to traffic along the Warburton Highway just south of the main trail head. This change is not expected to be noticeable.

Indicative attended traffic noise measurements have been undertaken and are described in Section 6.2.2.

The prevailing environment in this location was dominated by continuous traffic on Warburton Highway with occasional pass-bys on Dammans Road. Warburton Highway is likely to remain the dominant source after the opening of the project and, as such, the change in traffic noise to nearby residents in not expected to be noticeable.

Key findings - Operational vibration

The potential for human disturbance because of ground vibration generated by the operation of the project is considered to be very low. Accordingly, operational vibration has not been assessed.

Assessment of alternative to Trail 1

There is no difference, in terms of noise, between the assessment presented herein and the alternative to Trail 1 (the combination of Trail 45, Trail 46 and Trail 47), should it be adopted.

Therefore, the alternative has not been presented herein.

Residual Impacts

Construction

Reasonable and practicable mitigation measures are to be applied to all construction works to reduce noise as far as is reasonably practicable. The impact assessment has indicated that there is no potential impact due to out of hours works since there are none proposed.

Operation

Noise from the trails could be audible and intrusive at properties on Martyr Road in Warburton under normal operating conditions. A noise barrier has been recommended in this location; however, further design work would be required to define whether this approach is reasonable or feasible.

It is noted that the predicted noise levels for fixed equipment are based on typical equipment selections. As such the assessment recommends an offset distance between the equipment and residents as opposed to specific at source treatments.

It is possible that the required reduction could instead be achieved by selecting equipment that produces less noise than has been assumed herein during detailed design.

Management of potential impacts

Potential noise impacts due to the project would be avoided, mitigated, or managed to required standards through the recommended mitigation measures.

Abbreviations

Abbreviation	Title
AECOM	AECOM Australia Pty Ltd
CEMP	Construction Environmental Management Plan
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EES	Environment Effects Statement
EMF	Environmental Management Framework
EPA	Environment Protection Authority Victoria
GIS	Geographic Information System
ICNG	Interim Construction Noise Guideline (NSW Government)
NIRV	EPA Publication 1411: *Guidelines: Noise from Industry in Regional Victoria* (October 2011)
SEMP	Stakeholder Engagement Management Plan
SEPP N-1	EPA Publication S31: *State Environmental Protection Policy (Control of Noise from Industry, Commerce and Trade) No. N-1*
UGB	Urban Growth Boundary

Glossary

Term	Definition	
'A' Weighted	Frequency filter designed to adjust the absolute sound pressure levels to correspond to the subjective response of the human ear. The A-weighting filter emphasises frequencies in the speech range (between 1 kHz and 4 kHz) which the human ear is most sensitive to.	
Ambient noise	The A-weighted equivalent continuous sound pressure level L_{Aeq}, is typically the descriptor used to describe ambient noise.	
Background level (L_{90} *or* L_{A90})	The L_{90} sound pressure level is used to quantify the background level. For a day, evening or night period means the arithmetic average of the L_{A90} levels for each hour of that period for which the commercial, industrial or trade premises under investigation normally operates. The background level shall include all noise sources except noise from commercial, industrial or trade premises which appears to be intrusive at the point where the background level is measured.	
Decibel [dB]	The measurement unit of sound.	
Decibel scale	A three decibel increase in the sound pressure level corresponds to a doubling in sound energy. An increase or decrease of three decibels is typically considered to be the smallest change in sound level that a listener can detect. A change of five decibels, however, is clearly noticeable. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. This increase is typically perceived to sound twice as loud. The table below shows the sound pressure level that would be typically experienced when exposed to different sources:	
	0 dB	Threshold of human hearing
	40 dB	Whisper in a library
	50 dB	Open office space
	70 dB	Inside a car on a freeway
	80 dB	Outboard motor
	90 dB	Heavy truck pass-by
	100 dB	Pneumatic hammer
	110 dB	Rock concert
	120 dB	747 take off at 250 metres
Effective Noise Level	In accordance with EPA 1826, adjustments to the measured noise level are applied to account for the effects of duration, tonality, intermittency, and impulsiveness of the noise. The adjusted 30-minute noise level is called the 'Effective Noise Level', which is assessed in relation to the noise limits.	
Frequency [f]	Frequency is measured in Hertz (Hz). The frequency corresponds to the pitch of the sound: a high frequency to a high-pitched sound and a low frequency to a low-pitched sound.	

Term	Definition
Insertion loss	The reduction in sound pressure level at a receptor by inserting a barrier between the source and considered receptor.
Impulsiveness	A noise is more annoying when it has an impulsive component (such as banging noise). Where a noise source is impulsive, an adjustment is made to allow for the additional annoyance caused by the impulses.
L_{eq}	Equivalent (energy averaged) noise level measured over a time period. This noise descriptor is commonly used in environmental noise policies and assessments. The time period the measurement is averaged over is included in the subscript, i.e. $L_{Aeq,\ 30min}$.
L_{90}	The noise level exceeded 90% of the measurement period. This descriptor is used to represent the background noise level. The time period the measurement is averaged over is included in the subscript, i.e. $L_{A90,\ 30min}$
L_{max}	The maximum sound pressure level measured over the measurement period. The A-weighted form is denoted as 'L_{Amax}'.
Noise-sensitive area	NIRV Recommended Maximum Noise Levels are set at noise-sensitive areas. These are mainly residential dwellings, but can include, for example, motels and tourist establishments. They do not include schools. Noise is assessed at lower of: • the property boundary • within 10 metres of a dwelling.
Octave band	The International Standards Organisation has agreed upon preferred frequency bands for sound measurement and the octave band is the widest band for frequency analysis. The upper frequency limit is approximately twice the lower frequency limit and each band is identified by its band centre frequency. Typical Octave Band frequencies for environmental noise assessments are: 31.5Hz, 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz.
One-third octave band	Where more detailed information about a noise is required, standardised one-third octave band analysis may be used. There are three one-third octave bands for each octave band. (e.g. 25Hz, 31.5Hz, 40Hz one-third octave bands cover the same frequency range as the 31.5Hz octave band).
Sensitive receptor	Areas where the occupants, buildings or land use are potentially susceptible to the adverse effects of exposure to noise.
Sound power level	The total sound emitted by a source.
Sound pressure level	The amount of sound at a specified receiving point.
Tonality	Noise is subjectively more annoying when it has a tonal component (a perceptible hum or whine).

Term	Definition
	Tonality can be determined by subjective assessment or from one-third octave band analysis of the noise. Where a noise is tonal, an adjustment is made to allow for the additional annoyance caused by the tone.

1.0 Introduction

This noise impact assessment informs the land use and planning technical report. In addition to the content provided in the subsequent sections, this report utilises and is based on key project information provided in the following main report sections:

- Introduction as outlined in Section 1 of the main report.
- Project overview as outlined in Section 3.1 of the main report.
- Project development as detailed in Section 3.2. of the main report
- Main project components as detailed in Section 3.3 of the main report.
- Alternative to Trail 1 as detailed in Section 3.4 of the main report.
- Project timing as provided in Section 3.5 of the main report.

2.0 Scoping requirements

2.1 EES evaluation objectives

The *Working Draft Scoping Requirements for Warburton Mountain Bike Destination Environment Effects Statement* ('scoping requirements') by the Minister for Planning set out the specific environmental matters that need to be addressed by Yarra Ranges Council in order to satisfy the Commonwealth and Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project in accordance with the *Ministerial guidelines for assessment of environmental effects* under the EE Act.

The evaluation objectives that are relevant to the noise study and associated key issues are presented in Table 1.

Table 1 Relevant evaluation objectives for the noise study

Evaluation objective	Key issues
Biodiversity and habitats	
Avoid, minimise, and restore potential adverse effects on native vegetation, listed threatened species and ecological communities, and habitat for these species, as well as address offset requirements for residual environmental effects consistent with state and Commonwealth policies.	Indirect loss of vegetation or habitat quality, that may support any listed species or other protected fauna, resulting from hydrological or hydrogeological change, edge effects, habitat fragmentation, loss of connectivity, or other disturbance impacts arising from construction or operation, including noise, movement, vibration and lighting.
Social, economic, amenity and land use	
To minimise potential adverse social, economic, amenity and land use effects at local and regional scales.	Potential for increases in noise and vibration levels during project construction or operation to affect amenity adversely for sensitive receptors including residential areas.

Noise impacts to biodiversity and habitats have not been assessed in this report but are covered in EES Technical Report A and Chapter 8: Biodiversity and habitats.

2.2 EES scoping requirements

The aspects from the scoping requirements relevant to the evaluation objective are shown in Table 2, as well as the location where these items have been addressed in this report.

Table 2 Scoping requirements relevant to noise

Aspect	Scoping requirement	Section addressed
Social, economic, amenity and land use		
Key issues	Potential for increases in noise and vibration levels during project construction or operation to affect amenity adversely for sensitive receptors including residential areas.	Sections 7.0, 8.0 and 8.6
Existing environment	Identify dwellings and any other potentially sensitive receptors (e.g. residential, commercial, industrial, recreational areas etc.) that could be affected by the project's potential effects on air quality, noise or vibration levels, especially vulnerable receptors including children and the elderly.	Section 6.0
	Monitor and characterise background levels of air quality (e.g. dust), noise and vibration near the project, including established residential areas and other sensitive receptors	Section 6.0
Mitigation measures	Identify potential and proposed design responses and/or other mitigation measures to avoid, reduce and/or manage any significant effects for sensitive receptors during project construction and operation arising from specified air pollution indicators, noise, vibration, traffic and lighting, in the context of applicable policy and standards.	Section 9.0
Likely effects	Assess likely noise, vibration, traffic, lighting, and visual impacts at sensitive receptors adjacent to the project during project construction and operation (both with and in the absence of the proposed mitigation measures), relative to standards.	Section 7.0 and 8.0
Performance criteria	Outline measures to monitor the success of commitments to mitigate or manage effects on social, economic, amenity and land use values during all phases of the project.	Section 9.0
	Describe the approach to monitor effects and develop contingency measures to be implemented in the event of adverse residual effects on social, economic, amenity and land use values requiring further management.	Section 9.0
	Describe any further measures that are proposed to enhance social outcomes, and either manage risks to landscape and recreational values, or enhance visual amenity outcomes both for residents living near the project and for visitors to the locality, to form part of the EMF	Section 9.0

2.3 Linkages to other technical reports

This report has interdependencies with other reports in relation to the assessment of impacts associated with:

- The potential for changes in the noise environment to affect the viability of existing and proposed land uses as considered in the EES Land Use and Planning Technical Report.
- The potential for changes to the noise environment to affect significant fauna species as considered in the EES Biodiversity and Habitats Technical Report.

The specialists undertaking these assessments worked collaboratively to evaluate these potential impacts.

3.0 Legislation, policy, and guidelines

The legislation, policy, and guidelines relevant to this assessment and are summarised in Table 3.

Table 3 Legislation, policy, and guidelines relevant to the assessment

Document title	Summary	Relevance to the project
Legislation, Regulations, and policy		
Environment Protection Act 2017 ***(EP Act 2017)***	The Environment Protection Act ('the Act') aims to protect Victoria's air, water and land by adopting a 'general environment duty' (GED) which imposes a broad obligation on entities and individuals to take proactive steps to minimise risks of harm to human health and the environment from pollution or waste. The Environment Protection Authority administers the Environment Protection Act and subordinate legislation.	The framework for managing noise under the Act provides minor amendments to the previous approach to assessing noise from commercial and industrial sites (SEPP N-1, SEPP N-2 and NIRV). The noise limits for commercial, industrial and trade premises in rural areas are determined using the same methods as NIRV, however, the definition of noise sensitive area in the Environment Protection Regulations is different from that set out in the SEPP N-1/NIRV framework. The derived NIRV Recommended Maximum Noise Levels, SEPP N-1 and SEPP N-2 requirements have been used in this assessment due to the assessment being undertaken during the EP Act transition period. The Act also transfers the noise SEPPs to regulations and introduces the general environmental duty (GED), the environment reference standard (ERS) and unreasonable noise as described in Section 3.1.
Environment Protection Regulations 2021 **(Environment Protection Regulations)**	The Environment Protection Regulations are used to further the purpose of and give effect to the Environment Protection Act. The Noise Protocol (see below) is encompassed within in full.	The Environment Protection Regulations provide operational noise criteria via the Noise Protocol.
The Environment Reference Standard **(ERS)**	The ERS sets out objective noise levels based on Victoria's planning zones. The noise levels outlined in the ERS are objectives and are neither noise limits nor noise design criteria.	
EPA Publication 1826: Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and	The Noise Protocol explains how to determine operational noise criteria for new and existing commercial, industrial and trade premises and entertainment venues as defined by the	The Noise Protocol provides assessment criteria, including noise limits, for operational noise. The criteria apply at all nearby sensitive receptors during the operation of the project.

Document title	Summary	Relevance to the project
entertainment venues: March 2021 **(Noise Protocol)**	Environment Protection Regulations. The Noise Protocol is a subordinate legislation document. It is required to be adhered to by law.	In addition to setting recommended levels for industry, the Noise Protocol requires that industry should take reasonable opportunities to reduce noise.
Guideline advisory documents		
Noise Control Guidelines, EPA Publication 1254, 2008 **(EPA Publication 1254)**	Provides guidance with respect to noise from public address systems in public spaces.	There is a possibility that large events may make use of a temporary public address system.
Civil construction, building and demolition guide, EPA Publication 1834, 2020*.* **(EPA Publication 1834)** *(This replaces publications 480, 960, 981, Section 2 of 1254 and 1264)*	Outlines guidance with respect to community consultation, work scheduling, standard mitigation measures, criteria and unavoidable works that would apply to the construction stage of the project.	The standard mitigation measures, working hours and criteria have been adopted.

3.1 EP Act 2017

The new Environment Protection Act is not limited to a transition of the noise SEPPs to regulations. It also includes:

- **General Environmental Duty** – The general environmental duty (GED) is at the centre of the *Environment Protection Act 2017* and it applies to all Victorians. All individuals and businesses must reduce the risk of harm from your activities:
    - to human health and the environment
    - from pollution or waste.
- **Unreasonable noise** – For the purposes of paragraph (b) of the definition of unreasonable noise in section 3(1) of the Act, noise emitted from commercial, industrial and trade premises is prescribed to be unreasonable noise if the effective noise level of the noise exceeds:

    (a) the noise limit that applies at the time the noise is emitted; or

    (b) the alternative assessment criterion that applies at the time the noise is emitted if the assessment of an effective noise level is conducted at an alternative assessment location in accordance with the Noise Protocol.
- **Environment Protection Regulations** (supported by the *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*)**.** The *Environment Protection Act 2017* changes Victoria's focus for environment protection and human health to a prevention-based approach, underpinned by the GED**.** The GED will require everyone, including businesses and individuals, conducting activities that pose a risk to human health or the environment from pollution or waste to understand those risks and take reasonably practicable steps to eliminate or minimise them.

- **Environmental Reference Standard** - The environment reference standard (ERS) is made under section 93 of the *Environment Protection Act 2017* (the Act). It sets out the environmental values of the ambient air, ambient sound, land, and water environments that are sought to be achieved or maintained in Victoria and standards to support those values.

  Environmental values are the uses, attributes, and functions of the environment that Victorians value. Some examples are water that is safe to drink; air quality that sustains life, health, and wellbeing; land that is suitable for production of food; and an ambient sound environment that supports sleep at night.

Application of the GED under the EP Act implies that all noise generated by the project should be reduced as far as is reasonably practicable.

Construction noise should adhere with the ERS and EPA Publication 1834.

All operational noise should adhere with the GED and the following, depending on the source:

- Fixed operational equipment: EPA Publication 1826
- Patrons and mountain bike noise: The ERS
- PA noise (if required): The ERS and EPA Publication 1254.
- Patron vehicles: The ERS
- Events: The ERS (patrons, vehicles etc) and EPA Publication 1826 (music, if applicable)

3.1.1 Environment Reference Standard

The ERS applies to both the construction and operation phases of the project and is a reference tool, it does not set compliance limits.

In addition, it does not apply in situations where specific regulations apply to that part of the environment or activity. For example, those noise sources considered by the *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*. This is because noise limits and other requirements are clearly set by these regulations.

As such, for the purposes of this assessment, the ERS has been applied to noise from:

- Construction
- Patrons and mountain bikes.

From a noise perspective, the ERS provides a framework for assessing the ambient sound environment over a period of time for different categories of land use, as shown in Table 4.

Table 4 ERS land-use categories

Land use category	General description	Planning Zones
Category I	An urban form with distinctive features or characteristics of taller buildings, high commercial and residential intensity, and high site coverage.	Industrial Zone 1 (IN1Z) Industrial Zone 2 (IN2Z) Port Zone (PZ) Road 1 Zone (RDZ1) Capital City Zone (CCZ) Docklands Zone (DZ)
Category II	Medium rise building form with a strong urban or commercial character. Typically contains mixed land uses including activity centres and larger consolidated sites, and an active public realm.	Industrial Zone 3 (IN3Z) Commercial 1 Zone (C1Z) Commercial 2 Zone (C2Z)

Land use category	General description	Planning Zones
		Commercial 3 Zone (C3Z) Activity Centre Zone (ACZ) Mixed Use Zone (MUZ) Road 2 Zone (RDZ2)
Category III	Lower rise building form including lower density residential development and detached housing typical of suburban residential settings or in towns of district or regional significance.	Residential Growth Zone (RGZ) General Residential Zone (GRZ) Neighbourhood Residential Zone (NRZ) Urban Floodway Zone (UFZ) Public Park and Recreation Zone (PPRZ) Urban Growth Zone (UGZ)
Category IV	Lower density or sparse populations with settlements that include smaller hamlets, villages and small towns that are generally unsuited for further expansion. Land uses include primary industry and farming.	Low Density Residential Zone (LDRZ) Township Zone (TZ) Rural Living Zone (RLZ) Green Wedge A Zone (GWAZ) Rural Conservation Zone (RCZ) Public Conservation and Resource Zone (PCRZ) Green Wedge Zone (GWZ) Farming Zone (FZ) Rural Activity Zone (RAZ)
Category V	Unique combinations of landscape, biodiversity, and geodiversity. These natural areas typically provide undisturbed species habitat and enable people to see and interact with native vegetation and wildlife.	Natural areas are classified as land within Category V irrespective of the planning zones that apply to that land.
Category I, II, III or IV	Depending on surrounding land uses and the intent of the specific planning zone (which may have a diversity of uses) as specified in a schedule to the planning zone	Comprehensive Development Zone (CDZ) Priority Development Zone (PDZ) Special Use Zone (SUZ) Public Use Zone (PUZ)

The project area is considered to be:

- Expansive with a wide variety of soundscapes throughout,
- Generally, located in natural areas (some are more remote than others)
- Generally, in the vicinity of existing roads, existing recreational activities (lookouts, walking trails, golf course) and low-density residential areas

It is anticipated based on the above that ERS category V is appropriate to the project area since the term "*natural area*"; is defined as:

> ***natural areas*** *means national parks, state parks, state forests, nature conservation reserves, wildlife reserves and environmentally significant areas and landscapes outside metropolitan Melbourne that are identified in a planning scheme.*

The approach taken herein is that the ERS sets noise objectives for those sources that are not governed by existing legislation or guidance.

All reasonable and feasible mitigation is applied with the aim of meeting the objective, in accordance with the GED.

In this way the project achieves the intent of the ERS.

3.2 Construction noise

There are no statutory noise limits which apply to construction work in Victoria. However, the EPA provides recommendations for managing construction noise in EPA Publication 1834.

3.2.1 EPA Publication 1834

Victorian EPA Publication 1834 "*Civil construction, building and demolition guide*" provides guidance with respect to construction working hours for various types of development.

For the purposes of this assessment the project has classified as a "*commercial and industrial construction and demolition site*".

Section 4.3 "*Managing noise and vibration during working hours*" provides normal working hours and noise management measures that should be adopted at all times whilst Section 4.4 "*Managing noise and vibration outside normal working hours"* provides additional requirements for noise management outside of those hours.

This is presented in Table 5.

Table 5 Working hours defined in EPA Publication 1834

Period	Recommendations
Normal working hours Monday to Friday; 7am – 6pm Saturdays; 7am – 1pm	General noise at any time during the day might still be considered unreasonable, depending on the work practices and circumstances in which the noise is emitted. Assessment must consider the attributes of the noise and the time, place, and circumstances in which it is emitted.
Weekend/evening work hours Monday to Friday; 6pm – 10pm Saturdays; 1pm – 10pm Sundays and Public Holidays; 7am – 10pm	Noise levels at any residence must not exceed the background (L_{A90}) noise by: • 10 dB(A) or more for up to 18 months after project commencement • 5 dB(A) or more for 18 months or more after project commencement
Night period Monday to Sunday; 10pm – 7am	Noise is to be inaudible within a habitable room at any residential premises. If audible, this is considered unreasonable noise under the EP Act. However, provision is made for circumstances of unavoidable works, low-noise, or managed-impact works.

Construction noise targets have not been developed at this time. Instead, high-level assessment based on representative background noise measurements. Construction assessment criteria would be updated during construction to reflect the results of monitoring taken at that time.

It is noted that the integrating period for assessment against EPA 1834 (15 mins) and the ERS (8 hrs) is different, however, since the assessment period for the ERS is longer, the predictions for comparison with EPA 1834 represent a worst-case.

3.2.1.1 Out-of-hours works

Projects should aim to constrain works to normal working hours. Where necessary, works or activities outside normal working hours may occur for:

- **Low-noise impact works** – these are inherently quiet or unobtrusive, for example, manual painting, internal fit outs, and cabling. Low-noise works do not have intrusive characteristics such as impulsive noise or tonal movement alarms. The relevant authority must be contacted, and any necessary approvals sought.
- **Managed-impact works** – works where the noise emissions are managed through actions specified in a noise and vibration management plan (may be part of a broader environmental management plan), to minimise impacts on sensitive receivers. Managed-impact works do not have intrusive characteristics such as impulsive noise or tonal movement alarms.

  The project must contact the relevant authority and seek any necessary approvals. A noise and vibration management plan may need to be prepared or reviewed by a suitably qualified acoustic consultant or practitioner
- **Unavoidable works** – are works which pose an unacceptable risk to life or property or a major traffic hazard and can be justified. Includes an activity which has commenced but cannot be stopped. You will need to demonstrate that planned unavoidable works cannot be reasonably moved to normal work hours. This requires additional consideration of potential noise and vibration generating activities and controls to minimise noise and vibration. These can be recorded within the noise and vibration management plan (may be part of a broader environmental management plan).

The relevant authority must be consulted and provide any necessary approvals for unavoidable works. Sensitive receivers should be notified of the intended work, its duration, and times of occurrence.

Construction works would only occur during normal working hours. Therefore, unavoidable out-of-hours works are not considered in this assessment.

3.3 Operational noise

The Victorian EPA provide noise assessment procedures to protect people from industrial noise that may affect normal domestic and recreational activities, including sleep at night. The EPA publications aim to balance the needs of industry with the protection of sensitive uses, which is why different levels apply depending on the planning land-use zoning and the existing background level in the area.

The *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (publication 1826.4 – Published 1st July 2021) supersedes the following:

- State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1)
- State Environment Protection Policy (Control of Music Noise from Public Premises) No. N-2 (SEPP N-2)
- *Noise from Industry in Regional Victoria* (NIRV)

A review was undertaken to identify if there were changes in the Noise Protocol that would supersede the requirements set out in SEPP N-1, SEPP N-2 and NIRV. The review indicated that only minor amendments have been made to the current assessment framework.

Appendix A provides a summary of the key items identified in the review. Identified differences would not have an impact on the project and therefore, SEPP N-1, SEPP N-2 and NIRV are still referred to in this assessment. It is noted that a noise sensitive area, as defined by the Environment Protection Regulations, differs from that set out in SEPP N-1, SEPP N-2 and NIRV. The definition of a noise sensitive area, as described in the Regulations is set out in Appendix A.

A review of land uses in the project area has shown that there are no areas within it that fall into the new noise sensitive categories introduced by the Regulations.

3.3.1 Determining NIRV Recommended Maximum Noise Levels

NIRV outlines two methods for determining the Recommended Maximum Noise Levels (RMNLs) for the industry.

Outside of a major urban area, NIRV considers the land zoning and distance between the noise emitter and noise receptor. Steps for adjusting the RMNLs for existing background noise and high traffic noise areas can be also applied in relevant circumstances.

The operational components of the project and nearby sensitive receptors are outside of the UGB. Therefore, the RMNLs are derived in accordance with NIRV and are presented in Section 5.5.1. A detailed derivation of RMNLs is presented in Appendix B.

3.3.2 Assessment of noise using NIRV

The EPA provide guidance for the assessment of noise from industrial and commercial operations. Key considerations for an assessment using the NIRV Guidelines is summarised below:

- Industry is expected to take reasonable opportunities to reduce noise from site operations. Achieving compliance with the RMNLs that apply to noise from industry within the approved area of application is part of these obligations.
- It is noted that NIRV has a provision "*to take reasonable opportunities to reduce noise from site operations*", under the Act there is a requirement to meet the General Environmental Duty.
- The RMNLs derived for a noise sensitive building apply at the area of land which is within 10 metres of the facade. The calculated or measured noise level from an industrial site are compared to the relevant RMNLs at this location to determine compliance.
- Adjustments are to be applied to the measured or modelled output of an industrial site to account for the duration of noisy activities over a 30-minute period and the potential annoyance associated with noise characteristics such as tonality, intermittency and impulsiveness (See Section 5.6).
- Noise sources that are not assessed under NIRV are summarised below:
    - Road and rail corridors
    - Noise from construction or demolition activities on building sites
    - Residential noise
    - Non-commercial vehicles, on or off the site, except for maintenance activities, or
    - Noise from audible intruder, safety, or emergency alarms.
- All industry is encouraged to design and operate below the RMNLs at nearby sensitive receptors to achieve the intentions of NIRV.

3.3.3 EPA Publication 1826 – Music noise

Larger events, including regional, state, and national events have the potential to include music as part of the event. Music is governed by the *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (EPA Publication 1826)*

Clause 91 of the Noise Protocol provides that:

> *'The noise limit for music from outdoor entertainment venues and for music noise from outdoor entertainment events during standard operating hours, as defined in Regulations 128 and 129 is –*

(a) 65 dB(A) when the measurement point is located outdoors, within a noise sensitive area; and

(b) 55 dB(A) when the measurement point is located indoors, in a sensitive room within a noise sensitive area

A permit is required for an outdoor entertainment venue when the venue will operate outside of standard operation hours or within a period of more than 8 hours. Standard operating hours are defined as from 12 noon until 11 pm on any day.

3.3.4 EPA Publication 1254 – Public Address Systems

It is not expected that permanent public address systems (PA) would be installed at any location throughout the project area.

If a PA system is required in the future, then the guidance provided by Section 13 of EPA Publication 1254 would be followed.

4.0 Consultation

Development of the project and preparation of the EES have been informed by consultation with stakeholders and the community. Table 6 lists specific community and stakeholder feedback and how this feedback has been considered in the noise assessment.

Table 6 Stakeholder engagement undertaken for noise

Community and stakeholder feedback	Consideration in project design or impact assessment
Concerns about increase in noise due to additional traffic in the project area and surrounds	Noise due to traffic related to the project has been considered in Section 8.6.
Concerns about the project altering the amenity and peaceful environment of the area	Noise due to the operation of the project has been considered in Section 8.

5.0 Method

This noise assessment implements a risk-based approach, prioritising the key issues for assessment and informing measures to avoid, minimise and offset potential effects.

The approach used in this assessment has been guided by the evaluation framework that applies to the project (that is, existing regulatory framework of relevant legislation and policy) as well as the scoping requirements, set by the Victorian Minister for Planning, incorporating input from the Commonwealth Department of Agriculture, Water and Environment in relation to Matters of National Environmental Significance (MNES) .

This assessment is in alignment with the assessment approach parameters as outlined in the Land use and planning main report, namely:

- Overview of method – Section 6.1
- Risk Assessment – Section 6.3
    - Risk Overview and Purpose – Section 6.3.1
    - Risk Assessment Process - Section 6.3.2
    - Assigning a consequence level – Section 6.3.3
    - Assigning a likelihood level – Section 6.3.4
    - Assigning a level of risk – Section 6.3.5

The findings of the completed risk assessment are provided in Section 8 of the Land use and planning main report with the risk register provided in Appendix A.

A cumulative impact assessment has been undertaken on a project level. No major projects where there is potential for impacts to overlap temporally and spatially have been identified. Accordingly, no cumulative impacts with other projects are anticipated.

This section describes the method and key assumptions used to assess the potential noise impacts produced by the project.

5.1 Existing conditions

The aim of the existing conditions assessment is to identify where noise and vibration sensitive receptors are located relative to the proposed project footprint and develop an understanding of the existing noise environment.

Baseline noise levels were measured to establish the existing noise environment throughout the project study area. This information is used to describe the existing environment, including the presence of existing industry or other environmental noise sources, support the development and assess the potential change to the noise environment if the project was constructed.

Suitable noise monitoring locations were identified in areas where there was the potential for sensitive receptors to be affected by construction and operational activities. Available aerial images of the area, site investigations, and engagement with key stakeholders and the community were used to refine these locations based on priority and access.

The existing noise levels were measured with reference to the requirements outlined in the following documents:

- AS 1055:2018 - Acoustics - *Description and measurement of environmental noise*
- Clause 48 of EPA Publication 1826

A summary of the methodology used to conduct noise measurements is provided below:

Short term attended noise monitoring:

- The operator measured noise at a location for a short period of time in accordance with Clause 48 of EPA Publication 1826.
- The existing ambient environment, specific noise events and weather conditions were observed and recorded.

Existing noise levels were monitored and reported with reference to the following descriptors:

- **Background noise level (L_{A90} dB)**: The noise level that is exceeded for 90 per cent of a specified period. Background noise levels are used to determine limits for fixed plant and equipment under EPA Publication 1826. Background noise levels are also used to determine non-statutory construction noise criteria for works outside of normal working hours under EPA Publication1834.
- **Ambient noise level (L_{Aeq} dB)**: Commonly used to describe continuous sound pressure level for all sound occurring during the measurement period. The ambient noise level is used to quantify industrial noise, and to assess environmental noise impacts.
- **Maximum noise level (L_{Amax} dB)**: The maximum instantaneous noise level occurring during the measurement period. The maximum noise level is typically used to describe the highest noise level produced by very short peaks or spikes of sound.

Monitoring results and locations are summarised in Section 6.0.

5.2 Study area

Noise impacts have been assessed to a buffer area of 100 metres from the edge of the project footprint, which includes trails and trail heads. Figure 1 shows the study area considered for this noise impact assessment.

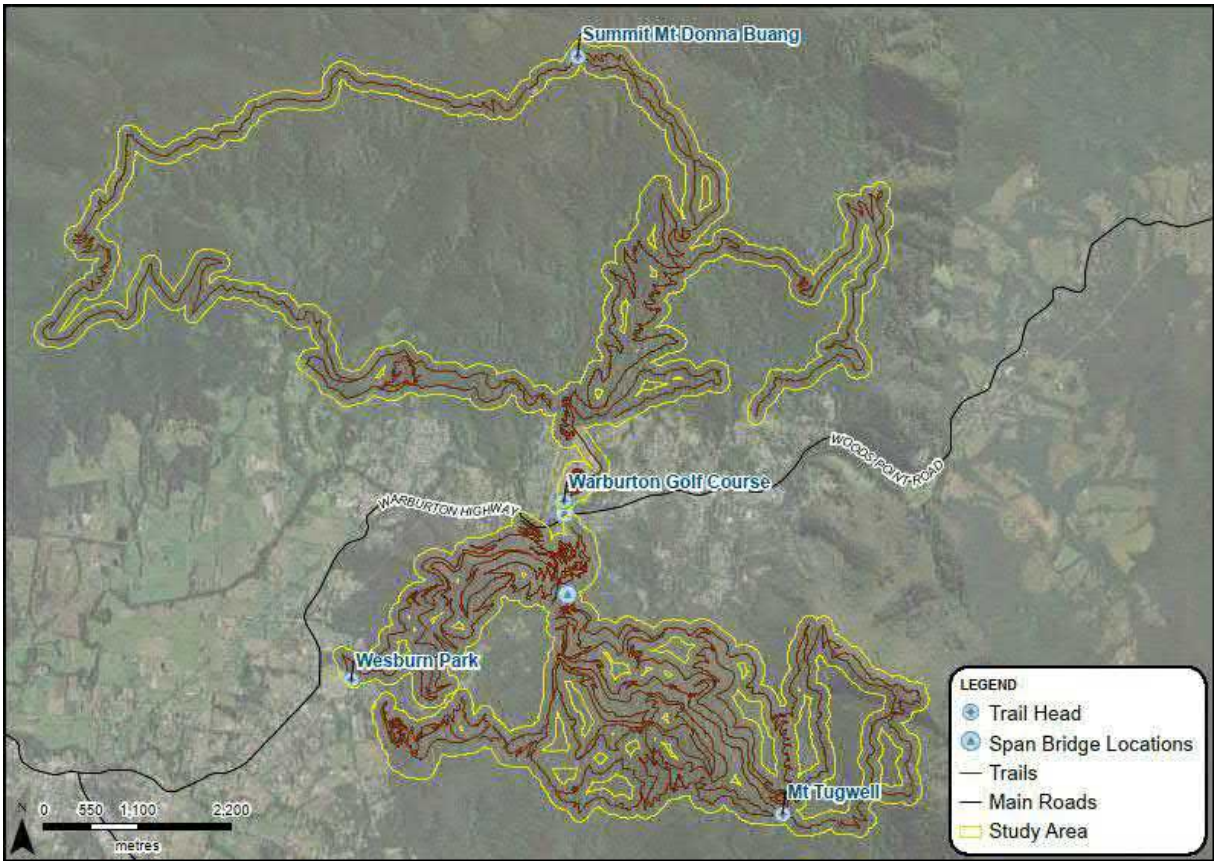


Figure 1 Study area

5.3 Avoidance and design

The following measures have been adopted in relation to the design, construction, and operation of the project to avoid and minimise impacts:

- Use of small construction teams and small plant and equipment for construction of trails
- Restriction of construction works to normal working hours as defined by the EPA
- Minimisation of trails near residences by focusing them in natural areas
- On-site mitigation for operational noise, where required
- Consideration of the minimum allowable distance between the nearest sensitive receptors and the trail head bike washes
- Development of specific measures for events.

5.4 Impact assessment: Construction

This study has assessed the likely level of construction noise due to the project at sensitive receptors in the vicinity.

The scope of the project construction noise assessment includes the following:

- Identify noise sensitive receptors in the vicinity of the construction works
- Establish construction noise criteria
- Determine the location, duration, and timing of activity
- Calculate the potential noise levels associated with construction works at the nearest sensitive receptors in reference to the project construction noise criteria
- Compare predicted noise levels to the criteria relevant for the proposed construction activity working hours
- Develop management and mitigation strategies for construction noise impacts based on the proposed construction methods.

Construction activities associated with the project would include the following components:

- Mountain bike trail networks
    - Upgrade of existing mountain bike trails
    - Construction of new mountain bike trails
    - Bridge construction and upgrades
- New Visitor's Hub and trail heads
- Ancillary infrastructure including trail signage and road upgrades for shuttle bus services
- Establishment of construction compounds to support construction activities
- Any on-site storage and structure erection works would be minimised
- All significant storage and workers staging would be from the Yarra Ranges Shire Yarra Bend Depot or contractor supply yard.
- Structural components would be prefabricated off-site whenever practicable to expedite site assembly works
- An allowance has been made for helicopter and truck deliveries of strategic materials would be used as required.
- Trail Builders would carry in each day's water, food and materials and carry out rubbish/waste (Please refer to CEMP – Waste Management)

- Works would be conducted during normal working hours so lighting would not be required

Trail construction is generally undertaken in teams of three to four people, with each team expected to complete between 60 and 100 metres of trail per day. Construction of the trails is anticipated to last approximately 18 months.

Up to eight teams would be dispersed across the different trail extents at any one time, each with a 1.6-tonne mini-excavator and dual cab ute with trailer. The mini excavator is left on-site, and crew transport tools and fuel into the works area by vehicle or power carrier.

Construction of the Yarra River Bridge and Old Warburton Road Bridge is anticipated to take up to approximately six months.

Construction of the main trail head is expected to take approximately three months, with works at other trail heads lasting several weeks.

The workforce is anticipated to come from local areas, typically Warburton, with construction crew staying in Warburton.

Construction scenarios have been developed based on the above information to assess impacts where noise would be greatest (i.e. worst-case) at surrounding receptors.

Accordingly, these worst-case scenarios have been developed based on all fixed and mobile plant equipment operating simultaneously over the relevant assessment period. The construction noise impact assessment is presented in Section 7.0.

5.4.1 Construction working hours

Construction works would be carried out during normal working hours (as discussed in Section 3.3 of Chapter 3: *Project Description*). For the purposes of this assessment, construction works have been assessed during normal working hours as defined in EPA publication 1834.

It is not expected that any works would need to be carried out in the evenings or at night. If it is the case that works would be undertaken outside of normal working hours, then noise monitoring would be required in accordance with **NM02**.

5.4.2 Construction assessment criteria

The construction noise criteria adopted for this assessment has been derived using the levels and methodology outlined in Section 3.2. No noise sensitive educational, community or health facilities have been identified within the study area.

Table 7 presents the construction noise criteria derived in accordance with EPA Publication 1834.

Table 7 Construction noise criteria – EPA 1834

Location	Normal working hours	Weekend/evening work hours		Night hours
		For up to 18 months from project commencement	After 18 months from project commencement	
Residential receptors	No specified guideline noise levels. Noise reduction measures apply.	Evening and unavoidable night works are not detailed in the project description and are therefore, not expected to be required. If it is the case that works would be undertaken outside of normal working hours, then noise monitoring will be required in accordance with NM02.		

5.4.3 Construction noise modelling methodology

Predicted noise levels for the proposed construction activities have been calculated assuming geometric spreading of sound from each noise source.

For construction activities that would be moving through an area, such as the construction of trails, noise setback distances have been calculated for the worst-case construction activities.

For construction activities occurring in specific locations, such as at trail heads and bridges, noise levels have been predicted at the nearest noise sensitive receptors to the works.

5.4.4 Noise data for construction equipment

Source sound power levels for the proposed construction equipment have been obtained from the following references:

- BS 5228-1:2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.*
- Manufacturers' noise data.
- AECOM's internal database.

The data shown in Table 8 shows the major equipment and their associated sound power levels that have been used to predict noise from the project construction activities. A full plant list is included in Appendix C.

Table 8 Key construction equipment and associated sound power levels

Equipment	Sound Power Level, dB(A)	Equipment	Sound Power Level, dB(A)
42t GVM truck and dog	102	Excavator (small)	102
Boom truck	105	Flat deck truck	91
Chainsaw	110	Generator	94
Compaction equipment	111	Grader	115
Concrete truck	108	Tip truck	91
Crane	99	Piling rig	107
Electric chainsaw	106	Pole truck	105
Excavator 20T	105	Horizontal boring machine	104

5.5 Impact assessment: Operation

Operational noise levels have been assessed for the project components where activity could impact nearby sensitive receptors.

The assessed project components are as follows:

- Bike washing stations located at each trail head
- Noise from patrons and mountain bikes
- Noise from patron vehicles
- Noise from events.

Noise from bike washing stations, patron vehicles and events would be concentrated at the trail heads, while noise from patrons would occur throughout the trail network. The locations of these areas are shown in Figure 1 above.

The following approach has been adopted to assess operational noise:

- Identify sensitive receptors likely to be affected by operational noise from the project.

- Establish the applicable Guideline Recommended Maximum Noise Level (RMNL) in accordance with NIRV.
- Determine the location and likely operation of noise sources associated with the project.
- Predict noise levels associated with operational activities at the nearest sensitive receptors.
- Compare the predicted noise levels to the relevant RMNL.
- If required, recommend in-principle methods to reduce operational noise.

The method for predicting the operational noise impacts is further discussed in the following sections.

5.5.1 NIRV Recommended Maximum Noise Levels

Section 3.3.1 describes the application of NIRV for determining the Recommended Maximum Noise Levels (RMNLs) for the project. NIRV RMNLs for nearby residential locations are summarised in Table 9.

Table 9 NIRV Recommended Maximum Noise Levels

Address	NIRV Guideline Recommended Maximum Noise Level (dB, $L_{Aeq\ 30min}$)		
	Day	Evening	Night
Visitor's Hub/main trail head			
16 Dammans Road, Warburton	45	38	33
20 Dammans Road, Warburton	45	40	35
3315 Warburton Highway, Warburton	45	39	34
Mount Donna Buang Trail Head			
135 Maroondah Hwy, Narbethong	45	40	35
1354 Don Rd, Mount Toolebewong	45	37	32
25 Sussex St, Warburton	45	37	32
105 Hazelwood Rd, East Warburton	45	37	32
Mount Tugwell Trail Head			
100 Old Warburton Rd, Warburton	45	37	32
135 Blacksands Rd, Three Bridges	45	37	32
40 Ada St, Big Pats Creek	45	37	32
29 Forest Rd, Wesburn	45	40	35
Wesburn Park Trail Head			
21 Wylie St, Wesburn	45	37	32
2827 Warburton Rd, Wesburn	45	37	32
685 Old Warburton Rd, Wesburn	45	37	32
670 Old Warburton Rd, Wesburn	45	40	35

If compliance with the RMNLs is achieved at the nearest receptors detailed in Table 9 then compliance would also be achieved at sensitive receptors located further away. The derivation of the RMNLs is presented in Appendix B.

5.5.2 Operational noise assessment scenarios

The operational activities discussed in this assessment include:

- Noise from fixed equipment: bike washing stations located at trail heads
- Noise from patrons: using the mountain bike trails and car parks
- Noise from special cases: including large events
- Noise from traffic.

5.5.3 Modelled operational equipment

The sound power for a single bike wash bay has been taken as 80 dB(A), which is consistent with a low pressure wash down station at a car washing facility.

5.5.4 Attended mountain bike measurements

The aim of measuring noise from mountain bike pass-bys was to better quantify the likely impact of patrons using the trails.

A controlled trial was arranged with Yarra Ranges Council in March 2021 within the Hey Hey My My trail (Crusher Track) in Wesburn.

18 mountain bikes were used to simulate noise due to repeated ascents and descents as well as noise due to a small jump section in trails that were closed to the public at the time.

Monitoring results and locations are summarised in Section 8.2.

5.6 Describing the character of noise

The types of noise and their character are accounted for in the assessment, as these can influence the level of disturbance to the nearby community.

For example, noise that has notable tonal, impulsive, or intermittent characteristics is generally perceived to be more annoying than a noise without these characteristics (i.e. steady-state noise).

As a result, noise with these qualities would typically be penalised by adjusting a measurement result to account for the additional disturbance due to one or more of these characteristics.

Table 10 Characteristics of industrial noise

Type	Definition[1]	Examples	Typical penalty where relevant[2]
Steady state	Noise with very little fluctuation in sound pressure level within the period of observation.	• Pumps • Electric motors • Gearboxes • Conveyers	0 dB
Intermittent	Noise for which the level drops significantly several times during the period of observation. The time during which the level remains at a constant value different from that of the ambient background noise must be one second or more.	• Air compressors • Mobile machinery • Manual work • Grinding • Welding	2 - 5 dB
Impulsive	Impulse noise can be defined as having a high peak of short	• Automatic press	2 - 5 dB

Type	Definition[1]	Examples	Typical penalty where relevant[2]
	duration or a sequence of such peaks (bangs, clicks, clatters, or thumps).	• Pneumatic drill • Riveting hammer blow • Material handling • Punch press • Gunshot	
Tonal	Tonal noise can be defined as having a prominent frequency and characterised by a defined pitch.	• Reverse beepers • Bells • Buzzers • Grinding metal	2 - 5 dB

1 Definitions as per *World Health Organisation – Fundamentals of Acoustics*

2 Character corrections as defined by EPA 1826 – it should be noted that penalties are added cumulatively.

5.7 Rationale

The methodology used in assessing noise from the construction and operation of the project is based on standard industry legislation, guidance, and practice. As such, the methodology for assessing noise (choice of noise modelling software, collection of data, setting of relevant criteria and such) has been tested, in the case of large infrastructure, by Inquiry and Advisory Committees (IAC) and, in the case of smaller developments, by the Victorian Civil and Administrative Tribunal (VCAT).

5.8 Assessment of alternative to Trail 1

The assessment of the identified alternative to Trail 1 (the combination of Trail 45, Trail 46, and Trail 47) contained in this report included the following tasks:

- Describe the existing conditions relevant to Trail 1 and the alternative to Trail 1
- Identify the residual environmental impacts determined for construction and operation of Trail 1 and the alternative to Trail 1
- Undertake a comparative analysis of Trail 1 and the alternative to Trail 1
- Identify the preferred trail for each discipline based on the comparative analysis.

5.9 Limitations, uncertainties, assumptions

The following limitations, uncertainties and assumptions apply to this assessment:

- This report is limited to surface noise impacts.
- Vibration due to construction and operation has not been considered in detail. Given the proposed equipment and activities, in combination with the distances to the various nearest sensitive receptors, vibration due to the project is likely to be insignificant.
- Noise monitoring has not been undertaken for the purposes of setting construction noise criteria for works outside of normal working hours on the understanding that construction works would only be undertaken during normal working hours as per EPA Publication 1834. Baseline noise monitoring would be required should works be undertaken outside of normal working hours.
- The sensitive receptors throughout the study area gave been identified using available GIS information and publicly available aerial imagery.
- Inputs used to develop the project construction and operational noise models are based on the information available at the time of reporting. Changes to these may impact the predicted noise levels.

- Noise modelling has assumed the worst-case noise scenarios for construction and operational activities.
- Noise due to the Wesburn Park Trail Head construction has not been considered. The works in this area would be confined largely to construction of new car parking places.
- Noise data for construction and operational noise modelling assumes that the equipment is maintained to a level consistent with manufacturer requirements and that, for construction works, good practice noise control measures are followed on-site. This would be managed through the procurement process used to select contractors to undertake the works.

6.0 Existing conditions

The following sections describe the existing noise environment considered throughout this assessment.

6.1 Sensitive receptors

A review of the types of sensitive receptors that may be impacted by noise from the project construction and/or operation was undertaken using GIS mapping and publicly available aerial imagery.

Noise sensitive receptors in the vicinity of the project are exclusively residential and are largely concentrated in the vicinity of Warburton and the Visitor's Hub/trail head at the Warburton Golf Course. Land to the north and south of Warburton is predominantly bushland.

There are no significant commercial or industrial land uses in the vicinity of the project footprint. There are no camping grounds (or proposed camping grounds) identified in the study area.

Specific distances between the nearest sensitive receptors and areas of the project footprint have been summarised in Table 11.

Table 11 Noise sensitive premises

Area	Description of sensitive receptors
Mountain bike trail network	
Trail networks to the north of Warburton	Residential premises are concentrated in the Warburton township and on both sides of the Warburton Golf Course. • Dwellings along Surrey Road and Sussex Street to the west of the golf course (Dwellings located approximately 100 metres from the trail network) • Dwellings along Dammans Road to the south of the golf course and along Martyr Road to the east of the golf course. Dwellings on Martyr Road are 25 metres from the trail network.
Trail networks to the south of Warburton	No residential premises have been identified near the trail networks to the south of Warburton.
Trail network to Wesburn	Residential premises concentrated in Wesburn. • Dwellings along Wylie Street and Old Warburton Road (Dwellings located approximately 100 metres from the trail network)
Bridges	
Yarra River Bridge	Nearest residential premises: • North: within 50 metres along Dammans Road (nearest identified at 16 Dammans Rd, Warburton) • East: within 100 metres along the Warburton Highway (nearest identified at 3315 Warburton Hwy, Warburton) • South: within 200 metres from the Warburton Highway (nearest identified at 3300 Warburton Hwy, Warburton)
Old Warburton Road Bridge	Nearest residential premises: • Northeast: More than 450 metres away along Scotchmans Creek Road (nearest identified at 70 Scotchmans Creek Rd, Warburton) • Southwest: More than 600 metres away along Old Warburton Road (nearest identified at 380 Old Warburton Hwy, Warburton)

Area	Description of sensitive receptors
Trail heads	
Visitor's Hub and main Trail Head	Nearest residential premises: • West: within 50 metres along Dammans Road (nearest identified at 16 Dammans Rd, Warburton) • East: within 40 metres/adjacent to the proposed car park area along Dammans Road and Martyr Road (nearest identified at 20 Dammans Rd, Warburton) • South: Within 90 metres along Warburton Highway (nearest identified at 3315 Warburton Hwy, Warburton)
Mount Donna Buang Trail Head	No identified noise sensitive buildings in the vicinity of the Mount Donna Buang Trail Head. The nearest residential receptors are located as follows: • North: more than 14 kilometres away, towards Narbethong (135 Maroondah Highway, Narbethong) • South: more than 4 kilometres away, at residences just north of the Warburton Gold Club (25 Sussex Street, Warburton) • East: more than 5 kilometres away (105 Hazelwood Road, East Warburton) • West: more than 7 kilometres away (1354 Don Road, Mount Toolebewong)
Mount Tugwell Trail Head	No identified noise sensitive buildings in the vicinity of the Mount Tugwell Trail Head. The nearest residential premises are located as follows: • North: 2 kilometres away (100 Old Warburton Road, Warburton) • West: more than 3 kilometres away (29 Forest Road, Wesburn) • South: more than 5 kilometres away (135 Blacksands Rd, Three Bridges) • East: more than 4 kilometres away (40 Ada Street, Big Pats Creek)
Wesburn Park	Nearest residential premises: • North: within 400 metres, along Wylie St (nearest identified at 21 Wylie St, Wesburn) • East: within 150 metres along Old Warburton Road (nearest identified at 670 Old Warburton Road, Wesburn) • South: within 200 metres along Old Warburton Road (nearest identified at 685 Old Warburton road, Wesburn) • West: within 400 metres along Warburton Highway (nearest identified at 2827 Warburton Road, Wesburn)

The identified nearest sensitive residential receptors to each trail head shown in Table 11 are shown in Figure 2 to Figure 5 below.

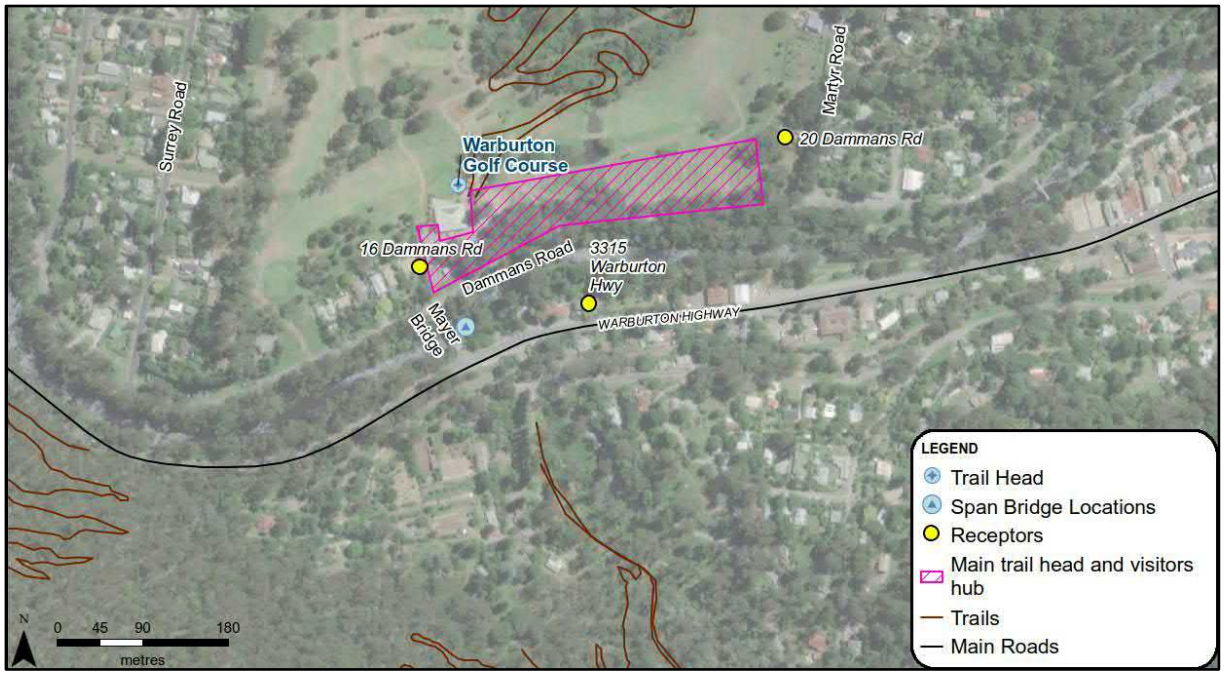


Figure 2 Nearest identified sensitive receptors to the main trail head/Visitor's Hub

Figure 3 Nearest identified sensitive receptors to the Mount Donna Buang Trail Head

Figure 4 Nearest identified sensitive receptors to the Mount Tugwell Trail Head

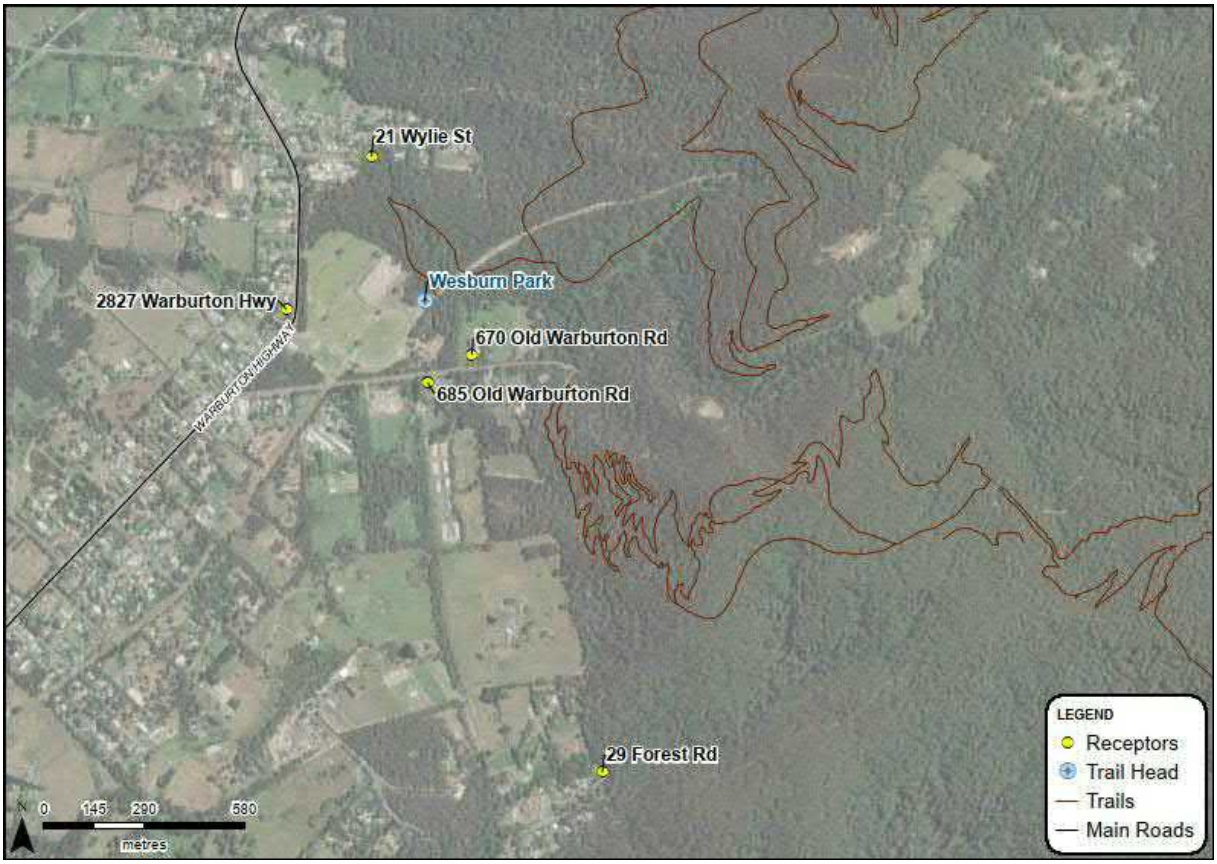


Figure 5 Nearest identified sensitive receptors to the Wesburn Park Trail Head

6.2 Existing noise environment

The following sections describe the measurements that have been undertaken throughout the project area to define the existing noise environment.

6.2.1 Monitoring locations

The locations of the noise monitoring are shown in Figure 6.

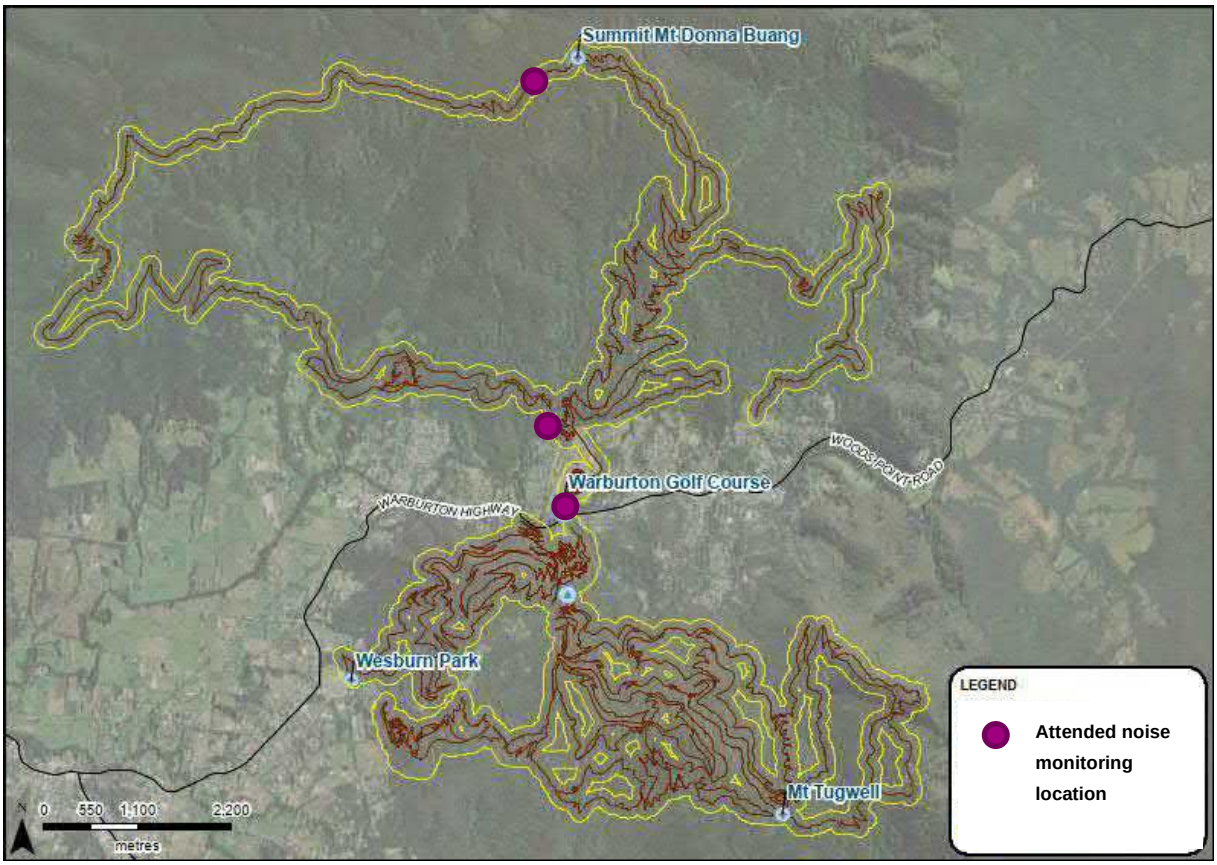


Figure 6 Noise monitoring locations

6.2.2 Attended noise measurements

Attended noise measurements were conducted on Saturday 20 March 2021 at three locations in accordance with Clause 48 of EPA Publication 1826.

They include:

- Mount Donna Buang, approximately 160 metres from the junction with Road 2 on the Mount Toolebewong side where there is little traffic and where sensitive receptors could include wildlife.
- On the road outside 23 Sussex Street, Warburton where there is little traffic and where sensitive receptors include some of the nearest residences to future trails.
- At the entrance to the Warburton Golf Club, Dammans Road, Warburton where the nearest residences are exposed to traffic noise from Warburton Highway.

The result of the measurements is summarised in Table 12.

Table 12 Attended noise measurements

Location	Start time (duration)	Measured noise level, dB			Observations
		L_{Aeq}	L_{Amax}	L_{A90}	
Mount Donna Buang	20/03/2021 14:30 (2 x 10 mins)	52	74	37	Distant traffic audible, occasional pass-bys
Outside 23 Sussex Street - Warburton	20/03/2021 15:26 (2 x 10 mins)	44	76	37	Cicada trilling (quiet) and distance traffic. Birdsong/wildlife, distant rustling of trees
Golf course entrance – Dammans Road	20/03/2021 16:00 (30 mins)	52	67	49	Constant traffic on Warburton Highway. Occasional pass-bys on Dammans Road.

The equipment and calibration details for the attended measurements are presented in Table 13.

Table 13 Addended measurement equipment details

Monitoring location	Equipment details	Laboratory calibration expiry
All	Brüel & Kjær Type 2270, Serial No. 3009262	20/04/2022

All noise monitoring equipment had a current laboratory calibration certificate at the time of the measurements. Each noise monitor was checked with a field calibrator at the start and completion of the monitoring period. No significant drifts in calibration were noted.

6.2.3 Observations

Key observations from the existing conditions noise monitoring include:

- Background noise levels throughout the project study area are typically low.
- Inspection of publicly available aerial imagery and observations made on-site show that there are no significant industrial sources of noise within the township of Warburton.
- The main source of noise in the township was observed to be Warburton Highway. However, the road has a single lane in each direction and speed is limited to 50 km/hr in the township. As such, noise from the highway is dominant but not significant
- Based on the observations made on-site, existing noise levels at residential properties that are more than 50 metres away from the highway are typical of a rural setting.
- Based on the measurements taken on Mount Donna Buang, it is considered that existing noise levels at residential properties outside of Warburton are likely to be typical of a rural setting.

6.3 Existing conditions information in relation comparison of Trail 1 and the alternative to Trail 1

For the purpose of comparing Trail 1 and the alternative to Trail 1, the identified nearest sensitive residential receptors are shown in Figure 3. Neither trail alignment is in vicinity of residential receptors.

The background noise environment is likely to be similar for Trail 1 and Trails 45, 46 and 47.

7.0 Construction impact assessment

This section discusses the potential impacts result of construction activities and the associated mitigation measures that should be implemented to reduce noise due to the project. Mitigation measures referred to are defined in Section 9.0.

7.1 Construction works during normal working hours

Construction noise criteria in Victoria is determined by EPA Publication 1834, described in Section 3.2.

During normal working hours, there are no specified guideline noise levels. However, noise reduction measures would be applied.

The construction activities assessed include the construction of trail heads and the construction or upgrade of trail networks, as follows:

- Mountain bike trail construction, including construction of the trail and elevated structures
- Long span bridges for crossing significant roads and waterways:
  - Yarra River Bridge: located just south of the main trail head and connecting the northern and southern trail networks.
  - Old Warburton Road Bridge: part of the southern trail network, allowing mountain bikers to cross over Old Warburton Bridge Road safely.
- Visitor's Hub and trail heads:
  - Visitor's Hub/main trail head: construction would include upgrading the capacity of the existing car park, installation of a bus shelter, toilet and shower facilities, picnic tables and bike wash bays.
  - Mount Tugwell Trail Head: construction would include a car park, bus turnaround bay, bike washdown station, toilets, and a picnic area.
  - Mount Donna Buang Trail Head: construction would include the installation of a bike washdown station.
  - Wesburn Park Trail Head: construction has not been considered for this EES. The works in this area would be confined largely to construction of new car parking places.
- Ancillary infrastructure and upgrades:
  - Mountain bike trail signage: Minimal signage is proposed on trails and at trail heads, construction noise has not been considered as this would be a low impact activity.
  - Road upgrades for shuttle services: Mount Bride Road and Edwardson Road are both gravel roads that would be improved to accommodate shuttle bus traffic. Upgrade works would be similar to routine maintenance works.

Noise levels at the nearest identified residential dwellings have been presented for construction activities in static locations, such as at a trail head.

Mobile activities such as the construction of mountain bike tracks have been presented in terms of the likely noise level at various distances to account for the wide range of offsets between the works and the receptors.

The only activity (either during construction or operation) that could be a risk in terms of low frequency noise component would be the piling for the bridges. Given the scale of the proposed construction an investigation into this is not considered to be warranted at this time.

An assessment is provided of noise from bridge construction more generally and drilling down into low frequency noise is not considered to be proportionate to risk. Ground borne noise from the piling could have a low frequency component but the nearest resident is more than 50 metres away so this is unlikely to be significant when compared to the airborne component.

A full description of the required construction activities, their duration and likely plant requirements is included in Appendix C.

7.1.1 Mountain bike trail construction

The following steps, and associated equipment, have been considered during the construction of the trails:

- Clearing the construction corridor of vegetation: chainsaws would be the largest item of equipment used for this activity
- Cutting the trail bench would be conducted using a mini excavator.
- Ride line definition: large obstacles manoeuvred and placed along track by excavator. Other smaller materials and obstacles would otherwise be placed manually.
- Clean up: trail labourers working behind the excavator would manually remove roots, manage drainage, and compact the trail.

The construction of elevated structures, tree root protection and raised embankments are not expected to require significant machinery and would predominantly be undertaken using hand tools.

Based on the above activities, the worst-case construction noise scenario is considered to be the simultaneous operation of a mini excavator and electric chainsaw. This scenario is presented in Table 14.

The only activity (either during construction or operation) that could be expected to present a character that could increase its intrusiveness and impacts (e.g. tonality, impulsiveness, intermittency) could be the chainsaw associated with the trail construction.

Given that these activities are expected to be relatively infrequent and the locations where they would be carried out are generally remote - drilling down into the next level of detail is not considered to be warranted and proportionate to risk.

Noise from chainsaws is likely to be a common occurrence due to the rural nature of the area. Nevertheless, further assessment will add little value since there is no reasonable or feasible mitigation measure available.

Table 14 Mountain bike trail construction activities – noise levels at distances from trail

Construction area	Noise levels at distance from construction area, $L_{Aeq\ (15\ mins)}$ dB			
	20m	50m	100m	200m
Earthworks for track construction (worst case: excavation and chainsaw operation)	77	69	62	58

7.1.2 Long span bridge construction

Construction works at the Old Warburton Bridge Road and Yarra River Bridge would require the following activities.

Structural components would be prefabricated off-site whenever practicable to expedite site assembly works.

The associated sound power levels for each activity are presented in Table 15.

Table 15 Construction activities for bridge construction works

Activity	SWL, dB(A)	Bridge structure where activity would take place	
		Yarra River Bridge	Old Warburton Road Bridge
Electricity undergrounding works	111	✓	
Site access and setup	105	✓	✓
Retaining wall repair (if required)	108	✓	✓
Earthworks (topsoil strip, creation of foundation level for crane platform)	104	✓	✓
Piling, abutments, and anchorage construction	112	✓	✓
Erection of steelwork (main steel and mast)	100	✓	✓
Cable installation and stressing	99	✓	✓
Installation of concrete/asphalt pathways, and cycleway lighting poles	113	✓	
Installation of crushed rock pathways	111		✓
Landscaping	110	✓	✓
Construction laydown area	107	✓	✓

The worst-case activities for the bridge works are the construction of abutments and anchorage, as well as the installation of pathways.

Construction noise levels predicted at the nearest residential dwellings to each bridge are presented in Table 16.

Table 16 Predicted construction noise levels near bridge construction areas

Address	Approximate dwelling distance from works, m	Predicted noise level at nearest residential receptor, $L_{Aeq\ (15min)}$ dB
Yarra River Bridge – Installation of concrete pathways, and cycleway lighting poles		
16 Dammans Road, Warburton	50	70
3315 Warburton Highway, Warburton	100	64
3300 Warburton Highway, Warburton	200	57
Old Warburton Road Bridge – Piling and abutments, and anchorage construction		
70 Scotchmans Creek Road, Warburton	450	48
380 Old Warburton Road, Warburton	600	44

7.1.3 Long span bridge construction – Helicopter operations

A helicopter may be employed during bridge assembly if a crane is not suitable.

This scenario has not been assessed at this stage. Noise due to helicopter operations is likely to be significant but only for short periods and mitigation at source would not be possible.

Therefore, specific management measures focussed on proactive community consultation are included in **NM03**.

7.1.4 Main trail head / Visitor hub

Construction noise associated with the main trail head and Visitor's Hub would be associated with site establishment, earthworks (topsoil strip and levelling), drainage installation, car park surfacing, marking, and landscaping.

The construction of facilities including bus shelters, toilet and showers and bike wash stations are expected to have a small, localised noise footprint.

The sound power levels associated with these construction activities are shown in Table 17, as well the resulting worst-case noise levels at the nearest residential receptors to the main trail head site.

Table 17 Predicted noise levels due to construction activities at the visitor hub/main trail head

Activity	SWL, dB(A)	Predicted noise level at nearest residential receptor, $L_{Aeq\ (15min)}$ dB	
		16 and 20 Dammans Rd (50m)	3315 Warburton Hwy (100m)
Site establishment	97	55	48
Earthworks	115	73	66
Car park upgrade	117	74	68
Landscaping	111	68	62
Deliveries	109	67	61

7.1.5 Mount Donna Buang Trail Head

The nearest noise sensitive residential premises to Mount Donna Buang Trail Head construction site are four kilometres to the south. Construction noise to these premises from the worst-case construction scenarios is predicted to be less than 30 dB $L_{Aeq,\ 15\ mins}$.

7.1.6 Mount Tugwell Trail Head

The nearest noise sensitive premises and the predicted noise levels associated with the worst-case construction works at the Mount Tugwell Trail Head site are presented in Table 18.

Table 18 Predicted noise levels due to construction activities at the Mount Tugwell Trail Head

Activity	SWL, dB(A)	Predicted noise level at nearest residential receptor, $L_{Aeq\ (15min)}$ dB			
		100 Old Warburton Rd (2km)	135 Blacksands Rd (5km)	29 Forest Rd, Wesburn (3km)	40 Ada St (4km)
Site establishment	97	< 30	< 30	< 30	< 30
Earthworks	115	30	< 30	36	< 30
Car park upgrade	117	38	< 30	32	< 30
Landscaping	111	33	< 30	< 30	< 30
Deliveries	109	30	< 30	< 30	< 30

7.1.7 Environmental Reference Standard (ERS)

The ERS is a reference tool, it does not set compliance limits.

As noted in Section 3.1.1, it is anticipated that ERS Category V is appropriate to the project area. Category V requires a qualitative assessment of noise.

At this stage, this has been caried out but undertaking representative background noise measurements at various locations and then comparing them with the predicted construction noise levels, noting that the predictions have been undertaken for a worst case 15 minute period as opposed to the sixteen hour daytime integrating period called up by the ERS. As such, the comparison is considered to be conservative.

The predicted construction noise levels are generally above the measured background levels presented in Table 12.

As such, noise associated with trail construction may be audible in the vicinity of the activity areas for up to a week as work crews move along the proposed network. Works associated with the main trail head construction, visitor hub construction and bridges would be audible for up to six months.

With the implementation of mitigation measures, noise associated with the construction of the project would be reduced as far as is reasonably practicable. As a minimum, the good practice measures described in **NM01** should be employed at all times.

It is considered therefore, that the project achieves the intent of the ERS by applying all reasonable and practicable measures.

7.1.8 Discussion

EPA 1834 does not provide construction noise criteria or guideline levels for works that are undertaken during normal working hours.

The project would reduce construction noise as far as is reasonably practicable to avoid unnecessary noise impacts upon sensitive receptors in accordance with the EPA Publication 1834, the ERS and the GED.

This intention has been captured in the application of the practices included within the initial mitigation measures listed in **NM01**.

Trail construction

Trail construction is generally undertaken in teams of three to four people, with each team expected to complete between 60 and 100 metres of trail per day. Construction of the trails is anticipated to last approximately 18 months.

There are less than 50 sensitive receptors located near the trail construction footprint with the closest receptor located approximately 50 metres away.

Noise associated with trail construction activities may be audible in the vicinity of the activity areas for up to a week as work crews move along the proposed trail network.

With the implementation of mitigation measures, noise associated with the trail construction would be reduced as far as is reasonably practicable. As a minimum, the good practice measures described in **NM01** would be employed at all times.

Long span bridge construction

Construction of the Yarra River Bridge and Old Warburton Road Bridge is anticipated to take up to approximately six months.

There are less than ten sensitive receptors located in the immediate vicinity of the bridge construction footprint with the closest receptor located 50 metres (Yarra River Bridge) and 450 metres (Old Warburton Road Bridge) away.

The highest predicted noise levels at sensitive receptors in the vicinity of the Yarra River Bridge are associated with the construction of abutments and anchorage, as well as the installation of pathways. Residents located along Dammans Road to the south are the nearest to the works and, as such, are expected to receive the highest noise levels during this period.

The nearest residents to the construction of the Old Warburton Road bridge are located more than 450 metres away. Construction activities would be audible in the area, but noise is not expected to adversely impact residential receptors nearest to the works areas.

With the implementation of mitigation measures, noise associated with the bridge construction would be reduced as far as is reasonably practicable. As a minimum, the good practice measures described in **NM01** would be employed at all times.

Noise due to helicopter operations is likely to be significant for a short period and therefore additional mitigation measures are provided in **NM03**.

Main trail head and visitor hub construction

Construction of the main trail head is expected to take approximately three months.

There are less than ten sensitive receptors located in the immediate vicinity of the main trail head construction footprint with the closest receptor located 50 metres away.

Construction activities at the Visitor's Hub/main trail head area would be audible at the nearest residential receptors, which are located adjacent to the site.

The highest predicted noise levels at sensitive receptors in the vicinity are associated with the car park extension and upgrade works. Residents located along Dammans Road to the south are the nearest to the works and, as such, are expected to receive the highest noise levels during this period.

With the implementation of mitigation measures, noise associated with the main trail head construction would be reduced as far as is reasonably practicable. As a minimum, the good practice measures described in **NM01** would be employed at all times.

Trail head construction

Construction of the trail heads is expected to take a number of weeks.

There are no identified noise sensitive receptors in the near vicinity of these construction areas.

Construction noise associated with works at the Mount Donna Buang and Mount Tugwell trail heads is expected to consist primarily of minor construction works including earthworks and car park upgrades.

The worst-case construction activities would result in noise levels less than 30dB $L_{Aeq,\ 15\ mins}$ at the nearest receptors to the Mount Donna Buang Trail Head.

The predicted noise levels from the worst-case construction activities at the Mount Tugwell Trail Head show that the received noise levels would be less than 38 dB $L_{Aeq,\ 15\ mins}$, and so adverse noise disturbance would be unlikely at the nearest residential premises.

Noise modelling does not account for the forested mountainous terrain in the area, which could provide shielding and so further reduce the received noise levels at these residential premises.

With the implementation of mitigation measures, noise associated with the trail head construction would be reduced as far as is reasonably practicable. As a minimum, the good practice measures described in **NM01** would be employed at all times.

7.2 Construction works during evening hours

Construction during the evening working hours defined by EPA 1834 is not expected to occur.

7.3 Construction works at night

Construction during the night-time working hours defined by EPA 1834 is not expected to occur.

7.4 Construction vibration

Working outside the safe working distances from sensitive receptors is the most effective way to manage impacts from vibration intensive activities. However, on most construction projects, particularly those with a limited available construction footprint, activities would likely at times need to be undertaken within these distances.

Working within these distances does not necessarily mean that cosmetic damage or an adverse response from the community would occur but it does indicate that there is a greater likelihood of these events.

The safe working distances have been determined using typical levels of ground vibration[1] and the guideline values documented in BS 6472-1:2008 (human annoyance) and DIN 4150-3 (structural damage to structures and utilities.

[1] NSW Roads and Maritime Services - Construction Noise and Vibration Guideline – August 2016

Table 19 Safe working distances

Plant	Rating / description	Safe working distances (m)			
		Heritage	Residential	Industrial	Human response
Excavation	-	21	11	<1	Avoid contact with structures
Compacting plate		14	10	7	21
Vibratory sheet piling	-	3	2	<1	22
Vibratory roller	< 50 kN (typically 1-2t)	16	10	7	30
	< 100 kN (typically 2-4t)	20	12	8	37
	< 200 kN (typically 4-6t)	40	25	16	73
	< 300 kN (typically 7-13t)	50	31	20	91
	> 300 kN (typically 13-18t)	66	42	26	122

The nearest resident to potential vibration intensive works is 16 Dammans Road, Warburton, which is approximately 50 metres from the main trail head / visitor hub car park. Vibratory rollers may be used to compact the car park surface.

Any works that are required to be undertaken within the safe working distances presented in Table 19 would be assessed further in accordance with **NM01**.

8.0 Operation impact assessment

This section discusses potential noise impacts as a result of operation of the project and the associated mitigation measures that aim to reduce likely noise levels to within the relevant criteria. Mitigation measures referred to are defined in Section 9.0.

The operational activities discussed in this section include:

- Noise from fixed equipment: bike washing stations located at trail heads.
- Noise from patrons: using the mountain bike trails and car parks.
- Noise from events.
- Noise from traffic associated with project operation.

8.1 Fixed equipment

Bike washing stations would be installed at each trail head and are the only fixed source of noise that is expected to be required. Five wash bays are proposed for the main trail head, whilst one bike wash bay is proposed for each of the other trail heads.

An example bike wash station with four bays is shown in Figure 7.

Figure 7 Example bike wash station

The sound power for a single bike wash bay has been taken as 80 dBA, which is consistent with a low pressure wash down station at a car washing facility. It is possible that the wash bays at the main trail head may require a pressure pump if the available mains pressure is not high enough. There would be one pump in an enclosure, and it would be located such that the structure provides shielding. It is considered therefore that the input noise level adopted is sufficient to account for this eventuality.

At this stage, the siting of the bike wash stations is not confirmed. Therefore, instead of providing predicted noise levels at specific receptors, Table 20 presents setback distances have been calculated to account for distance and atmospheric attenuation effects. The simultaneous operation of five bike wash bays has been assumed for the main trail head as it is considered to be representative of a worst-case scenario.

Table 20 Predicted noise levels at distances from bike wash stations

Location	Sound Power Level, dB(A)	Predicted noise level of bike wash stations at setback distances, $L_{Aeq\ 30min}$ dB				
		20m	50m	100m	150m	200m
Main trail head	87	60	51	44	40	37
Mount Donna Buang Trail Head	80	53	44	37	33	30
Mount Tugwell Trail Head	80	53	44	37	33	30
Wesburn Park Trail Head	80	53	44	37	33	30

The evening period NIRV RMNL for the nearest residential receptors to the trail hubs is 38 dB $L_{Aeq\ 30min}$.

For the predicted noise levels to comply with NIRV at the nearest residential receptors to the Main trail head / visitor hub, the bike wash station would need to be at least 200 metres away from the nearest residents. This should be accounted for within the design and siting of the main trail head bike wash stations.

If the bike wash stations are to be located less than 200 metres from the nearest resident at the main trail hub then shielding in the form of noise barriers around the wash area and the orientation of the bike washes should be given consideration at the detailed design stage.

The bike wash station at Wesburn Park trail head should be located at least 50 metres away from the nearest residentials to comply with NIRV.

In each case, if during detailed design it is found that the selected pressure pump displays any of the characteristics detailed in Table 10, then these distances may need to be increased.

The nearest residential receptors to the Mount Donna Buang and Mount Tugwell trail heads are more than two kilometres away from each site and are unlikely to receive any perceptible noise from the bike wash stations.

8.2 Patrons and mountain bikes

There are no State Environment Protection Policies or relevant Victorian guidance with respect to noise from patrons outdoors.

Consensus as to an appropriate assessment method has yet to be reached because unlike other noise sources (e.g. mechanical equipment), there is a large variation in patron noise over time and this variation is not always linked to the number of patrons.

Noise from patrons using the mountain bike destination precinct would be characterised by:

- Mountain bikes on the trails.
- Patrons at trail heads and throughout the precinct
- Patron cars parking at the trail heads.
- Patrons congregating at the picnic facilities throughout the precinct.

Under normal operating conditions (i.e. not at events) patrons are expected to be spread around the precinct, as opposed to there being large numbers of people concentrated in specific locations. As such, noise due to patrons is unlikely to be significant.

Therefore, noise due to patrons throughout the precinct under normal operating conditions (i.e. not at events) is not expected to cause disturbance.

Noise due to mountain bikes on the trails is assessed in the following sections.

8.2.1 Attended noise measurements

A controlled trial was arranged with Yarra Ranges Council in March 2021 in the vicinity of existing trails to quantify the noise produced by mountain bike activity.

Suitable noise monitoring locations within the Hey Hey My My trail (Crusher Track) in Wesburn were identified in an area that was closed to the public at the time. Eighteen mountain bikes were used to simulate noise due to repeated ascents and descents as well as noise due to a small jump section.

One second measurements were taken to capture the variation in noise levels as bikes pass by.

In general, noise from the bikes was audible at the measurement location for a short period (30 seconds – 1 minute). Given that the trial was conducted based on 18 bikes riding very close together, it is considered that the measurements represent a reasonable worst case scenario and that, under normal conditions, bike noise would be audible in one location for a shorter time.

The ascent/descent monitoring location was approximately three metres from the nearest point on the trail, as is shown in Figure 8.

Figure 8 Monitoring location – adjacent to the ascent / descent trail

The small jump monitoring location was approximately 4.5 metres from the point on the trail at which the highest noise level was observed, as is shown in Figure 8.

Figure 9 Monitoring location – Adjacent to a jump section

In general, noise due to the various measured activities was as follows:

- Ascent: Noise on the ascent was generally limited to cyclists talking.
- Descent: Noise on the descent was higher than the ascent and was composed of freewheeling, tyre noise, occasional skidding, and voices.
- Jumps: The highest measured levels were due to impact noise when the bikes landed.

A summary of the attended measurements is provided in Table 21

Table 21 Attended noise measurements – Mountain bikes

Direction	Start time	Measured noise level, dB			Observations
		L_{Aeq}	L_{Amax}	L_{A90}	
Descent	20/03/2021 11:38	51	74	35	Tyre noise, skidding, voices
Ascent	20/03/2021 11:43	52	66	41	Riders talking was generally the loudest item. Little difference between e-bikes and traditional bikes
Descent	20/03/2021 11:45	55	68	43	
Ascent	20/03/2021 11:47	50	63	39	
Descent	20/03/2021 11:52	55	73	41	

Direction	Start time	Measured noise level, dB			Observations
		L_{Aeq}	L_{Amax}	L_{A90}	
Ascent	20/03/2021 11:53	48	58	38	
Jump Section	20/03/2021 12:04	56	68	35	16 riders; L_{max} at 4.5 m from noise monitor
Jump Section	20/03/2021 12:06	55	69	44	
Jump Section	20/03/2021 12:08	60	82	46	

8.2.2 Calculated noise levels at the nearest residences

The measurements found that the mountain bike activities typically consisted of a series of short, intermittent noises that are above the ambient sound level. This type of noise has been quantified using the L_{Amax} acoustic parameter. The L_{Amax} represents the highest instantaneous level, which is likely to be the most disturbing component of sound for residents near this particular noise source.

The nearest residences to ascent trails are approximately 100 metres away (Sussex Street). Descent trails that are close to residents (such as those on Martyr Road – 25 metres away) would be low speed sections with no features. Jump sections would be not be located close to residents with the nearest being over 200 metres away.

The calculated noise level due to mountain bikes at the nearest residence is then compared to a representative existing background noise level (refer Table 12) in Table 22.

Table 22 Calculated mountain bike levels

Direction	Measured noise level, L_{Amax}, dB	Distance correction (distance), dB	Calculated noise level at nearest residence, L_{Amax}, dB*	Representative background noise level, L_{A90}, dB
Descent	74	-18 (25 m)	56	37
Ascent	66	-30 (100 m)	36	37
Jump Section	82	-33 (200 m)**	49	37

* - the calculated noise levels are conservative as they assume direct line of sight to the trails and do not include attenuation due to ground absorption or variations in terrain.

** - Measurements taken at 4.5 metres, all other measurements were taken at 3 metres

8.2.3 Discussion

Descent trails that are close to residents (such as those on Martyr Road – 25 metres away) would be low speed sections with no features. Jump sections would be not be located close to residents with the nearest being over 200 metres away.

Therefore, the predicted ascent noise levels provided in Table 22 are likely to be representative of typical noise levels at the nearest receptors since descent trails and jump sections are generally located further away than the minimum distance assumed in the calculation.

Nevertheless, it can be seen that, for the majority of residences near to the trails, noise due to mountain bikes would be occasionally audible but that the magnitude of that noise, when compared to the existing background noise level, shows that it will not be intrusive.

The exception is properties on Martyr Road which are approximately 25 metres from the nearest trail. At this location, noise due to bike pass-bys could be clearly audible.

In accordance with the GED, the project would aim to reduce noise levels as far as is reasonably practicable. Therefore, noise mitigation, in the form of noise barriers to the section of trails through the golf course, adjacent to properties on Martyr Road has been proposed in **NM05**.

A noise barrier would be expected to reduce noise to the nearest dwellings by between 5 and 10 dB.

8.2.4 Environmental Reference Standard (ERS)

The ERS is a reference tool, it does not set compliance limits.

Predicted mountain bike noise levels are generally above the measured background levels presented in Table 12 at the nearest dwellings.

There is one location at which noise due to mountain bikes under normal operation could be intrusive.

With the implementation of **NM05** at this location, noise associated with the normal operation of the project would be reduced as far as is reasonably practicable.

It is considered therefore, that the project would achieve the intent of the ERS by applying all reasonable and practicable measures.

8.3 Public address systems

It is not expected that permanent public address systems would be installed at any location throughout the project area.

If it is the case that a PA system is required in the future, then the guidance provided by Section 13 of EPA 1254 should be followed.

8.4 Patron vehicles

Noise from patron vehicle movements in car parks located in the vicinity of dwellings have the potential to cause sleep disturbance at night. The project would only operate during normal working hours, and so assessment of sleep disturbance is not required.

8.5 Events

A number of events are anticipated, including local and regional events, as well as potential state and national events. These are further described in Section 3.4.3 of Chapter 3: *Project Description*.

The expected size and duration of these events are summarised below:

- Anticipated local events
    - 30 events per year, less during winter.
    - Approximately 300 participants and 50 spectators per event.
    - Event duration 3 hours (Generally evenings or weekends).
- Anticipated regional events
    - 10 events per year.
    - Approximately 400 participants and 600 spectators and support.
    - Event duration 3 - 12 hours.
- Potential state events:
    - 1 event every 2 years.

    - Approximately 1400 participants and 1600 spectators and support.
    - Event duration 3 days.
- Potential national events
    - 1 event every 4 years.
    - Approximately 2700 participants and 4500 spectators and support.
    - Event duration 4 days.

Small scale local events would largely attract participants with only a small number of spectators and assistants. It is not expected that these events would have a significant noise footprint.

Larger events, including regional, state, and national events have the potential to involve temporary public address systems and music as part of the event. Noise due to these would need to be assessed under the following policy and guidelines:

- Public address systems: EPA Publication 1254 Section 13: Public Address Systems.
- Music: EPA Publication 1826.
- Environment Protection Regulations.

It is anticipated that the level of the PA system and the music production system will need to be limited in order to meet the requirements of EPA 1254 and EPA 1826 at the nearest residents.

Participant and staff briefings for large events should provide guidance with respect to the potential impact of noise to nearby residences. The briefings should include guidance on the mindful use of competitor equipment such as compressors.

In addition, areas where there are likely to be large congregations of people, such as the pits and the area around the finish line, would be located as far from the nearest residents as is reasonably practicable.

Noise from events should be addressed through event specific management plans rather than this EES. Management plans would require separate approval prior to an event being held when the specific set up of a proposed event is known. It is envisaged that a specific noise management plan (or a noise section of an event management plan) would set out specific measures to manage noise during regional, state, or national events. Compliance with the obligations of the EP Regulations will be required.

8.6 Traffic noise

The Mountain Bike Destination would result in increased traffic in the area, due to the establishment of a shuttle bus service that would transport riders between the trails, as well as patrons driving by car to the main trail head to access the shuttle bus services.

In 2019, SALT[3] prepared a SIDRA model of the intersection of Warburton Highway and Mayer Bridge. This intersection would experience the greatest increase of traffic volumes due to it being the access point of the Golf Course Trail Head.

The latest SALT[3] reports produced for assessing traffic impacts to the project were reviewed:

- Appendix F – Local movement and transport report Final strategy (September 2019)
- Appendix N – Traffic Impact Assessment (August 2019).

It is understood that these reports were used as the basis for Technical Report F: Transport, and are therefore considered to be relevant.

A qualitative traffic noise assessment was conducted by WSP in 2019 to assess the potential change in traffic noise levels near the Warburton Golf Course, particularly at Mayer Bridge (Dammans Road) and the Warburton Highway. These areas are shown in Figure 10.

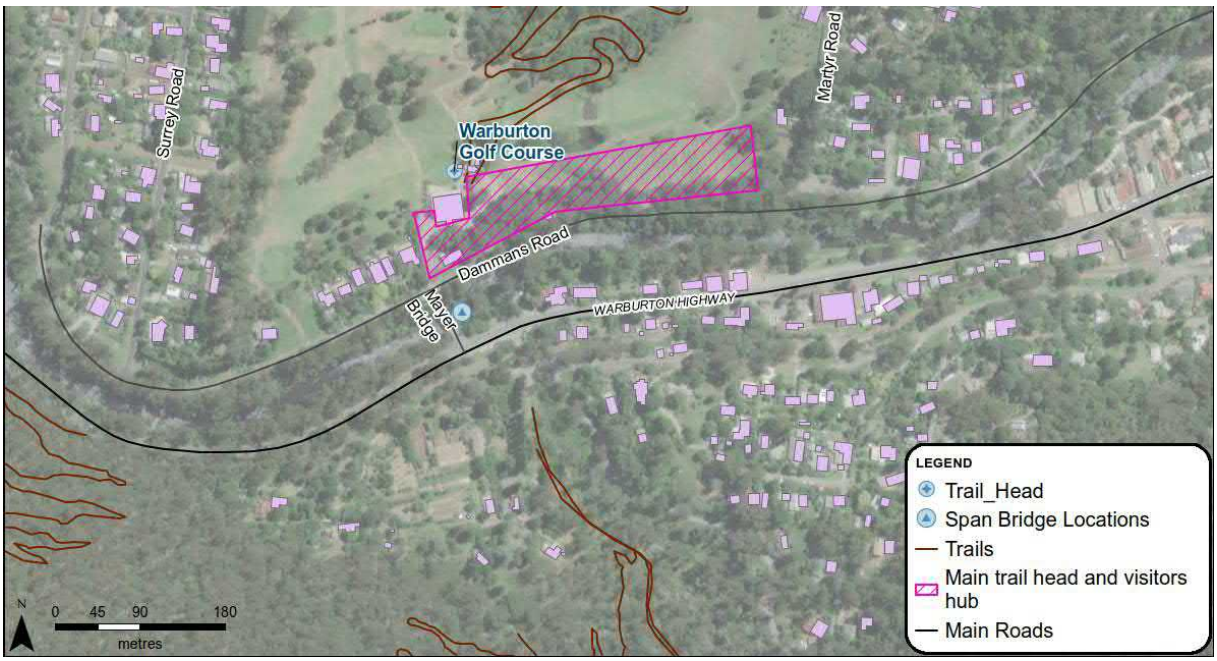


Figure 10 Main trail head area and surrounding traffic network

The traffic data used in the WSP assessment was also based on information provided in the SALT[3] reports.

The assessment concluded that increases in traffic volumes due to the project would have the following effects:

- Traffic volumes along Mayer Bridge are predicted to double, resulting in a 3 dB increase in noise levels, which may be noticeable to local residents.
- The Warburton Highway is predicted to experience an increase of 1 dB due to increased traffic in the area. This increase in noise levels is not expected to be noticeable to local residents.

In the absence of any additional or updated data for future traffic volumes associated with the project, it is considered that the results provided in the WSP report are still relevant.

Indicative attended measurements have been undertaken and are described in Section 6.2.2. The measured level at a location representative of the nearest residence on Dammans Road, on a Saturday afternoon (1100 hrs on a Saturday is identified as the peak transport period in Technical Report F: Transport), was 54 dB $L_{A10,\ 30\ mins.}$

The prevailing environment in this location was dominated by continuous traffic on Warburton Highway with occasional pass-bys on Dammans Road. Warburton Highway is likely to remain the dominant source after the opening of the project and, as such, the change in traffic noise to nearby residents is not expected to be noticeable. Assessment against the ERS will add little value since the project has no control over the existing dominant source of traffic noise (Warburton Highway) and the assessment has shown that the project will have a negligible impact on the existing levels of traffic noise in the area.

8.6.1 Shuttle buses

Shuttle buses would operate between the primary trail head at Warburton Golf Course to Mount Donna Buang and Mount Tugwell (with a pickup/drop off at Wesburn Park on the way to Mount Tugwell). 16 shuttle buses would operate per day over 8 hours to each of Mount Donna Buang and Mount Tugwell. Each shuttle bus carries 25 people.

Any change in traffic noise to nearby residents is not expected to be noticeable due to the number of uplift shuttles per day.

8.6.2 Events traffic

The *Warburton Mountain Bike Destination Revised Economic Impact Assessment Draft Report, October 2020* provides the volume of participants as 300 per event and 2 spectators per participant with 20 per cent being day visitors and 80 per cent being overnight visitors.

The traffic assessment assumes that all day visitors drive and that overnight participants cycle but their two accompanying spectators drive then there are 330 vehicles and 240 cyclists daily for the event. In comparison, the visitor volumes assessed for a Saturday as part of the traffic study is 284 vehicles and 527 cyclists. Although potentially slightly higher, the risk of congestion and issues due to traffic volume is low.

As such, the difference between traffic under normal operating conditions, and that expected during an event, is not considered significant from a noise perspective.

Nevertheless, events will be assessed as part of specific event Traffic Management Plans over the course of the Warburton Mountain Bike Trail's lifetime.

8.7 Operational vibration

The potential for human disturbance because of ground vibration generated by the operation of the Project is considered to be very low. Accordingly, operational vibration has not been assessed.

9.0 Mitigation and contingency measures

Mitigation measures have been developed in accordance with the mitigation hierarchy and consideration of the level of potential impact. The focus of these mitigation measures is firstly avoiding impacts where reasonably practicable (building upon the avoidance measures included in the design), and secondly, implementing project-specific measures to achieve acceptable outcomes.

Where it was deemed necessary, mitigation measures include monitoring of environmental performance and implementation of contingency actions should there be a risk of the appropriate standards being exceeded.

The recommended mitigation measures that have been recommended to avoid, mitigate or manage noise associated with the project are defined in Table 23.

Table 23 Mitigation measures relevant to noise

Mitigation ID	Mitigation measure	Stage
NM01	**Managing noise and vibration from construction activities** Construction noise will be managed in accordance with Section 4.3.3 of EPA Publication 1834. This includes the development of a plan to manage noise during construction in consultation with the EPA. The plan would include the following general good practice techniques: • Undertake preparatory work off-site where there is low potential for impacting people (e.g. formwork, cutting or prefabrication of materials off-site prior to transporting to the construction site) • Connect to the electricity grid as early as possible to avoid the use of diesel generators. • Restrict areas where mobile plant can operate so that it is away from people who could be affected by noise. • Locate site vehicle access and waiting areas away from people who could be affected by noise. • Plan vehicle movements to avoid manoeuvres and idling at location nearest to nearby people. • Use quieter equipment or methods. This may require considering: - buying or leasing quieter equipment - avoiding metal-to-metal and metal-to-stone contact - installing mufflers - reducing throttle and turning off equipment when not in use - placing things down rather than throwing - educating drivers to use driving practices that minimise noise. • Use low-noise saw blades. • Use electrical equipment rather than equipment driven by a diesel generator. • Use low-noise emitting generators. • Use effective alternatives to 'beeper' alarms (e.g. broadband alarms, proximity sensors). • Avoid using reversing alarms by designing site layout to avoid reversing (e.g. drive-through for parking and deliveries). • Maintain equipment by: - inspecting regularly and maintaining equipment to ensure good working order - checking machines with enclosures, including doors and door seals and that the door closes properly against seals	Construction

Mitigation ID	Mitigation measure	Stage
	- maintaining air lines on pneumatic equipment so they do not leak. • Maintain vehicles by: - considering good working conditions of mufflers - securing loose parts that may rattle. • Limit noise caused by people on-site. This may include procedures to: - avoid yelling and shouting on-site (note: if people on-site need to shout to hear each other over the site ambient noise, it is possible the noise level may be putting their hearing at risk) - minimising the use and volume of any electrical amplified sound-reproducing equipment, for example radios, stereos, televisions, or public address systems. • Plan transport and haulage routes to minimise the number of trucks/vehicles. Where there are large numbers of truck movements, consider truck route and truck waiting protocols (e.g. engines on/off and restart requirements). • Implement substitute methods taking into consideration: - alternatives to rock-breaking work methods, such as hydraulic splitters for rock and concrete, hydraulic jaw crushers, chemical rock and concrete splitting, and controlled blasting such as penetrating cone fractures. The suitability of alternative methods should be considered on a case by case basis, including what potential risks they involve. - alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electrical generator located away from nearby people. In terms of vibration, any works that are required to be undertaken within the safe working distances presented in Table 19 should be assessed further.	
NM02	**Baseline noise monitoring** Noise monitoring would be undertaken prior to construction if works are planned occur outside of normal working hours. The purpose of the monitoring would be to confirm the applicable noise criteria for evening and night-time works. Noise monitoring will be undertaken at the nearest noise sensitive residential properties to any out-of-hours works. A response plan would be developed to manage potential impacts if nominated criteria are exceeded, including: • Actions taken to rectify the exceedance • Actions to minimise risk of reoccurrence • Name of the person(s) responsible for undertaking the required actions • The duration of the monitoring would be determined by a suitably qualified acoustic consultant.	Construction
NM03	**Helicopter noise** Helicopters may be required for the construction of long bridge spans at the Yarra River and Old Warburton Road bridges and have the potential to cause adverse noise impact to the local community.	Construction

Mitigation ID	Mitigation measure	Stage
	The following mitigation measures have been developed with reference to Section 4.3.2 of EPA 1834: Community consultation • Residents and community stakeholders that may be impacted would be informed at least 24 hours prior to the event of helicopter operations being conducted to support bridge construction works. • Works notification may include letter drops, specific notifications and individual briefings. • All noise complaints would be investigated and monitoring undertaken where necessary. Hours of operation: • Helicopters would only be used during normal working hours as defined in EPA Publication 1834 (Monday to Friday 7am to 6pm, Saturday 7am to 1pm).	
NM04	**Operational noise – Bike washes** The main trail head / visitor hub bike wash stations shall be at least 200 metres away from the nearest residents. If the bike wash stations are to be located closer than 200 metres from the nearest resident at the main trail hub then shielding in the form of noise barriers around the wash area and the orientation of the bike washes would be given consideration at the detailed design stage. The bike wash station at the Wesburn Park Trail Head would be located at least 50 metres away from the nearest residentials to comply with NIRV. In each case, if during detailed design it is found that the selected pressure pump displays any of the characteristics detailed in Table 10, then these distances may need to be increased.	Operation
NM05	**Operational noise – Noise barrier to Martyr Road** Noise due to bike pass-bys could be clearly audible at properties on Martyr Road which are approximately 25 metres from the nearest trail. Therefore, noise mitigation, in the form of noise barriers to this section of trails would be installed, subject to consultation with the immediate landowners. Noise barriers must be built from a non-porous material with no gaps, including at the base and a surface density of at least 15 kg/m^2 at its thinnest point. Indicative materials include 17 mm plywood, 25 mm timber, concrete, glass, or 1 mm steel. The barrier would be at least 1.8 m higher than the trail surface and be located as near to the trail as possible. The exact extent and location of the barrier should be defined at detailed design stage.	Operation

Mitigation ID	Mitigation measure	Stage
NM06	**Events noise** Larger events, including regional, state, and national competitions that include public address systems and music as part of the event would be assessed and approved in accordance with the following policy and guidelines: • Public address systems: EPA Publication 1254 Section 13: Public Address Systems. • Music: EPA Publication 1826. • Environment Protection Regulations. Participant and staff briefings for large events should provide guidance with respect to the potential impact of noise to nearby residences. The briefings should include guidance on the mindful use of competitor equipment such as compressors. In addition, areas where there are likely to be large congregations of people, such as the pits and the area around the finish line, should be located as far from the nearest residents as is reasonably practicable.	Operation

9.1 Residual Impacts

The following sections provide discussion around residual impacts due to noise from the project.

9.1.1 Construction

A comparison of the measured background levels and the predicted construction noise levels was undertaken to determine if there would be a deterioration in acoustic amenity during this phase of the project. It was found that noise generating construction activities are likely to be audible at sensitive receptors for short periods (between weeks to months) during normal hours only.

Although there is not a specific noise limit that would apply during these hours, it is recommended that all reasonable and practicable mitigation measures are applied to noise generating construction activities. Mitigation should aim to reduce disturbance caused by construction noise and maintain the existing acoustic amenity where possible.

The assessment has indicated that there is no potential impact due to out of hours works since there are none proposed.

9.1.2 Operation

It is noted that the predicted noise levels for fixed operational equipment at the main trail head are based on typical equipment selections. As such, the assessment recommends that an offset distance be maintained between the proposed equipment and residents to achieve the Project criteria.

Either way, the installation must be designed such that all reasonable and feasible measures are taken to reduce noise and that the relevant criteria set out in EPA 1826 are met. In which case, there will be no residual impact. It is recommended that the proposed offset distances and the selection of noise generating equipment be reviewed again during detailed design.

Noise from cyclists using the trails could be audible and intrusive at properties on Martyr Road in Warburton under normal operating conditions. Accordingly, a noise barrier of approximately 100 metres in length has been recommended in this location. Although the barrier is not a regulatory requirement, the aim is to reduce disturbance caused by cyclists using the trail at the impacted properties.

Further work would be required during detailed design to refine the barrier dimensions and confirm if this structure would be reasonable and feasible.

10.0 Assessment of alternative to Trail 1

The assessment and comparison of Trail 1 and the alternative to Trail 1 is based on the residual impact of these options assuming effective implementation of the proposed mitigation measures outlined in Section 9.0

Each of the items outlined in the impact assessment are described in Table 24. No new noise impacts have been identified in relation to the alternative to Trail 1

Table 24 Comparison of impacts between Trail 1 and the alternative to Trail 1

Impact	Trail 1	Alternative	Conclusion
Construction noise	Construction noise would be audible for up to six months in some locations	No considerable difference in impact	No considerable difference in impact profile
Operational noise	A noise barrier would be implemented to trails in the vicinity of Martyr Road in Warburton	No considerable difference in impact	No considerable difference in impact profile
Events noise	Specific management plans would be developed for events	No considerable difference in impact	No considerable difference in impact profile
Traffic noise	N/a	N/a	N/a

A trail network based on the alternative to Trail 1 would retain the same construction methodology, operating hours, and nearest receptor.

As such, there is no considerable difference, in terms of noise, between the assessment presented herein and the alternative to Trail 1 (the combination of Trail 45, Trail 46 and Trail 47), should it be adopted.

11.0 Conclusion

The purpose of this report is to assess the potential noise impacts associated with the Warburton Mountain Bike Destination to inform the preparation of the EES required for the project.

A summary of the key assets, values or uses potentially affected by the project, and an associated assessment of noise impacts and recommended mitigation measures, are summarised below.

Existing conditions

Baseline noise levels were measured to establish the existing noise environment throughout the Project study area. This information is used to explain the existing noise environment, including the presence of existing industry or other environmental noise sources, support the development and assess the potential change to the noise environment if the project was constructed.

The measured background levels were considered typical of rural areas with no audible noise from transportation and industrial sources.

Impact assessment findings

The following sections describe the key conclusions of the impact assessment.

Construction noise

Noise associated with trail construction activities may be audible in the vicinity of the activity areas for up to a week as work crews move along the proposed trail network.

The highest predicted noise levels at sensitive receptors in the vicinity of the Yarra River Bridge are associated with the construction of abutments and anchorage, as well as the installation of pathways. Residents located along Dammans Road to the south are the nearest to the works and, as such, are expected to receive the highest noise levels during this period.

The nearest residents to the construction of the Old Warburton Road bridge are located more than 450 metres away. Construction activities would be audible in the area, but noise is not expected to adversely impact residential receptors nearest to the works areas.

Construction activities at the Visitor's Hub/main trail head area would be audible at the nearest residential receptors, which are located adjacent to the site.

Construction noise associated with works at the Mount Donna Buang and Mount Tugwell trail heads is expected to consist primarily of minor construction works including earthworks and car park upgrades.

There are no identified noise sensitive receptors in the near vicinity of the Mount Donna Buang and Mount Tugwell trail heads construction areas.

Construction noise would be reduced as far as is reasonably practicable to avoid unnecessary noise impacts upon sensitive receptors during EPA normal working hours in accordance with the EPA Publication 1834. This intention has been captured in the application of the practices included within the mitigation measures listed in **NM01**.

If works are to be conducted outside of EPA normal working hours, then noise monitoring will be required in accordance with **NM02**.

A helicopter may be employed during bridge assembly if a crane is not suitable. In this case noise control at source is not possible and the mitigation measures detailed in **NM03** would be employed.

Construction vibration

Vibration due to construction and operation has not been considered in detail. Given the proposed equipment and activities, in combination with the distances to the various nearest sensitive receptors, vibration due to the project is likely to be insignificant.

Any works that are required to be undertaken within the safe working distances presented in Table 19 would be assessed further in accordance with **NM01.**

Operational noise

Noise from fixed equipment would be limited to bike washing stations located at each trail head.

Based on the assumed sound power level for the activity, bike wash stations would be sited at least 200 metres from the nearest residential premises at the main trail head, and at least 50 metres from the nearest residential premises at Wesburn Park in accordance with **NM04.**

If the bike wash stations are to be located closer than 200 metres from the nearest resident at the main trail hub then shielding in the form of noise barriers around the wash area and the orientation of the bike washes would be given consideration at the detailed design stage.

In each case, if during detailed design it is found that the selected pressure pump displays any of the characteristics detailed in Table 10, then these distances may need to be increased.

In accordance with the GED, the project would aim to reduce noise levels as far as is reasonably practicable. Therefore, noise mitigation, in the form of noise barriers to the section of trails through the golf course, adjacent to properties on Martyr Road is outlined in **NM05**.

Noise from vehicle movements is not assessed as activities would not be occurring at night.

The potential for large events to be undertaken at the mountain bike destination has been considered. Noise from public address systems shall comply with EPA 1254 and music shall comply with EPA 1826. Compliance with the EP Regulations will also be required.

Events would be considered under the relevant council permits (a specific event management plan may need to be developed and approved prior to regional, state, or national events proceeding) and noise guidelines on a case by case basis and this is captured in **NM06**.

In addition, areas where there are likely to be large congregations of people, such as the pits and the area around the finish line, should be located as far from the nearest residents as is reasonably practicable.

Traffic noise

Increased road traffic activity has the potential to increase noise levels by 3 dB at residential receptors located near Myers Bridge, just south of the main trail head and Warburton Golf Club. This is a moderate increase and may be noticeable to local residents.

There is a predicted 1 dB increase in noise levels due to traffic along the Warburton Highway just south of the main trail head. This change is not expected to be noticeable.

Indicative attended measurements have been undertaken and are described in Section 6.2.2.

The prevailing environment in this location was dominated by continuous traffic on Warburton Highway with occasional pass-bys on Dammans Road. Warburton Highway is likely to remain the dominant source after the opening of the project and, as such, the change in traffic noise to nearby residents in not expected to be noticeable.

Operational vibration

The potential for human disturbance because of ground vibration generated by the operation of the Project is considered to be very low. Accordingly, operational vibration has not been assessed.

Summary of residual impacts

Specific reasonable and practicable mitigation measures are to be applied to all construction works to reduce noise as far as is reasonably practicable. The impact assessment has indicated that there is no potential impact due to out of hours works since there are none proposed.

It is noted that the predicted noise levels for fixed equipment are based on typical equipment selections. As such the assessment recommends an offset distance between the equipment and residents as opposed to specific at source treatments. It is possible that the required reduction could be achieved by selecting equipment that produces less noise than has been assumed herein during detailed design.

In addition, noise from the trails could be audible and intrusive at properties on Martyr Road in Warburton. A noise barrier has been recommended in this location; however, further design work would be required to define whether this approach is reasonable or feasible.

Potential noise impacts due to the project would be avoided, mitigated or managed to required standards through the recommended mitigation measures detailed in Section 9.0.

12.0 References

Legislation

- Environment Effects Act 1978 (Vic).
- Environment Protection Act 1970 (Vic).
- Environment Protection and Biodiversity Conservation Act 1999 (Cth).

Australian Policies and Guidelines

- *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978*, Victorian Government Department of Sustainability and Environment (June 2006).
- *State Environment Protection Policy (Control of Noise from Industry, Commerce and Trade) No. N-1*, EPA, Publication S31 (October 2001).
- *State Environment Protection Policy (Control of Music Noise From Public Premises) No. N-2*
- *Environmental Guidelines for Major Construction Sites*, EPA, Publication 480 (February 1996).
- *Noise from Industry in Regional Victoria*, EPA, Publication 1411 (October 2011).
- *SEPP N-1 and NIRV Explanatory Notes*, EPA, Publication 1412 (October 2011).
- *Applying NIRV to Proposed and Existing Industry*, EPA, Publication 1413 (October 2011).
- *Noise Control Guidelines,* EPA, Publication 1254 (October 2008).
- *Civil construction, building and demolition guide,* EPA, Publication 1834 (December 2020).
- *Interim Construction Noise Guideline*, Department of Environment and Climate Change NSW, Publication 2009/265 (July 2009).

Future Victorian Regulations

- *The Environment Protection Amendment Act 2018 (*Proposed Final, December 2020, to take effect from 1 July 2021).
- *Environment Reference Standards (ERS)* –Proposed Final, December 2020, EPA (Victorian draft subordinate legislation, to take affect from 1 July 2021).
- *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*, EPA (Proposed Final, December 2020) (Protocol to take effect from 1 July 2021).

Australian Standards

- Australian Standard 2436-2010 Guide to noise and vibration control on construction, demolition, and maintenance sites.

Overseas and International Standards

- German Standard DIN 4150: Part 3 – *Structural Vibration in Buildings – Effects on Structures* (1999-02).
- British Standards 6472-1:2008 *Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.*
- British Standard 5228-1:2009 *Code of practice for noise and vibration control on construction and open sites* – Part 1: Noise.

Appendix A

Transition to the EP Act

Transition to EP Act 2017

Item	Existing SEPP N-1/NIRV definition	EP Act – Draft Protocol	Expected impact to project
Development of criteria			
Derivation of criteria	SEPP N-1 noise limits are derived from the measured background levels and the land zoning in the vicinity of the site. NIRV Recommended Maximum Noise Levels are defined based on the land zoning in the vicinity of the site.	No change.	No impact.
Application of criteria outside of urban growth boundary	SEPP N-1 sets mandatory noise limits for industry in the Melbourne 'metropolitan region'. (i.e. the area within the Urban Grown Boundary). NIRV sets guideline Recommended Maximum Noise Levels for all locations outside of the SEPP N-1 area, except for Major Urban Areas such as Mildura and Bendigo. Assessments within a Major Urban Area use the procedures set out SEPP N-1 to define the guideline Recommended Maximum Noise Levels (i.e. background measurements are required).	Minor change in nomenclature.	No impact.

Item	Existing SEPP N-1/NIRV definition	EP Act – Draft Protocol	Expected impact to project
Character corrections			
Duration adjustment	An adjustment is made where the noise source being assessed is not audible in the noise-sensitive area for a full 30-minute period. The same adjustment is made for both major and minor premises.	Minor change. Per clauses 79-80 of EPA Publication 1826 the duration adjustment is calculated considering the total time for which the noise source is operating as opposed to the time for which the noise is audible as specified in SEPP N-1	No impact.
Correction for tonality	The adjustment for tonal noise from a major premise is objectively determined from one-third octave analysis of the noise. For minor premises, the adjustment is based on the subjective prominence of the tone.	There is no longer any distinction between major or minor premises but the method for defining the subjective and objective adjustments remain the same.	No impact.
Correction for impulsiveness	SEPP N-1 sets out different impulsiveness adjustment procedures for major and minor premises.	There is no longer any distinction between major and minor premises in the adjustment for impulsiveness. The adjustment is made on the subjective prominence of the impulsive character of the noise.	No impact.
Correction for intermittency	An intermittency adjustment of three or five decibels is made depending on the change in noise level and the time of day at which it occurs. The same adjustment is made for both minor and minor premises.	No change.	No impact.

Item	Existing SEPP N-1/NIRV definition	EP Act – Draft Protocol	Expected impact to project
Identification of sensitive receptors			
Definition	Noise sensitive areas are defined in SEPP N-1 as: *(a) that part of the land within the apparent boundaries of any piece of land which is within a distance of 10 metres outside the external walls of any of the following buildings -* • *Dwelling (except Caretaker's House)* • *Residential Building* *(b) that part of the land within the apparent boundaries of any piece of land on which is situated any of the following buildings which is within a distance of 10 metres outside the external walls of any dormitory, ward, or bedroom of such buildings -* • *Caretaker's House* • *Hospital* • *Hotel* • *Institutional Home* • *Motel* • *Reformative Institution* • *Tourist Establishment* • *Work Release Hostel*	The definition of a noise sensitive area has been expanded over that contained in SEPP N-1. However, it is not detailed in the Noise Protocol but is instead provided by the Regulations, as follows: (*a) that part of the land within the boundary of a parcel of land that is -* *(i) within 10 metres of the outside of the external walls of any of the following buildings—* *(A) a dwelling (including a residential care facility but not including a caretaker's house);* *(B) a residential building;* *(C) a noise sensitive residential use; or* *(ii) within 10 metres of the outside of the external walls of any dormitory, ward, bedroom or living room of one or more of the following buildings* *(A) a caretaker's house;* *(B) a hospital;* *(C) a hotel;* *(D) a residential hotel;* *(E) a motel;* *(F) a specialist disability accommodation;* *(G) a corrective institution;* *(H) a tourist establishment;*	A review of land uses in the project area has shown that there are no areas within it that fall into the new noise sensitive categories introduced by the Regulations.

Item	Existing SEPP N-1/NIRV definition	EP Act – Draft Protocol	Expected impact to project
		(I) a retirement village; *(J) a residential village; or* *(iii) within 10 metres of the outside of the external walls of a classroom or any room in which learning occurs in the following buildings (during their operating hours)—* *(A) a child care centre;* *(B) a kindergarten;* *(C) a primary school;* *(D) a secondary school; or* *(b) subject to paragraph (c), in the case of a rural area only, that part of the land within the boundary of -* *(i) a tourist establishment; or* *(ii) a campground; or* *(iii) a caravan park; or* *(c) despite paragraph (b), in the case of a rural area only, where an outdoor entertainment event or outdoor entertainment venue is being operated, that part of the land within the boundary of the following are not noise sensitive areas for the purposes of that event or venue -* *(i) a tourist establishment;* *(ii) a campground;* *(iii) a caravan park;*	
General Environmental Duty			

Item	Existing SEPP N-1/NIRV definition	EP Act – Draft Protocol	Expected impact to project
The general environmental duty (GED) is at the centre of the Environment Protection Act 2017 and it applies to all Victorians. All individuals and businesses must reduce the risk of harm from their activities: ○ to human health and the environment ○ from pollution or waste.			Application of the GED implies that all noise generated by the project should be reduced as far as is reasonably practicable.
Environment Reference Standard			
The ERS sets out the environmental values of the ambient air, ambient sound, land, and water environments that are sought to be achieved or maintained in Victoria and standards to support those values. The ERS applies to both the construction and operation phases of the project.			The ERS is a reference tool, it does not set compliance limits. The approach taken herein is that the ERS sets noise objectives for those sources that are not governed by existing legislation or guidance. All reasonable and feasible mitigation is applied with the aim of meeting the objective, in accordance with the GED. In this way the project achieves the intent of the ERS.

Appendix B

Construction and operational noise criteria

Construction noise criteria

The construction noise criteria for residential receptors are presented in the following table.

Construction noise criteria for residential premises (EPA Publication 1834)

Time of day	Guideline noise levels	Applicability to project
Normal working hours 7am to 6pm, Monday to Friday 7am to 1pm, Saturdays	Noise reduction measures should be applied.	Construction works will be during normal working hours only.
Weekend/evening work hours 6pm to 10pm Monday to Friday 1pm to 10pm Saturdays 7am to 10pm Sundays and public holidays	Noise level should not exceed background noise by: • 10dB or more for up to 18 months after project commencement • 5 dB or more after 18 months	Not applicable
Night period 7pm to 10am Monday to Sunday	Noise must be inaudible within a habitable room of any residential premises	Not applicable

Construction works are proposed to only occur during normal working hours, and so all feasible and reasonable work practices to reduce unacceptable levels of noise should be applied.

Operational noise criteria

The relevant guidelines for noise from industrial operations in regional Victoria are provided in EPA Publication 1411 Noise from Industry in Regional Victoria (NIRV). The guidelines came into effect in October 2011 and replace the former Information Bulletin N3/89 Interim guidelines for control of noise from industry in country Victoria (N3/89).

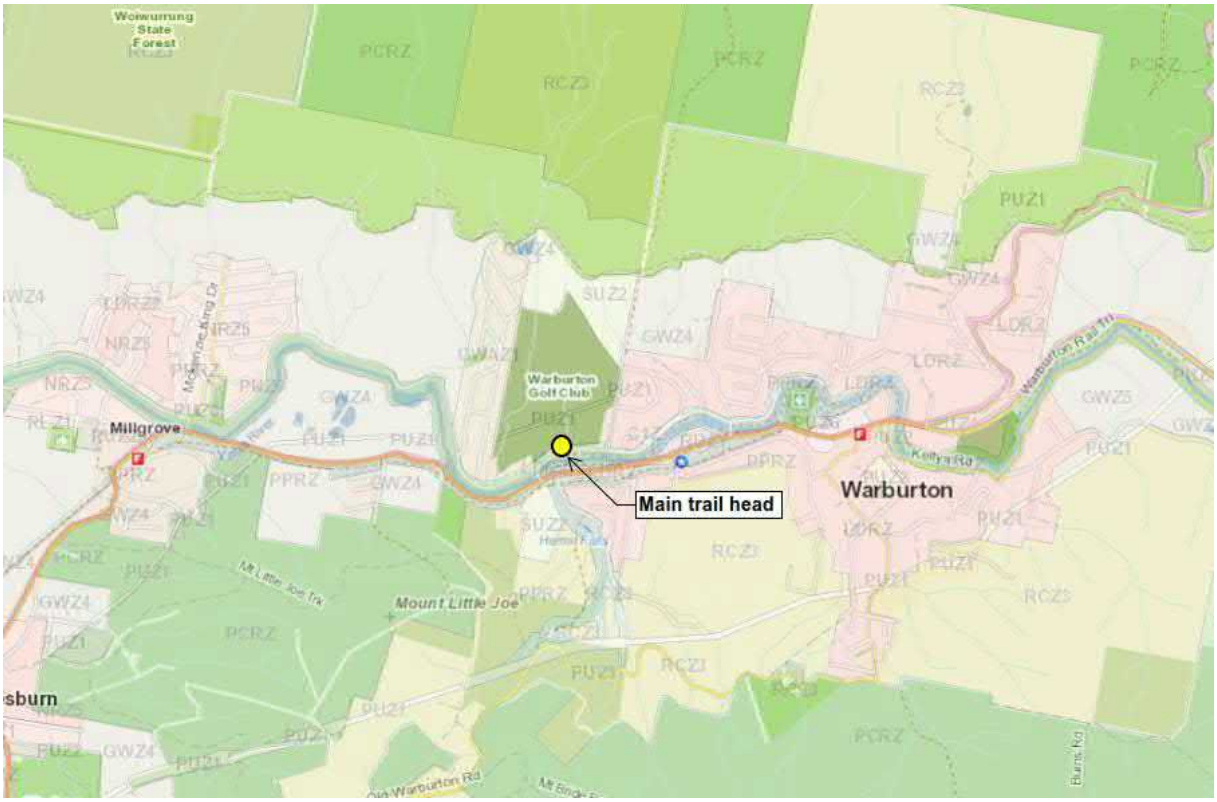
NIRV is a non-statutory guideline. This approach is applied in regional Victoria because the unique characteristics of rural areas, such as generally low ambient noise levels and large location-constrained, resource-based industries, mean that noise limits cannot always be achieved.

Step 1: Zone Levels

NIRV prescribes different *'zone levels'* depending on the zoning of the land at the noise-emitting premises, and at the noise sensitive receptors, to define the *'Recommended Maximum Noise Levels'*.

The existing land zoning within the project area is summarised below.

- The Visitor hub/main trail head is located on the Warburton Golf Course site, which is on a Green Wedge Zone (GWZ4). This area is surrounded by residential premises that are located within Green Wedge A Zone (GWAZ1) and Low-Density Residential Zone (LDRZ).



Zoning map for Warburton area

- The Mount Donna Buang Trail Head is located within a Public Conservation and Resource Zone (PCRZ). The nearest residential receptors are located within the following zones:
  - North: Not applicable since the nearest residential receptor is more than 14 kilometres away, towards Narbethong (135 Maroondah Highway, Narbethong)
  - West: Rural Conservation Zone (RCZ3)
  - South: Green Wedge A Zone (GWAZ1)
  - East: Green Wedge Zone (GWZ5)

Zoning map for Mount Donna Buang area

- Mount Tugwell Trail Head is located within a Public Conservation and Resource Zone (PCRZ). The nearest residential receptors are located within the following zones:
  - North: Rural Conservation Zone (RCZ3)

- West: Green Wedge Zone (GRZ4)
- South and East: Rural Conservation Zone (RCZ3)

- Wesburn Park Trail Head is located within a Public Park and Recreation Zone (PPRZ). The nearest residential receptors are located within
  - North and West: Rural Living Zone (RLZ1)
  - South: Green Wedge A Zone (GWAZ1)
  - East: Green Wedge Zone (GWZ4)

Zoning map for Mount Tugwell and Wesburn areas

Table 1 of NIRV is used in conjunction with the planning scheme for the subject sites to determine the applicable zone levels in the following time periods.

Period	Day	Evening	Night
Monday to Friday	0700h – 1800hrs	1800h – 2200hrs	2200h – 0700hrs
Saturday	0700h – 1300hrs	1300h – 2200hrs	2200h – 0700hrs
Sundays and public holidays	N/A	0700h – 2200hrs	2200h – 0700hrs

The zone levels applicable to the main trail head and other trail head sites are as follows.

Generating Zone	Receiving Zone		Zone Level, dB(A)		
	Location	Zone	Day	Evening	Night
Main Trail Head/Visitor's Hub					
GWZ4	West	GWAZ1	45	38	33
	East and south	LDRZ	45	40	35
Mount Donna Buang Trail Head					
PCRZ	North	FZ	45	40	35
	West	RCZ3	45	37	32
	South	GWAZ1	45	37	32
	East	GWZ5	45	40	35
Mount Tugwell Trail Head					
PCRZ	North, South and East	RCZ3	45	37	32
	West	GRZ4	45	40	35
Wesburn Park Trail Head					
PPRZ	North and West	RLZ1	45	37	32
	South	GWAZ1	45	37	32
	East	GWZ4	45	40	35

Step 2: Distance adjustment

NIRV states that distance adjustments are to be made to the zone levels when source and receiver are in different zone classifications or are separated by another zone type (other than road or railway line). The distance adjustment is based on the distance between the receptor and the boundary of the zone in which the source is located.

The adjustment to the zone levels for distance is a subtraction of one decibel for every 100 metres from the receptor to the boundary of the land use zone in which the source is located, up to a maximum of nine decibels.

Generating Zone	Receiving Zone		Distance to nearest receptor	Distance adjustment
	Location	Zone		
Main Trail Head/Visitor's Hub				
GWZ4	West	GWZ	50m to 16 Dammans Rd	No distance adjustment
	East	LDRZ	40m to 20 Dammans Rd	No distance adjustment
	South	LDRZ	90m to 3315 Warburton Hwy	No distance adjustment
Mount Donna Buang Trail Head				
PCRZ	North	FZ	>14km to 135 Maroondah Hwy	One decibel (up to 9 dB) for every 100 metres of distance between the boundary of the PCRZ and the receptor
	West	RCZ3	>7km to 1354 Don Rd	
	South	GWAZ1	>4km to 25 Sussex St	
	East	GWZ5	>5km to 105 Hazelwood Rd	
Mount Tugwell Trail Head				
PCRZ	North	RCZ3	>2km (100 Old Warburton Rd)	One decibel (up to 9 dB) for every 100 metres of distance between the boundary of the PCRZ and the receptor
	West	GRZ4	>3km (29 Forest Rd)	
	South	RCZ3	>5km (135 Blacksands Rd)	
	East	RCZ3	>4km (40 Ada St)	
Wesburn Park Trail Head				
PPRZ	North	RLZ1	400m to 21 Wylie St	One decibel (up to 9 dB) for every 100 metres of distance between the boundary of the PPRZ and the receptor
	West	RLZ1	400m to 2827 Warburton Rd	
	South	GWAZ1	200m to 685 old Warburton Rd	
	East	GWZ4	150m to 670 Old Warburton Rd	

The zoning of project infrastructure with reference to the nearest residential properties is shown below.

Address	Distance to Zone boundary	Distance adjustment, dB	Distance Adjusted Zone Level, dB(A)		
			Day	Evening	Night
Main Trail Head/Visitor's Hub					
16 Dammans Rd	N/A	N/A	45	38	33
20 Dammans Rd	N/A	N/A	45	40	35
3315 Warburton Hwy	120m	-1	44	39	34
Mount Donna Buang Trail Head					
135 Maroondah Hwy	N/A	N/A	45	40	35
1354 Don Rd	500m	-5	40	32	27
25 Sussex St	630m	-6	39	31	26
105 Hazelwood Rd	500m	-5	40	35	30
Mount Tugwell Trail Head					
100 Old Warburton Rd	N/A	N/A	45	37	32
135 Blacksands Rd	N/A	N/A	45	37	32
40 Ada St	200m	-2	43	35	30
29 Forest Rd	N/A	N/A	45	40	35
Wesburn Park Trail Head					
21 Wylie St	N/A	N/A	45	37	32
2827 Warburton Rd	N/A	N/A	45	37	32
685 old Warburton Rd	N/A	N/A	45	37	32
670 Old Warburton Rd	N/A	N/A	45	40	35

Step 3: Base noise level check

NIRV provides 'base noise levels', which place lower limits on the distance-adjusted levels and are shown below.

Base Noise Level Check, dB (A)		
Day	Evening	Night
45	37	32

NIRV Base noise level check and corrected zone levels

Address	Base noise level check adjustment?	NIRV corrected zone levels, dB(A)		
		Day	Evening	Night
Main Trail Head/Visitor's Hub				
16 Dammans Rd	No	45	38	33
20 Dammans Rd	No	45	40	35
3315 Warburton Hwy	Yes (D)	45	39	34
Mount Donna Buang Trail Head				
135 Maroondah Hwy	No	45	40	35
1354 Don Rd	Yes (D/E/N)	45	37	32
25 Sussex St	Yes (D/E/N	45	37	32
105 Hazelwood Rd	Yes (D/E/N)	45	37	32
Mount Tugwell Trail Head				
100 Old Warburton Rd	No	45	37	32
135 Blacksands Rd	No	45	37	32
40 Ada St	Yes (D/E/N)	45	37	32
29 Forest Rd	No	45	40	35
Wesburn Park Trail Head				
21 Wylie St	No	45	37	32
2827 Warburton Rd	No	45	37	32
685 old Warburton Rd	No	45	37	32
670 Old Warburton Rd	No	45	40	35

Notes:

- There are no background relevant areas in the vicinity of the project area, therefore no adjustment has been made for this.
- There are no cumulative effects due to significant industrial noise sources.

Appendix C

Construction activity and plant schedule

Modelled equipment for proposed construction activities

Equipment	Equipment SWL, dBA	Bridge works											Trail construction	Trail head construction				
		Electricity undergrounding works	Access and site setup	Retaining wall repair (if required)	Earthworks	Piling, abutments and anchorage	Erection of steelwork	Install and stress cables	Concrete/ asphalt pathway installation	Install cycleway lighting poles	Landscaping	Construction laydown		Access and site setup	Earthworks	Car park installation/ upgrades	Deliveries	Landscaping
42t GVM truck and dog	102																1	
Boom truck	105	1																
Chainsaw (electric)	106												1					
Compaction equipment	111								1	1	1					1		1
Concrete readymix trucks	108					1												
Concrete truck	108			1					1	1						1	1	
Crane	99				1		1	1				1			1			
Crane truck	99	1															1	
Excavator 20T	106	1			2							1			2			

Equipment	Equipment SWL, dBA	Bridge works											Trail construction	Trail head construction				
		Electricity undergrounding works	Access and site setup	Retaining wall repair (if required)	Earthworks	Piling, abutments and anchorage	Erection of steelwork	Install and stress cables	Concrete/ asphalt pathway installation	Install cycleway lighting poles	Landscaping	Construction laydown		Access and site setup	Earthworks	Car park installation/ upgrades	Deliveries	Landscaping
Flat deck truck	91						1											
Generator	94	1												1				
Grader	115														1	1		
Medium tipper truck	91													2				
Piling rig	107					1												
Pole truck	105	1	1															
Small excavator	102												1					
Tip truck	91	2	1	1		1			1	1	1	1				1		1
Trailer-mounted horizontal boring machine for rock anchors	104		1															
Activity sound power level, dB(A)		**111**	**105**	**108**	**106**	**112**	**100**	**99**	**113**	**113**	**111**	**107**	**111**	**97**	**115**	**117**	**109**	**111**

Appendix F

Planning Scheme Amendment

Note: the Draft Planning Scheme Amendment is included as a separate document in the EES.

Please refer to EES Attachment VII - Draft Planning Scheme Amendment

Appendix G

Bushfire Assessment

Warburton Mountain Bike Destination Project

Bushfire Assessment Report for Environment Effects Statement (EES)

FINAL REPORT

Prepared for AECOM Australia Pty Ltd

13 October 2021

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- Client: Matt Harrington, Sebastian Ulrichs and David Hyett

Biosis staff involved in this project were:

- Lucy Wilson (mapping)
- Mitchell Deaves (quality assurance)

Contents

Diagrams

Figures

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1 Purpose and scope of this report

Biosis Pty Ltd (Biosis) has been engaged by AECOM (Client) to prepare a bushfire assessment of the Warburton Mountain Bike Destination Project (Project).

1.1 Environment Effects Statement

The Minister for Planning decided that an Environment Effects Statement (EES) is required for the Project under the *Environment Effects Act 1978* (EE Act).

Section 4.3 of the EES Scoping requirements requires the proponent to:

> *Describe the bushfire hazard for the immediate project area and broader landscape conditions and undertake appropriate risk assessment that considers the potential for increased risk of bushfire to people, property and community infrastructure due to the project.*

1.2 Purpose of this report

This bushfire assessment has been prepared to support the EES process.

This report is not intended to be a detailed assessment of the requirements in the Bushfire Management Overlay (BMO) at Clause 44.06 and Clause 53.02 of the Yarra Ranges Planning Scheme (Planning Scheme), it is a strategic assessment which can be used to inform future decisions about the construction and operation of the trails, including the proposed planning controls.

It is recognised that more detailed bushfire assessments are likely to be required once the design for new buildings is settled (e.g. the visitor hub at Warburton Golf Course). The requirement for such assessments should be integrated into the draft planning scheme amendment documentation.

1.3 Scope of this report

This report addresses the following matters:

- An overview of the State bushfire planning policy.
- Analysis of fire behaviour likely to affect the project area, taking into account landscape scale and local conditions.
- Assessment of the bushfire risk, taking into account existing and future communities, the nature of the proposed use, existing uses in the project area, access arrangements and the views of the relevant fire authority.
- Identification of suitable bushfire mitigation measures that could be incorporated into the Project to reduce the risk from bushfire to an acceptable level.

2 Methodology

2.1 Assessment methods

The following methodology was used to conduct this bushfire assessment:

- **Review of policy and regulatory framework:**
  - Review of the relevant State policy at Clause 13.02 of the Planning Scheme.
  - Review of relevant guidance published by DELWP in relation to strategic bushfire assessments.
  - Review of the proposed controls.
- **Review related EES background information:**
  - Relevant technical assessments prepared as part of the EES process were reviewed, including the transport assessment and full project description.
  - The relevant aspects of the EES Scoping requirements were reviewed.
- **Review of existing emergency management arrangements:**
  - Review of the existing arrangements already in place in much of the public land within the project area.
- **Consultation:**
  - The Country Fire Authority (CFA) and Fire Rescue Victoria (FRV) were consulted in relation to the hazard assessment and draft recommendations.
- **Hazard assessment:**
  - An assessment of the bushfire hazard at the landscape scale was conducted, based on the policy direction at Clause 13.02 of the Planning Scheme for strategic planning decisions.
  - Aerial photography was used to inform this assessment.
  - A site inspection was conducted to assess of the bushfire hazard at the proposed trail head locations, including Warburton Golf Course, Mount Tugwell, Mount Donna Buang and Wesburn Park. This involved classifying existing vegetation in accordance with Method 1 in *AS3959-2018 - Construction of buildings in bushfire prone areas* (AS3959) and the methodology at Clause 53.02 for bushfire hazard site assessments.
- **Access arrangements and other hazards:**
  - Review access arrangements and recommendations from other technical assessments prepared as part of the EES process.
  - Consider any other hazards (e.g. ignition sources associated with the project).
- **Risk assessment and mitigation measures:**
  - Particular ignition risks associated with the construction and operational phases of the project were identified and considered.

- Factors that may mitigate the risk from bushfire (e.g. proposed management plans, existing fire prevention activities or neighbourhood safer places) were reviewed.
- Recommendations to mitigate the risks from bushfire to an acceptable level (e.g. vegetation management around the visitor centre or management plans) were made.
- Biosis' ecologists working on the biodiversity assessment were consulted to identify any consequential implications on biodiversity values.

- **Conclusions and policy consideration:**
  - An assessment of how the Project meets relevant bushfire policy objectives at Clause 13.02-1S of the Planning Scheme and responds to EES scoping requirements was conducted.

2.2 Assumptions and limitations

The assessment of hazard at the landscape scale was completed using desktop information.[1] The site inspection conducted was limited to an assessment of the bushfire hazard at nominated trail heads (e.g. where more people are expected to gather), and did not include an assessment of the entire trail network.

It is expected the usual strategic fire prevention activities, already in place will continue to occur under the existing emergency management arrangements. For example, the risk landscape planning work that DELWP has been conducting as part of the Strategic Bushfire Management Plan for the region.[2]

This assessment does not rely on any fire modelling.

[1] Including aerial photography and fire history information published by DELWP.

[2] https://www.safertogether.vic.gov.au/__data/assets/pdf_file/0026/493532/DELWP_BushfireManagementStrategies_2020_Metro_PortPhillip_rr.pdf

3 Project description

A full description of the Project is included in Chapter 3 of the EES. The aspects of the Project relevant to this bushfire assessment are described below.

3.1 Project area

The project area is located 70 kilometres east of Melbourne in the Yarra Ranges and is centred around the township of Warburton. The project area extends across Mount Donna Buang, Mount Little Joe and Mount Tugwell. The landscape surrounding the proposed mountain bike trails is heavily forested and mountainous. In some cases, proposed trails would be isolated from roads, emergency tracks and other public infrastructure.

The northern section of the project area is located to the north of the Warburton Highway within the Yarra Ranges National Park. This area includes Mount Donna Buang. Some sections of the northern trails would cross into the Woi Wurrung State Forest, as well as road reserves and freehold land within the Warburton Golf Course.

The southern section of the project area is located to the south of the Warburton Highway within the Yarra State Forest. This area includes Mount Little Joe and Mount Tugwell. Some sections of the southern trails would cross into natural feature reserves and freehold land.

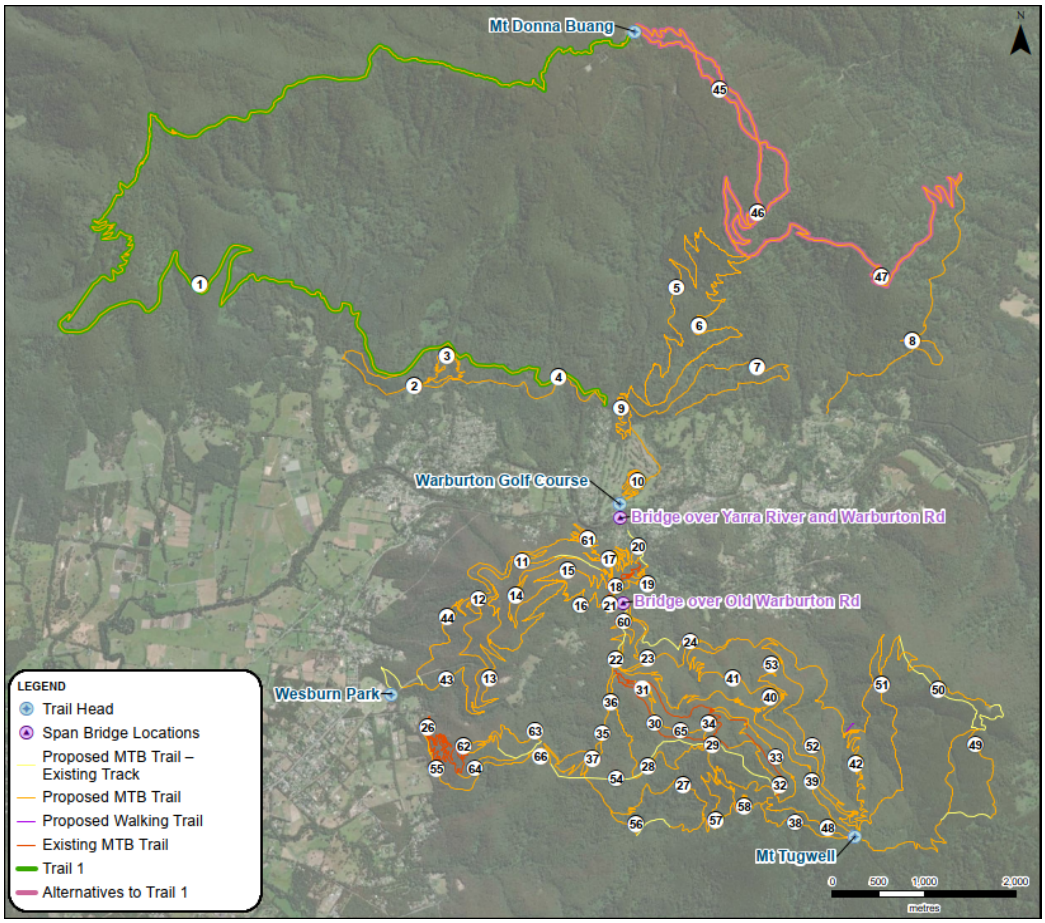
The proposed trails would intersect four private landholdings and run within 100 metres of a further eight private residences. Traversing Mount Donna Buang, Mount Little Joe, Mount Tugwell and the O'Shannassy Aqueduct, the proposed trails intersect with a range of existing recreation uses including bushwalking, horse riding, motocross and 4WDing. The proposed development of the main trail head would result in an intersection between the project and the Warburton Golf Course.

3.2 Proposed development

3.2.1 Overview

The main project components proposed are as follows:

- The mountain bike trail network, consisting of:
  - Upgrade of existing mountain bike trails - approximately 12 kilometres (seven per cent of project length).
  - New mountain bike trails – up to approximately 155 kilometres (87 percent of project length).
  - Upgrade of existing vehicle track - upgrade approximately 10 kilometres (six per cent of project length).
- New visitor's hub and main trail head at the Warburton Golf Course and new trail head facilities at Mount Tugwell, Mount Donna Buang and Wesburn Park (see Diagram 1). An additional network access point to the network will be established at Dee Road.



3.2.2 Management arrangements

The trail network will traverse State Parks, National Parks, road reserves, Yarra Ranges Shire Council (Council) land and freehold land.

There are different land tenures and management arrangements in place across the project area, including:

- National Parks – managed by Parks Victoria
- State Forest – managed by DELWP
- Privately owned land (e.g. Warburton Golf Course) – leased by Council
- Council land – managed by Council

The majority of the network is within the Fire Protected Area where bushfire risk management is governed by the *Forests Act 1958.*

Council is proposed to become responsible for all aspects of the construction and operation of the trail network. This will include it controlling the trail network, trail heads, visitor hub and shuttle services (e.g. through leasing and contractual arrangement).

Land surrounding the network will continue to be managed as it currently is. For example, DELWP will continue to be responsible for fire prevention activities in State Parks immediately adjacent to the trails. Council intends to work with different land managers to integrate its fire prevention activities and emergency management arrangements through the development of an Emergency Management Plan.

3.2.3 Upgrades of existing mountain bike trails

Approximately 12 kilometres of mountain bike trails existing in the vicinity of Mount Tugwell are proposed to be upgraded and incorporated into the designated Warburton Mountain Bike Destination trail network.

3.2.4 New mountain bike trails

Approximately 155 kilometres of the mountain bike trails proposed for the project would be new bike trails. The following sections describe key aspects of the network:

Existing vehicle roads and tracks

Approximately 10 kilometres of existing vehicle roads and tracks are proposed to be incorporated into the designated Warburton Mountain Bike Destination trail network.

The existing vehicle roads and tracks are gravel tracks currently open to public access, but with limited use. Mineshaft Hill Track would be used to provide connectivity between a number of the new or upgraded mountain bike trail sections and no construction activities are required to incorporate it into the network.

Cemetery Track is proposed to be closed to public access and repurposed as a mountain bike trail. The track is currently extensively damaged by recreational vehicle use, causing significant environmental impact and making it impassable to DELWP management vehicles. The mountain bike trail construction on this section will address significant erosion issues and provide for land manager access.

New visitor's hub and trail heads

The new visitor's hub and main trail head is proposed to be developed to the south of Warburton Golf Course, where the existing carpark would be upgraded from the current capacity of approximately 30 spaces to accommodate around 180 spaces with room for future expansion if required.

The visitor's hub would be co-located with the main trail head and would allow direct access to the northern and southern mountain bike trail networks. Other facilities would include a shuttle bus shelter, toilet and shower facilities, picnic tables, comprehensive visitor information that is related to the mountain bike trails and bike wash bays.

Three other trail heads are proposed as part of the project:

- A new trail head would be established on top of Mount Tugwell, off Mount Bride Road and would include a carpark, a bus turnaround bay, a bike wash down station, toilets and picnic area.
- The existing visitor node at Mount Donna Buang would be integrated into the network, with the existing car park to be used for shuttle bus drop-offs, and installation of a bike wash down station.
- Wesburn Park existing facilities will provide an additional access point to the network, in particular being suitable for additional parking and for accommodating mid-week visitation such as school groups or larger groups.

Wesburn Park masterplan

As a separate project, a masterplan has been finalised for the redevelopment of Wesburn Park. The redevelopment is anticipated to include the creation of 120 additional car parking spaces (reflected in the masterplan), which would be expected to be utilised by visitors of the Warburton Mountain Bike Destination. The works required for the redevelopment are not proposed as part of the Warburton Mountain Bike Destination project and therefore not assessed as part of the EES. It is anticipated that as part of the Warburton Mountain Bike Destination project, a bike wash down station would be installed at Wesburn Park.

3.2.5 Project timing and future detailed design process

The timing of the key project phases is proposed as follows:

- Project development and approval: 2020 – mid-2022
- Project construction: progressively from mid-2022 depending on funding
- Project operations and maintenance: staged opening during 2022 and beyond depending on funding.

The construction phase of the project is separated into Stage 1 and Stage 2. Construction Stage 1 is fully funded however, Stage 2 is subject to acquiring funding. Stage 1 would involve the construction of 110 kilometres of trails from mid-2022 and would take approximately 18 months. Stage 2 is subject to funding and would take approximately 12 months to construct. The exact trails and infrastructure to be delivered under each stage has not yet been determined and will be finalised once the final design has been approved and costed.

4 Controls and policy context

4.1 Existing controls

The project area is affected by the Bushfire Management Overlay (BMO) pursuant to the Yarra Ranges Planning Scheme (Planning Scheme).

The site is within the designated Bushfire Prone Area (BPA).

4.2 Proposed controls

A draft planning scheme amendment has been prepared which will be exhibited concurrently with the EES. An incorporated plan is proposed to be included the Planning Scheme. Draft documentation has been reviewed as part of the preparation of this report and the controls include the following bushfire management requirements:

- Bushfire Emergency Management Plan as recommended in this report.
- Need for the preparation of a Bushfire Management Plan for the proposed visitor's hub at Warburton Golf Course (or in any other trail head location where buildings are proposed in the future) that mirrors the requirements in the Bushfire Management Overlay and Clause 53.02 of the Planning Scheme.
- Construction Environmental Management Plan and Operational Environmental Management Plan that integrate the traffic management and ignition risk mitigation measures identified in this report.

4.3 Integrated bushfire hazard identification and mitigation

In Victoria the planning and building systems are integrated in how they deal with bushfire risk. The planning system is largely responsible for strategic decisions and decisions in areas with more significant bushfire hazard. The building system is largely responsible for decisions on sites with lower levels of bushfire hazard. Mapping tools under the planning and building systems are used to designate the level of bushfire hazard.

4.3.1 Building system

In the building system, areas that are likely to be subject to bushfire are mapped in the designated Bushfire Prone Area (BPA) pursuant to Section 192A of the *Building Act 1993*. Areas designated as BPA areas that are exposed to lower levels of bushfire hazard – typically grassland environments and other bushfire prone areas where extreme bushfire behaviour is unlikely to be generated.

The BPA designation triggers a bushfire construction requirements under the National Construction Code 2016 (National Construction Code). A minimum construction standard of Bushfire Attack Level (BAL) – 12.5 applies in all parts the BPA.

4.3.2 Planning system

The planning system requires bushfire risk to be considered when developing land in the BPA and the BMO.

The BMO is a planning overlay control applied to areas that have the potential for more significant fire behaviour, such as a crown bushfire and extreme ember attack and radiant heat (DELWP 2017). These are the type of locations where the creation of new or expanded settlements should be avoided where possible and

accordingly the mapping of the BMO has also used as an important input for the landscape scale bushfire assessment.

4.3.3 Australian Standard AS.3959-2018

Australian Standard AS.3959-2018 – *Construction of buildings in bushfire prone areas* (2018) (AS.3959**)** is used to determine the level of bushfire attack on buildings and to determine the appropriate construction response in the building system. The standard also underpins aspects of the planning system. For example, clause 13.02 refers to different radiant heat exposure thresholds as calculated under AS.3959.

As part of any assessment of bushfire behaviour there are assumptions made based on vegetation type, slope and assumptions about the weather conditions under AS.3959.

Vegetation – classified and excluded

According to AS.3959, there are different classifications for vegetation, including 'classifiable' vegetation which is likely to contribute to fire behaviour (e.g. forest, woodland, grassland, shrub) and 'excluded' which has a less significant influence on fire behaviour and is therefore excluded from the assessment. Under the standard, excluded vegetation is described as:

- *Single areas of vegetation less than 1 hectare in area and not within 100 metres of other classifiable vegetation.*
- *Multiple areas of vegetation less than 0.25 hectares in area and not within 20 metres of the site or each other.*
- *Strips of vegetation less than 20 metres in width and not within 20 metres of the site or each other or other areas of classifiable vegetation.*
- *Non-vegetated areas including waterways, roads, footpaths, buildings or rock outcrops.*
- *Low threat vegetation including managed grassland, maintained lawns, golf courses and public reserves.*

4.4 State bushfire planning policy Clause 13.02-1S

The Planning Policy Framework seeks to increase the Victorian community's resilience to bushfire through risk-based planning that prioritises the protection of human life.

Clause 13.02-1S – *Bushfire planning* (Clause 13.02-1S) applies to all planning and decision making under the *Planning and Environment Act 1987* (PE Act) relating to land that is within a BPA, subject to a BMO or are proposed to be developed in a way that may create a bushfire hazard.

The objective of Clause 13.02-1S is:

- *To strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life.*

The strategies that underpin Clause 13.02-1S include:

- *Give priority to the protection of human life by:*
  - *Prioritising the protection of human life over all other policy considerations.*
  - *Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire.*

- *Reducing the vulnerability of communities to bushfire through the consideration of bushfire risk in decision making at all stages of the planning process.*

Of particular relevance to this assessment, Clause 13.02-1S sets out the following strategy for settlement planning:

- *Plan to strengthen the resilience of settlements and communities and prioritise protection of human life by:*
- *Directing population growth and development to low risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).*
- *Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009) where human life can be better protected from the effects of bushfire.*
- *Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development.*
- *Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reducing bushfire risk overall.*
- *Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale destruction.*
- *Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.*
- *Not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL-12.5 rating under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).*

Integrated decision making and prioritisation of bushfire considerations

Clause 71.02 – *Operation of the planning policy framework* of the Planning Scheme also provides important guidance on the consideration of bushfire in decision making and how this is to be balanced against other policy considerations. In particular, Clause 71.02-3 states the following:

> *Planning authorities and responsible authorities should endeavour to integrate the range of policies relevant to the issues to be determined and balance conflicting objectives in favour of net community benefit and sustainable development for the benefit of present and future generations. However in bushfire affected areas, planning authorities and responsible authorities must prioritise the protection of human life over all other policy considerations.*

4.5 Guidance and practice notes

The following practice notes and guidance have been published in relation to bushfire risk assessment:

- *Advisory Note 46, Bushfire Management Overlay Mapping Methodology and Criteria*, Victorian Government, August 2013 (Advisory Note 64 BMO mapping methodology)
- *Advisory Note 68 – Bushfire State Planning Policy Amendment VC140* (Planning Advisory Note 68)
- *Planning Practice Note 64 - Local planning for bushfire protection, Victorian Government, September 2015* (PPN64: Local planning for bushfire protection)
- *Technical Guide Planning permit Applications Bushfire Management Overlay*, Victorian Government, September 2017 (BMO Technical Guide)

5 Existing emergency management arrangements

5.1 Overview

The National Park and State Forests are already managed to mitigate the risks to recreational users of the park. Fire prevention and emergency management arrangements in place, as required under legislation such as the *Emergency Management Act 1986* and the *Country Fire Authority Act 1958.*

Council, Parks Victoria and DELWP undertake fire prevention activities, such as controlled burns when conditions are suitable. These agencies also have emergency management arrangements in place that call for parks to be closed on high risk days.

These measures, outlined below, will continue once the Project is operating.

5.2 Existing management plans

There are several emergency management plans already in place and these will continue to be updated and implemented over the construction and operation of the project.

5.2.1 Council - Yarra Ranges Municipal Emergency Management Plan (January 2020, V5.2.1)

The plan describes actions taken before during and after emergencies. The actions taken contribute to the development of a safer more resilient community in Yarra Ranges.

The plan applies to all emergencies. Sub plans have been developed to manage specific hazards of fire, heat wave, pandemic, storm and floods. A Municipal Relief and Recovery Plan has also been developed.

While the plan is written for the municipal district of Yarra Ranges, it is consistent with regional and state-wide emergency management arrangements and legislation.

5.2.2 Council - Yarra Ranges Municipal Fire Management Plan (February 2019)

The plan is a sub-plan of the broader Municipal Emergency Management Plan. This plan also meets the requirements of *Country Fire Authority Act 1958* for municipal councils to prepare and maintain a municipal fire prevention plan. It consists of:

- The Strategy, which describes a strategic approach to managing fire risk.
- The Action Plan, which details how the strategy will be implemented.
- Location specific plans developed in partnership with local communities.
- Locations of Neighbourhood Safer Places and Community Fire Refuges.
- Victoria Fire Risk Register outputs for Yarra Ranges.
- Hazard Tree Identification Process required by the *Electrical Safety Act 1998.*

5.2.3 Parks Victoria Emergency Management Plan (September 2020)

The plan includes park area information, emergency contacts and emergency response instructions for park areas. The plan contains a specific instruction for bushfire risk, which covers preparedness, response and recovery actions.

More generally, Parks Victoria has an existing protocol for park closure on high danger days. On days of forecast Code Red Fire Danger Rating, Parks Victoria and the Department of Environment, Land, Water and Planning will close the majority of parks in the relevant weather district for public safety.

5.2.4 DELWP – Port Phillip Regional Supplement (Readiness and Response Plan 2020-21)

The Port Phillip Regional Supplement forms part of the State Emergency Readiness and Response Plan for 2020/21. This region-specific supplement defines the readiness, initial response and relevant emergency management procedures to be adopted by all Forest Fire Management Victoria (FFMVic) staff in the FFMVic Port Phillip Region.

The plan also outlines how different agencies operate within the region, including FFMVic, CFA, FRV and SES, with reference to the *Joint Metropolitan Regional Local Mutual Aid Plan.*

5.3 Municipal Fire Management Committee

The *Emergency Management Act 1986* requires every municipal council form an emergency management planning committee to prepare an emergency management plan.

The Yarra Ranges Emergency Management Planning Committee (MEMPC) considers that fire risk within the municipality requires a Municipal Fire Management Plan (outlined above).

The MEMPC has appointed a subcommittee, the Municipal Fire Management Committee (MFMPC) to develop the Municipal Fire Management Plan. Membership of the MFMPC consists of:

- The Country Fire Authority
- The Metropolitan Fire Brigade
- Department of Environment, Land, Water and Planning
- Parks Victoria
- Melbourne Water
- Victoria Police
- VicRoads
- Yarra Ranges Council

6 Consultation

6.1 Country Fire Authority and Fire Rescue Victoria

The CFA and FRV were consulted as part of the development of this assessment.

A videoconference meeting was held on 24 June 2021. At that meeting, Biosis, AECOM and Yarra Ranges Shire Council representatives provided CFA and FRV with an overview of the Project, assessment and approvals process and the context for this assessment.

Key issues raised by CFA at that meeting were:

- How the Project would respond to policy objectives at Clause 13.02 of the Planning Scheme.
- Potential impacts on access, for the existing community and emergency service vehicles.
- Interaction between biodiversity considerations and bushfire risk (including the location of native vegetation offset sites).
- Emergency management arrangements, including communication with visitors, access to safer places and the consideration of human behaviour in emergency situations.
- Managing peak demands during the summer period, including accommodation for visitors to the area.
- How the recommendations from the bushfire assessment would be integrated into the approvals process (e.g. the Planning Scheme Amendment).

6.2 Response to feedback

This report addresses the matters raised by CFA and FRV at the meeting held on 24 June 2021. It is noted that DELWP should also be consulted in relation to land that it manages (this is referenced in in section 11 of this report).

In addition, Yarra Ranges Shire Council has committed to provide CFA with a draft version of the assessment and draft Planning Scheme Amendment documentation for further feedback before the EES and Planning Scheme Amendment documentation are formally exhibited. A copy of the draft documentation will be provided to the relevant fire authority for comment.

CFA and FRV will also have the opportunity to make submissions to the Inquiry.

There is a need to ongoing communication between CFA, FRV and Yarra Ranges Council as the Project progresses in relation to emergency management arrangements.

7 Bushfire Hazard Assessment

7.1 Approach to hazard assessment

A bushfire hazard assessment is a factual assessment of the bushfire hazard and the likely forms of bushfire attack.

The bushfire hazard assessment has been prepared in two parts:

- Bushfire Hazard Landscape Assessment of the project area. This considers the hazard at the broader landscape scale, which is important given the scale of the project area and nature of the proposed land use
- Four separate Bushfire Hazard Site Assessments for each of the proposed trail head locations. While the exact design of each trail head is still to be confirmed, a more detailed assessment has been completed given the trail heads are located where there is expected to be a greater congregation of people.

7.2 Mechanisms of bushfire attack

As noted in the *Technical Guide Planning permit Applications Bushfire Management Overlay* (DELWP, September 2017) (BMO Technical Guide) there are up to five forms of bushfire attack that need to be taken into account when undertaking bushfire assessments. These are:

- ember attack
- radiant heat
- localised flame contact
- flame contact from the fire front
- extreme fire behaviour.

The likely forms of bushfire attack are informed by an assessment of vegetation, topography and other features at the landscape scale and the site scale.

7.3 Bushfire Hazard Landscape Assessment

7.3.1 Landscape type

According to the landscape typologies in the BMO Technical Guide (DELWP), the project area would be classified as landscape type 3, which has the following features:

- *The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site.*
- *Bushfire can approach from more than one aspect.*
- *The site is located in an area that is not managed in a minimum fuel condition.*
- *Access to an appropriate place that provides shelter from bushfire is not certain.*

This means that the project area is located in a relatively high bushfire risk location.

7.3.2 Likely bushfire scenarios

Likely bushfire scenarios have been identified based on the topography, vegetation, landscape features and predominant wind direction described in Figure 1. All of these factors influence fire behaviour at the landscape scale.

It is acknowledged that if a more extreme fire develops (e.g. large, intense, destructive plume drive fires with long landscape fire runs from all aspects) that there will not necessarily be a defined front. The fire history in the area indicates that more extreme landscape fires have occurred and will continue to impact on the project area.

Scenario 1 – Landscape fire developing from the north or north-west

One credible fire scenario is the development of a landscape scale fire to the north-west or north of the project area. The ranges to the north of the project area are a rugged forested landscape where extreme fire behaviour could be expected. All forms of bushfire attack would be present, including extreme ember attack, radiant heat and direct flame contact. Strong winds and cyclonic fire behaviour could also be expected in such a scenario.

Scenario 2 – Landscape fire developing from the south west

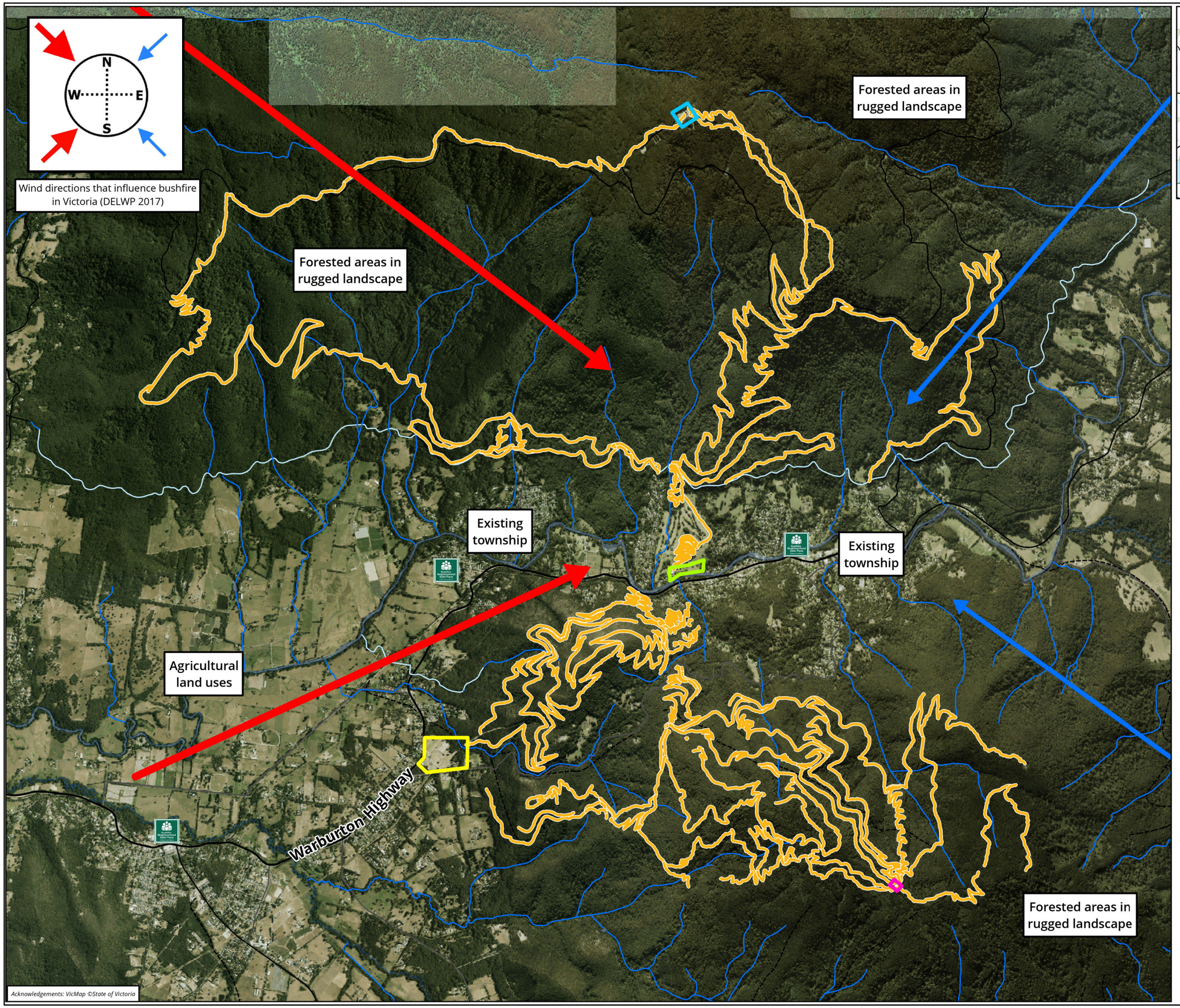
A fire could develop in the rugged forested areas to the south west of the project area. Such a fire would have the potential to generate extreme fire behaviour. The main difference when compared with scenario 1, is that this scenario would be driven by secondary winds. However, if the fire generated sufficient energy all forms of bushfire attack and strong winds would be expected to impact on the project area.

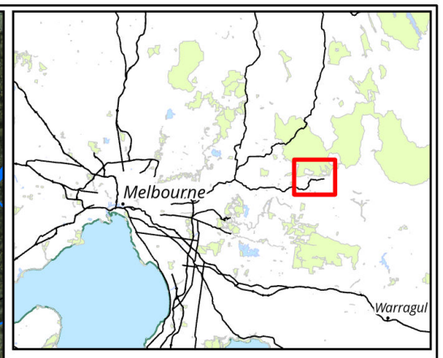
Scenario 3 – Localised fire activity

A smaller fire could develop in any of the areas surrounding the project area, including a fire developing in the agricultural land to the south west of the project area. In less extreme conditions, such a fire could generate ember attack, radiant heat and direct flame contact.

Figure 1 shows the key influencers of fire behaviour at the landscape scale.

Figure 2 shows the fire history in the project area and surrounds.





Legend

- Neighbourhood Safer Place-Bushfire Place of Last Resort (NSP-BPLR)
- Proposed MTB trail
- Primary wind direction
- Secondary wind direction
- Local government area boundary

Sites

- Mt Donna Buang Summit Trail Head
- Mt Tugwell Trail Head
- Warburton Golf Course Trail Head
- Wesburn Park Trail Head

Figure 1 Bushfire Hazard Landscape Assessment - Warburton MTB EES

0 0.5 1 1.5 2

Kilometres

Scale: 1:40,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

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Matter: 35239,
Date: 07 July 2021,
Checked by: MD, Drawn by: LW, Last edited by: lwilson
Layout: 35239_F1_LandscapeAssessment
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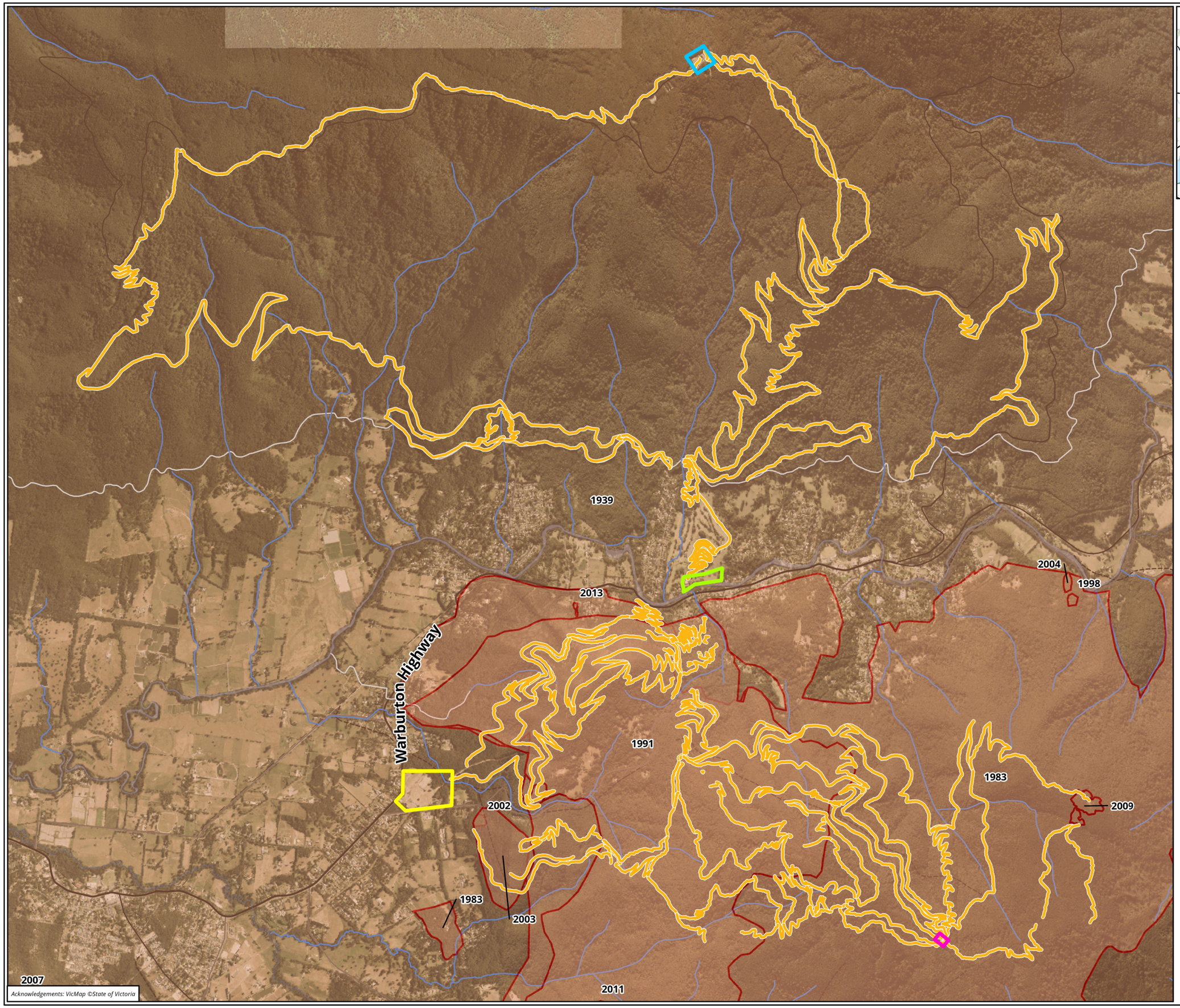

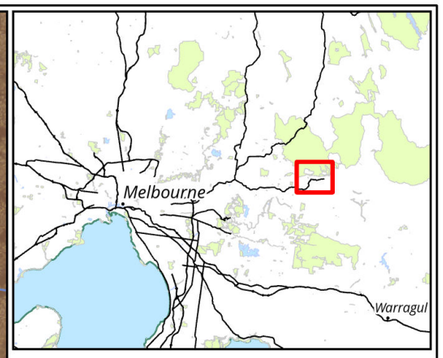

Legend

- Proposed MTB trail
- Bushfire (labelled by year)

Sites

- Mt Donna Buang Summit Trail Head
- Mt Tugwell Trail Head
- Warburton Golf Course Trail Head
- Wesburn Park Trail Head

Figure 2 Fire history map – Warburton MTB EES

0 0.4 0.8 1.2 1.6

Kilometres

N

Scale: 1:35,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

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7.4 Bushfire Hazard Site Assessment – Warburton Golf Course trail head

7.4.1 General description

A new visitor's hub and main trail head is proposed at the Warburton Golf Course. The existing golf course is located on Dammans Road and is a short distance from the main town, which can be accessed from Dammans Road or across Mayar Bridge which links to Warburton Highway and the existing Lilydale to Warburton rail trail.

The golf course already attracts a number of visitors and it is intended that the visitor hub and car parking area for this Project would utilise existing assets.

Diagram 2 below shows a concept plan for the Warburton Golf Course trail head.

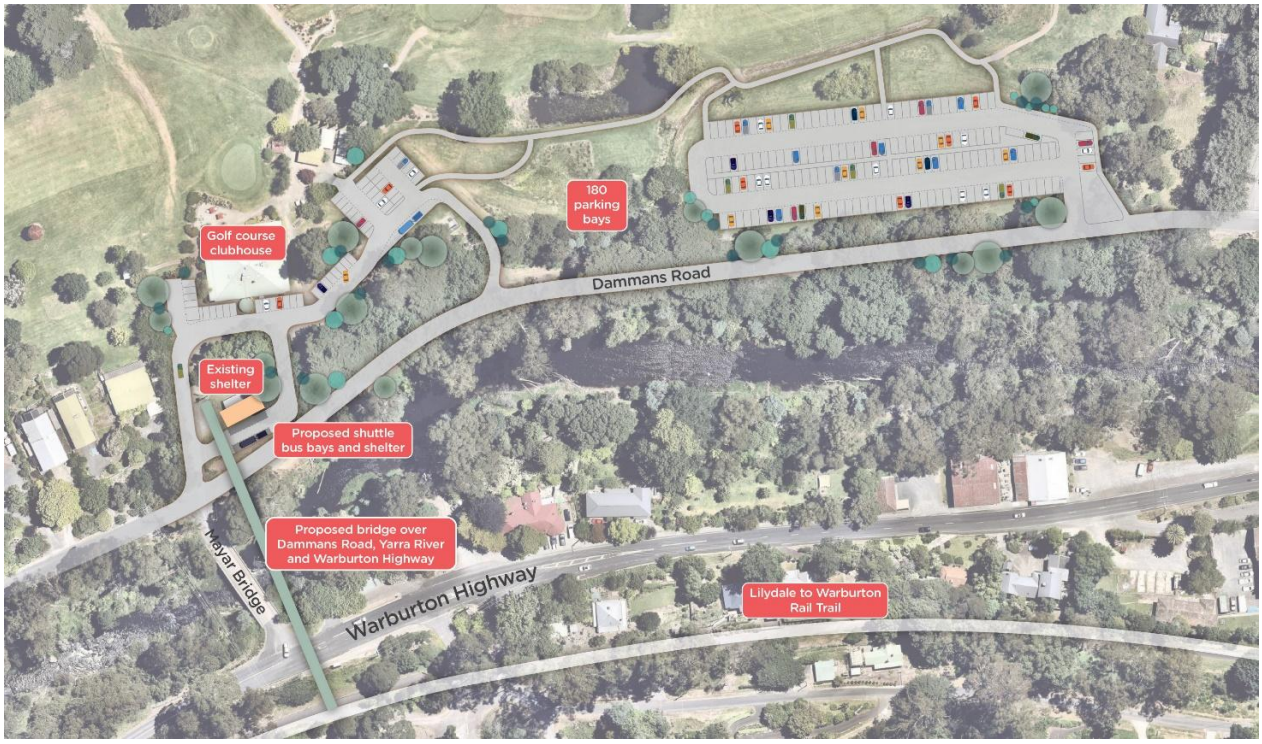


Diagram 2 Warburton Golf Course trail head concept plan

7.4.2 Site photographs

Photos 1 – 6 below show the existing site conditions at the Warburton Golf Course trail head.

Photo 1 View from club house looking north

Photo 2 View from club house looking east

Photo 3 View from golf course entry towards Mayars Bridge to south of site

Photo 4 View of vegetation along Yarra River to south of site

Photo 5 View from club house looking west

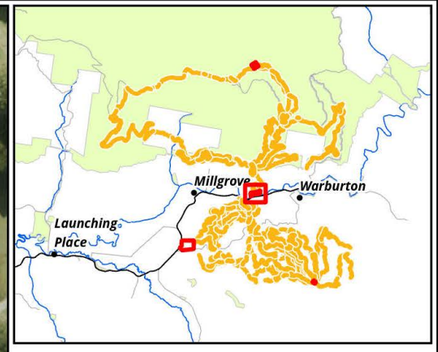
Photo 6 Hedgerow along Dammans Road

7.4.3 Vegetation classification

Figure 3 shows the vegetation and topography most likely to affect the fire behaviour at the site scale. This is summarised in Table 1.

Table 1 Warburton Golf Course trail head site assessment classifications and slope

	North	East	South	West
Vegetation	Forest and Low threat	Low Threat and Modified	Forest and Modified	Modified and low threat
Effective slope	Upslope (under Forest)	Not applicable	Flat (under Forest)	Not applicable



Legend

- Site
- Slope
- Proposed MTB trail
- Assessment area (150 m)

Vegetation

- Forest
- Low threat
- Modified

Figure 3 Bushfire Hazard Site Assessment - Warburton Golf Course Trail Head

0 25 50 75 100 125 N

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 55

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7.5 Bushfire Hazard Site Assessment – Mount Donna Buang trail head

7.5.1 General description

A trail head is proposed at the summit of Mount Donna Buang. Only limited changes are proposed in this location, with the introduction of bike racks and washing facilities. There are already a number of facilities at the top of Mount Donna Buang, including a look out, toilets, car parking, picnic facilities and access to existing formal and informal tracks and skiing or tobogganing areas.

Diagram 3 below shows a concept plan for the Mount Donna Buang trail head.

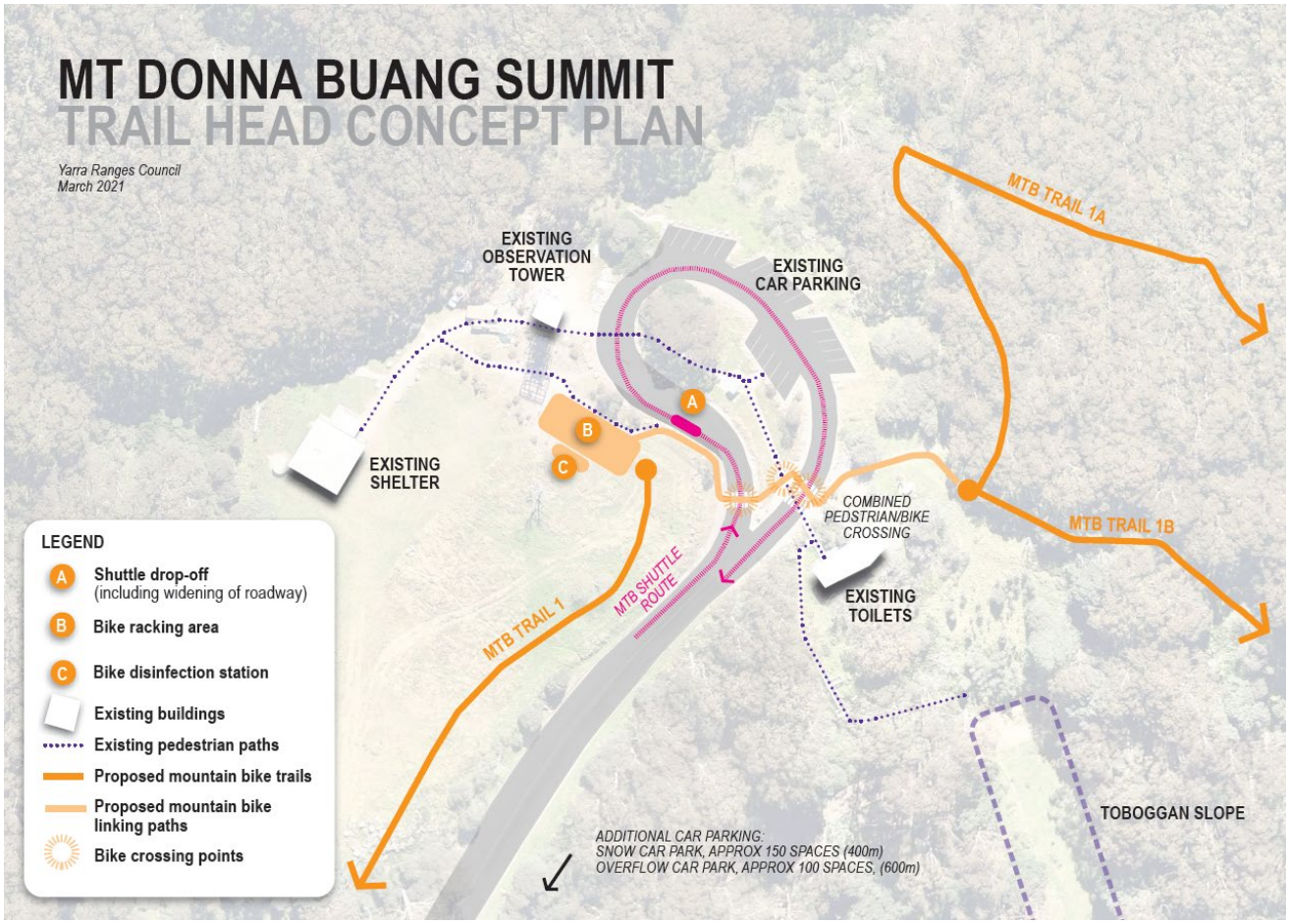


Diagram 3 Mount Donna Buang trail head concept plan

7.5.2 Site photographs

Photos 7 – 12 below show the existing site conditions at the Mount Donna Buang trail head.

Photo 7 View from road towards proposed trail head

Photo 8 View looking west from existing picnic shelter

Photo 9 View looking north from existing shelter

Photo 10 View looking south east from existing toilet block

Photo 11 View from existing carpark looking east

Photo 12 View of existing carpark looking north

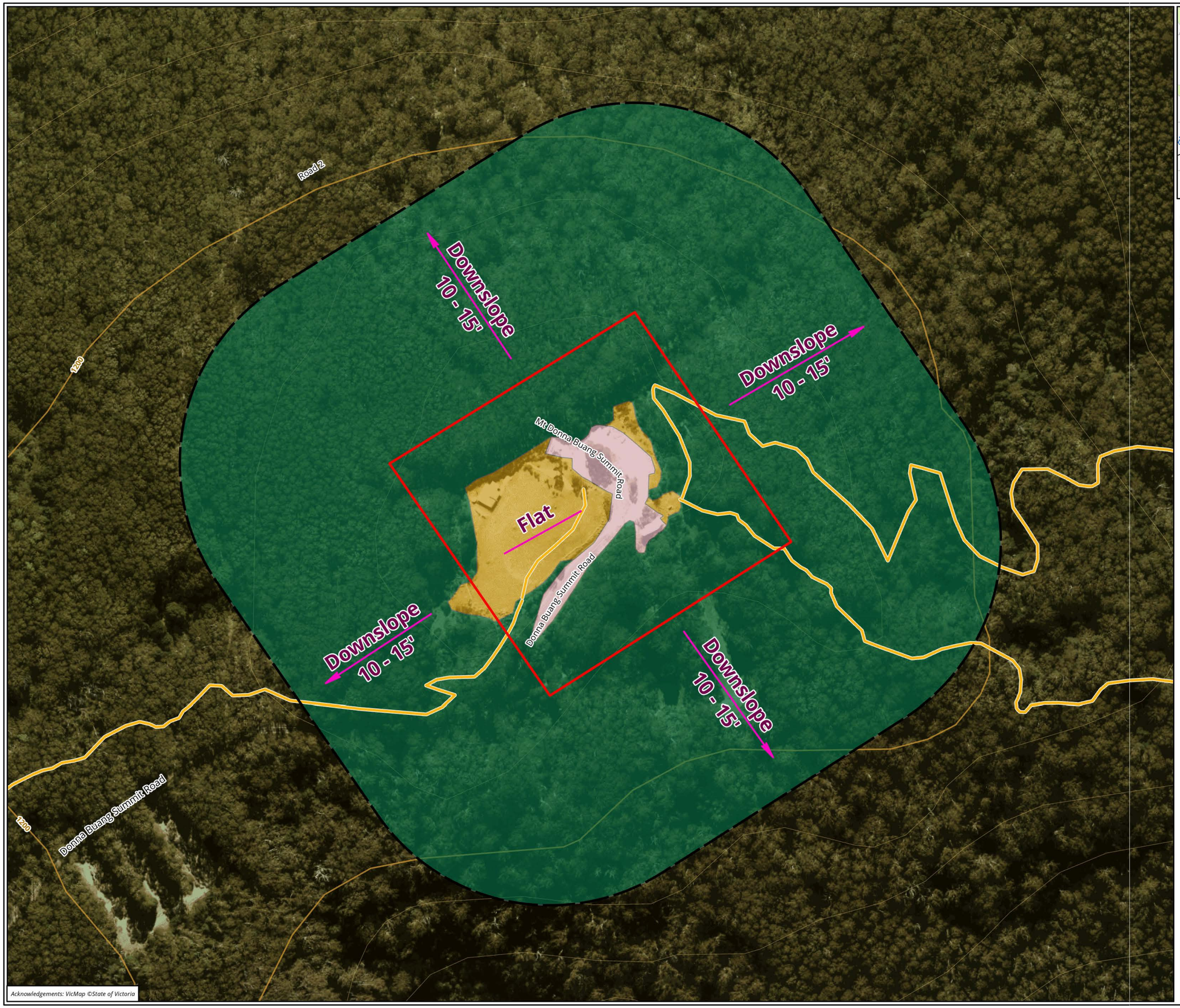
7.5.3 Vegetation classification

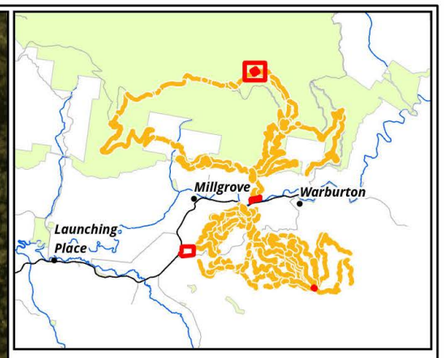
The vegetation and topography within 150 metres of the trail head is shown on Figure 4. This is summarised in Table 2 below.

Table 2 Mount Donna Buang trail head site scale assessment classifications and slope

	North West	North East	South East	South West
Vegetation	Forest	Forest and Grassland	Forest	Forest and Grassland
Effective slope	DS[3] >10-15'	DS >10-15' and Flat	DS >10-15'	DS >10-15' and Flat

[3] DS = Downslope





Legend

- Site
- Slope
- Proposed MTB trail
- Assessment area (150 m)

Vegetation

- Forest
- Grassland
- Low threat

Figure 4 Bushfire Hazard Site Assessment - Mt Donna Buang Summit Trail Head

0 25 50 75 100 125 N

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 55

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7.6 Bushfire Hazard Site Assessment – Mount Tugwell trail head

7.6.1 General description

New trail head facilities are proposed at Mount Tugwell on Mt Bride Road. This trail head is located in a heavily forested area with relatively steep topography. Mt Bride Road is a dirt road currently servicing locations in the existing park.

Diagram 4 below shows a concept plan for the Mount Tugwell trail head.

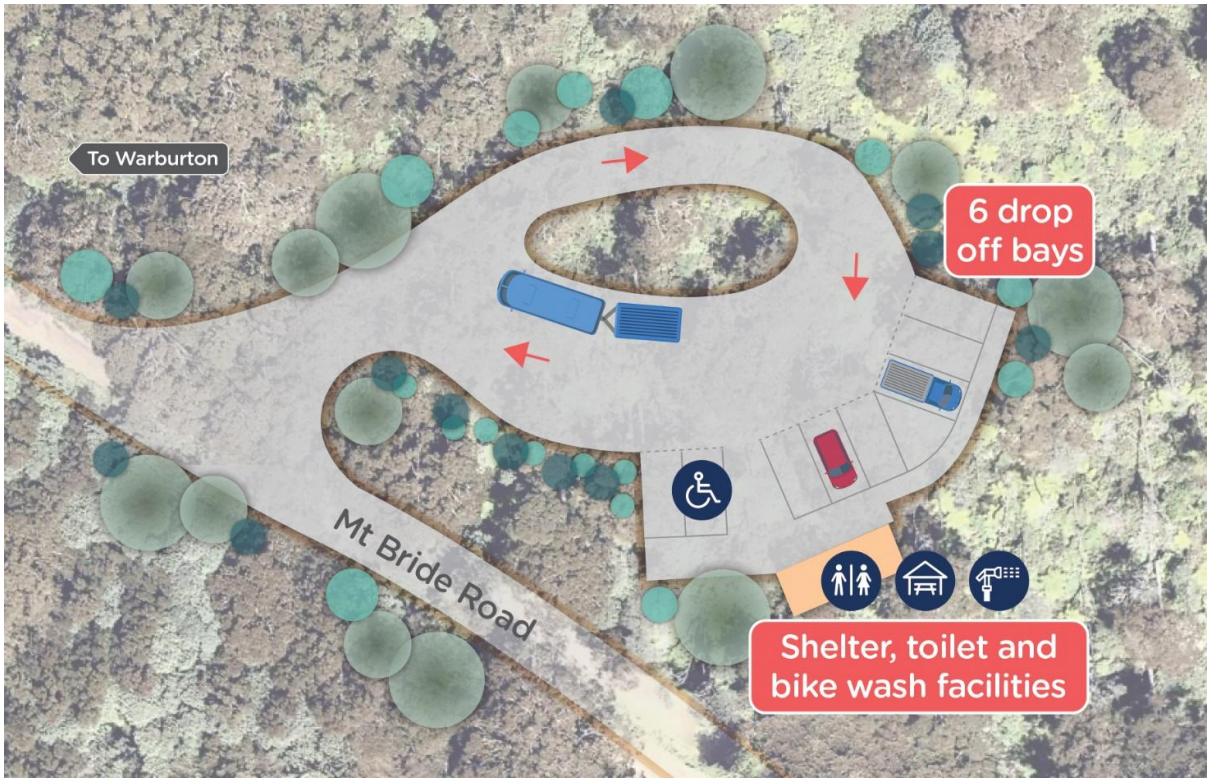


Diagram 4 Mount Tugwell trail head concept plan

7.6.2 Site photographs

Photos 13 – 17 below show the existing site conditions at the Mount Tugwell trail head.

Photo 13 View of proposed trail head location

Photo 14 View looking south west from site

Photo 15 View looking north west from site

Photo 16 View of vegetation on south west side of Mt Bride Road

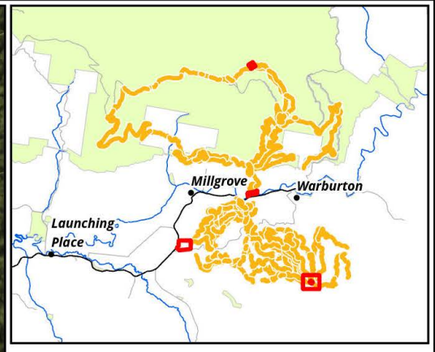
Photo 17 View looking north west down Mt Bride Road

7.6.3 Vegetation classification

The vegetation and topography within 150 metres of the trail head is shown on Figure 5. This is summarised in Table 3 below.

Table 3 Mount Tugwell trail head site assessment classifications and slope

	North West	North East	South East	South West
Vegetation	Forest	Forest	Forest	Forest
Effective slope	DS >10-15’	DS >15-20’	Flat and Upslope	Upslope



Legend

- Site
- Slope
- Proposed MTB trail
- Assessment area (150 m)

Vegetation

- Forest

Figure 5 Bushfire Hazard Site Assessment - Mt Tugwell Trail Head

0 20 40 60 80 100 N

Metres

Scale: 1:2,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

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7.7 Bushfire Hazard Site Assessment – Wesburn Park trail head

7.7.1 General description

The existing facilities at Wesburn Park will provide an additional access point to the network, in particular being suitable for additional parking and for accommodating mid-week visitation such as school groups or larger groups.

As a separate project, a masterplan has been finalised for the redevelopment of Wesburn Park. The redevelopment is anticipated to include the creation of 120 additional car parking spaces, which would be expected to be utilised by visitors of the Warburton Mountain Bike Destination. These will be assessed separately, but noted for context.

Diagram 5 below shows a concept plan for the Wesburn Park trail head.

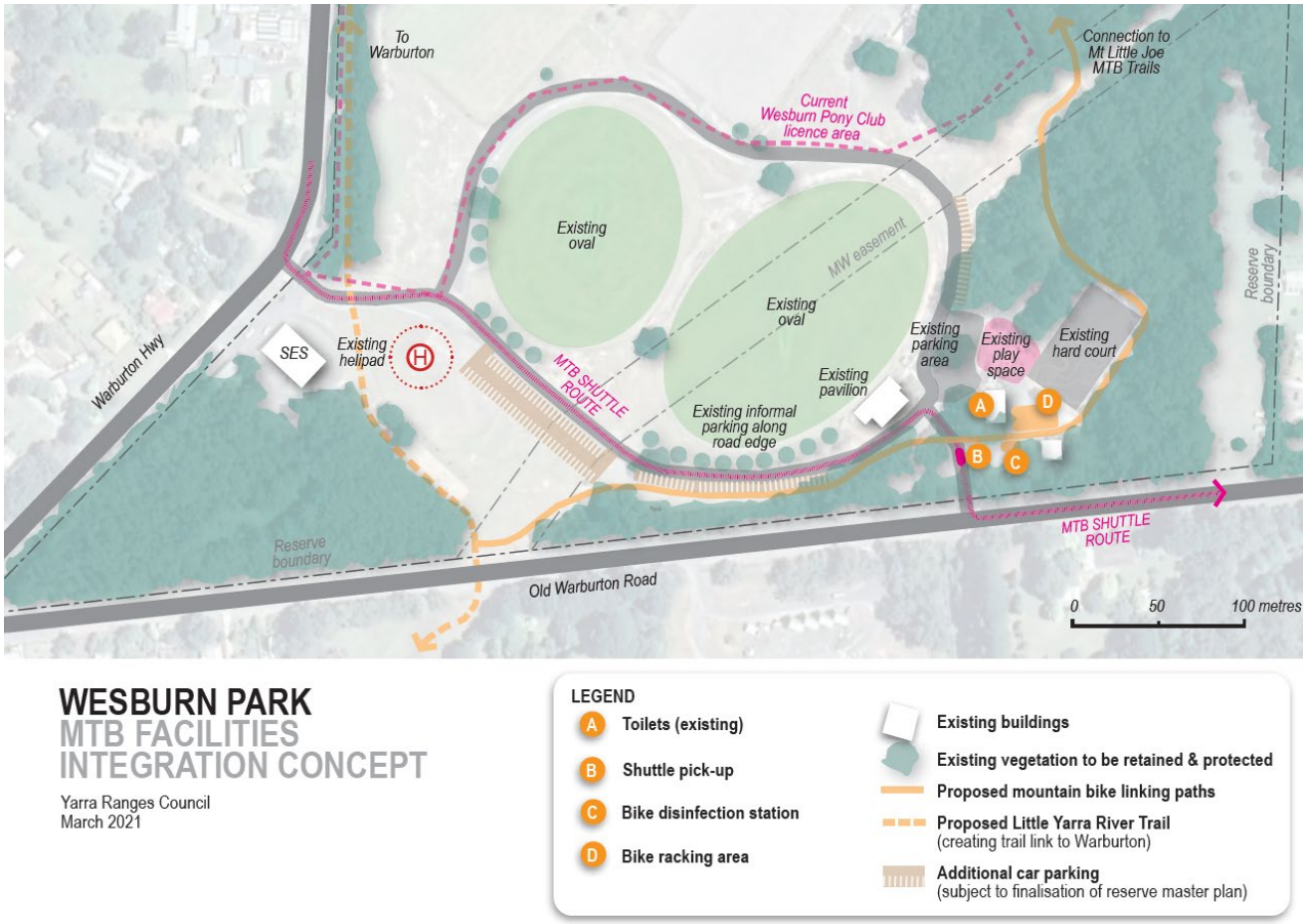


Diagram 5 Wesburn Park trail head concept plan

7.7.2 Site photographs

Photos 18 – 22 below show the existing site conditions at the Wesburn Park trail head.

Photo 18 Existing ovals at reserve

Photo 19 Vegetation to east of proposed shuttle pick up area

Photo 20 View to entry with Old Warburton Road

Photo 21 View west from south west carpark

Photo 22 View south west from south west carpark

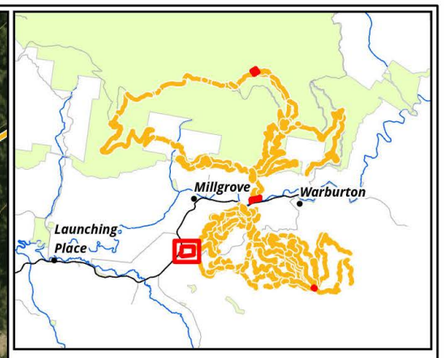
7.7.3 Vegetation classification

The vegetation and topography within 150 metres of the trail head is shown on Figure 6**.** This is summarised in Table 4 below.

Table 4 Wesburn Park trail head site assessment classifications and slope

	North West	North East	South East	South West
Vegetation	Forest and Low Threat	Forest	Grassland, Modified[4] and Low Threat	Forest and Low Threat
Effective slope	DS 0-5' (under Forest)	Flat and Upslope	Flat and Upslope	DS 0-5' (under Forest)

[4] Modified as defined in Clause 53.02 of the Planning Scheme



Legend

- Site
- Slope
- Proposed MTB trail
- Assessment area (150 m)

Vegetation

- Forest
- Grassland
- Low threat
- Modified

Figure 6 Bushfire Hazard Site Assessment - Wesburn Park Trail Head

0 30 60 90 120 150

Metres

N

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

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8 Assessment of access

The community, CFA and FRV have raised preliminary concerns about the impact of the Project on access, in the context of fire risk.

There are two aspects of access that need to be considered as part of this bushfire assessment:

- Potential impacts on emergency service vehicles.
- General congestion on the network which may impact of the existing community's ability to evacuate to a safer place before a high bushfire risk day.

8.1 Transport assessment

A detailed transport assessment has been prepared as part of the EES. *Technical Report F: Transport Environment Effects Statement* (AECOM Australia Pty Ltd, May 2021) (Transport Assessment) considered:

- The impacts of the project on emergency service access in the construction phase and the operation phases of the project.
- Impacts of the Project on the wider transport network, which are relevant to the consideration of access for the existing community.

8.1.1 Emergency service access

In relation to emergency service access, the Transport Assessment concluded that:

> *Emergency access during project operations: All trail heads would remain accessible via the existing public roads which would also be used by emergency services. If required a helicopter can be used for emergency rider crashes which is located at Wesburn Park. It is proposed that a Road Safety Audit include consideration of emergency access, any road improvement works be undertaken if deemed to be required and that an emergency access plan be implemented for the project.*

8.1.2 Transport network

In relation to network impacts during construction, the Transport Assessment concluded that:

> *Traffic impacts during road/lane closure for bridge construction: There is the potential that construction traffic and road/lane closures would increase delays and impact access for the local residential and business community. Several lane and road closures would take place during construction although limited to 4 hours at a single time and there are suitable detours available. To a manage potential impacts a Traffic Management Plan would be implemented, road/lane closures are limited to occurring in off-peak periods to maintain access for impacted residents and emergency vehicles and no more than one road closure a day would occur to minimise any impact related to the closures. In addition, a Stakeholder Communication Plan is proposed to be implemented which would include road and lane closures notification to impacted residents and emergency services while vehicular passage may not be available or be limited.*

In relation to network impacts during the operational phase, the Transport Assessment concluded that:

> *Adequacy of road network infrastructure to accommodate operations traffic in the local road network: A Road Safety Audit is proposed to be undertaken for Cemetery Track and Edwardstown Road prior to the commencement of operation to determine if any road improvements are required.*

In relation to network impacts near the trail heads during the operational phase, the Transport Assessment concluded that:

> *Parking at trail heads and Warburton town centre: Given the increase in vehicles due to the project there is a risk that there is unacceptable parking congestion at trail heads and in Warburton town centre. For the trail heads it is proposed that Operational parking management plan to include using the Wesburn Park car park as an overflow car park to accommodate visitors during peak periods and events. Appropriate signage and wayfinding would be provided to adequately direct visitors. To prevent parking congestion in the town centre it is proposed to investigate a shared use path between the Lilydale-Warburton Rail Trail and Warburton Highway to promote use of cycling between destinations. An operational parking management plan would also include monitoring of the town centre parking, installing bike parking and considering previous recommendations as part of SALT's 2019 Movement and Transport Strategy.*

8.1.3 Consolidated recommendations

The following recommendations from the Transport Assessment are noted as relevant to this bushfire assessment:

- Construction phase:
  - Emergency access plan.
- Operational phase:
  - Traffic Management Plan.
  - Stakeholder Communication Plan is recommended, which deals with potential impacts on existing communities and emergency service vehicles.
  - Operational Parking Management Plan (which includes flow of car parking across different Project locations and monitoring of parking in the Warburton town centre).

9 Other potential hazards

9.1 Fire ignition

The community has raised concerns about the increased risk of ignition associated with the project.

During the construction phase there is potential for additional ignition sources within the project area. This could include:

- Hot works during the construction of trails or bridge construction within the network.
- Presence of petrol power machines with hot exhausts.
- Workers smoking on site.

These risks exist on any work site, however in forested areas these risks need to be more carefully managed. It is expected that the Construction Environmental Management Plan (CEMP) would include mitigation measures such as having water supply to suppress any ignition available where any hot works or machinery is operating and staff protocols for the operation of machinery and smoking.

10 Bushfire risk assessment

10.1 Factors influencing risk assessment

10.1.1 Coordinated management arrangements

The trail network will traverse land in different land tenures, however there will be one central manager responsible for all aspects of the operation of the network. Council will be ultimately responsible for all aspects of the network including trail maintenance, trail heads, bus operators and emergency management arrangements.

Council will provide oversight over the different land tenures and management arrangements that are already in place, including:

- National Parks – managed by Parks Victoria
- State Forests – managed by DELWP
- Privately owned land (e.g. Warburton Golf Course) – leased by Council
- Council land – managed by Council

Council intends to integrate its emergency management arrangement and fire prevention activities with pre-existing emergency management arrangements and activities already adopted by other public land managers.

10.1.2 More formalised recreational use

The Project is primarily designed to create additional recreational facilities in existing State Forests and National Parks and existing recreational land (e.g. Warburton Golf Course and Wesburn Park). These areas are already used for recreational purposes, including hiking, bike riding, golfing, four wheel driving, horse-riding and camping. At the moment most of the recreational uses are informally managed. There are people visiting State and National Park areas during the peak of summer and there is no central management or oversight of these visitors. While Parks Victoria or DELWP can formally close its parks (e.g. via public notices), there is still a possibility that visitors will enter the park on high fire risk days.

These existing recreational uses (particularly the informal camping, mountain bike riding and hiking in parks) already present a significant risk to human life. However, this is a risk that is already accepted by the State on the basis of the benefits of people engaging in recreational activities. To counter this risk, Parks Victoria, DELWP and Council already have emergency management plans and conduct proactive fire prevention activities.

While the Project will increase visitation in the region, it is a different type of use compared with the existing recreational activities. Firstly, riders will generally access the trails via one of the main trail heads and therefore be able to review the latest fire danger information (e.g. on notice boards) before they start riding. Secondly, it is expected that a high percentage of riders will utilise the shuttle buses, meaning there will be a high degree of oversight of the number of people using the network at any one time. This more formalised approach to the operation of the network will allow a central manager to communicate with riders about the risk of bushfire.

In addition, mountain biking is a low ignition risk activity. It is does not involve campfires or hot machinery (which are existing ignition risks that are managed for camping and other recreational uses in the project area).

10.1.3 Access

As outlined above, there has been a detailed assessment of the impacts of the Project on the transport network, including impacts on the local road network and emergency service vehicles. There have been a number of specific recommendations made in the Transport Assessment relating to the construction and operational phases of the Project.

The central management arrangements will allow greater oversight of these different traffic management measures and plans. It has been recommended that transport management plans are reviewed and updated over time. These plans can be integrated with broader emergency management arrangements for the network.

10.2 Assessment of bushfire risk

10.2.1 Within the broader landscape

The most likely (and significant) fire scenario to impact on the project area is a landscape fire that develops from the north or north-west of the project area. This is a rugged forested area with steep slopes, vegetation that is likely to carry a fire and limited access for emergency service vehicles.

This represents a relatively high bushfire risk as it is likely to result in ember attack, direct flame contact and radiant heat. Strong winds would also be expected which could create localised damage (e.g. trees falling on roads).

Visitors using the lower parts of the network, closer to Warburton and Wesburn townships are at a lower risk. These visitors would have easier options for egress in the event of a fire and slightly easier access to a neighbourhood safer places in Warburton, Millgrove and Yarra Junction.

This level of bushfire risk exists and already impacts on the existing community, including the residents of Warburton and Wesburn.

By attracting additional visitors to the project area, the risk is expected to increase to a degree (e.g. by virtue of the fact that additional people will be in the area if a bushfire started).

10.2.2 At the trail heads

A site assessment of the bushfire hazard within 150 metres of all of the proposed trail heads has been completed as part of this assessment. This assessment was completed on the basis that more visitors are likely to congregate in those locations. However, it is noted that the scope of works at the trail heads is at a concept stage and therefore cannot be assessed in the same level of detail as what would be expected under the BMO.

The highest risk elements of the Project are the trail heads located at Mount Tugwell and Mount Donna Buang, given the single road access into those locations and the fact that forest surrounds these sites.

There is likely to be a 'natural' limitation on the number of riders at the trail heads on high risk days. On hot, windy days, mountain biking is a less attractive activity. However, ultimately it is expected that emergency management arrangements would need to be implemented to ensure visitors are not in those locations on high risk days.

If new buildings are proposed at the trail heads in the future a site assessment will be required (as part of the preparation of a Bushfire Management Plan) to determine the appropriate construction standard, defendable space, access and water supply requirements. The Bushfire Management Plan requirements in the PSA should mirror the requirements in the BMO.

10.3 Residual risk

The main residual risks related to the operation and use of the network can be summarised as follows:

- Riders using the network on high risk days, putting themselves and emergency service personnel at risk.
- Additional visitors coming to the project area and surrounds, putting themselves at risk and increasing the possible demand on emergency services.
- Disruption to access routes during the construction period, impacting safe access for the existing community and emergency service personnel.
- Additional demand on the transport network, having consequential impacts on access roads in the project area and surrounds. This could impact on safe access for the existing community and emergency service personnel.
- Larger events attracting a more significant number of riders and visitors to the region during the high fire danger period.
- Future buildings (such as those used for accommodation or leisure and recreation purposes) not being constructed to an appropriate construction standard and not having sufficient defendable space or water supply (e.g. visitor hub at Warburton Golf Course Trail Head).

A response to each of these residual risks is addressed in Section 11 of this report.

11 Recommendations to mitigate risk

The following is a recommended response to the residual risks identified in section 9 of this report.

11.1 Increased visitation to a high risk location

There are two aspects to this risk:

- Additional visitors will be in the region during the summer period and therefore be exposed to the risk of bushfire (e.g. risk to new community).
- Visitors will place additional demands on infrastructure and emergency services during high fire risk periods (e.g. a risk to the existing community).

To mitigate this risk it is recommended that a Bushfire Emergency Management Plan (BEMP) be prepared that governs the construction and operational phases of the Project.

An event specific BEMP should be prepared for larger events (e.g. events likely to attract interstate or international guests).

11.1.1 Bushfire Emergency Management Plan – construction and operation of the network

Council, as the central manager of all aspects of the network should lead the development of the BEMP. Council should have ultimate responsibility for implementing for all aspects of the BEMP.

This plan must be integrated with other management plans, such as pre-existing emergency management plans utilised by Parks Victoria, DELWP and Council and proposed Emergency Access Plans, Stakeholder Communication Plan and Traffic Management Plan.[5]

The BEMP should be prepared in consultation with the relevant fire authority (which could be CFA, FRV or DELWP) and address the following matters:

- Describe all aspects of the network or relevant construction activities (e.g. including the ttrail network, trail heads, visitor hub and shuttle buses).
- Outline the purpose of the BEMP which is to describe the procedures for:
  - Closure of network on any day with a Fire Danger Rating of Code Red (and possibly on days rated as Very High and Extreme).
  - Evacuate the network (evacuation from the site to a designated safer off-site location).
  - Shelter-in-place (remaining on-site in a designated building). This is only likely to apply to staff involved in the operation of the network as a last resort.

[5] As recommended in the Transport Assessment

- Include a mechanism for the review of the BEMP. At a minimum the plan should be reviewed and updated annually prior to the commencement of the declared Fire Danger Period.
- Describe roles and responsibilities for implementing the emergency procedures in the event of a bushfire and the triggers for acting. For example, when the network will be closed and the circumstances under which staff and visitors will shelter in place or evacuate.
- Describe how key aspects of the BEMP will be communicated to visitors and staff. This should include a pro-active approach to communication where visitors may be expected to travel from different parts of Victoria or from interstate.
- Emergency contact details.
- Consider the timing of major events and cancellation policy that may apply depending on the Fire Danger Rating (there should be a cross reference to event specific plans which will be required for major events – see discussion at section 11.1.2 of this report).
- Bushfire monitoring procedures. This should include how radio, internet and social networks will assist in monitoring potential threats during the bushfire danger period. It should describe and show (e.g. using a map) the area to be monitored for potential bushfire activity.

In addition, it is expected that a CEMP will need to be prepared for the construction activities. This plan will need to include mitigation measures to deal with ignition risks associated with hot works or machinery or smokers in the project area.

11.1.2 Bushfire Emergency Management Plan – event specific

An event specific BEMP should not duplicate the existing emergency management arrangements, however it should deal with any particular risks associated with a larger scale event. For example, different evacuation triggers or communication protocols may need to apply, such as cancellation on Very High or Extreme Fire Danger rating days (e.g. in addition to Code Red triggers).

11.2 Demand on the transport network

The potential impacts of the Project on the transport network and emergency service vehicles has been considered in the Transport Assessment. The following management and communication plans have been recommended in the Transport Assessment and it is assumed they will be required:

- Construction phase:
  - Emergency access plan.
- Operational phase:
  - Traffic Management Plan.
  - Stakeholder Communication Plan is recommended, which deals with potential impacts on existing communities and emergency service vehicles.
  - Operational Parking Management Plan (which includes flow of car parking across different Project locations and monitoring of parking in the Warburton town centre).

As outlined above, these management plans should be integrated into the BEMP. While the plans recommended to deal with potential transport impacts, they need to be developed iteratively with the BEMP.

11.3 Resilience of new structures

Given the nature of the assessment and approvals process for the Project, the design of future buildings has not been confirmed. It is expected that a new building would be constructed at the Warburton Golf Course trail head, however the location and design of that building has not been confirmed. There are other structures proposed at the other trail heads, such as bike washing facilities and bus pick up areas.

A bushfire hazard site assessment[6] has been completed for each of the trail heads, given this is a location where visitors are expected to congregate. However, it is expected that a further bushfire hazard site assessment would need to be completed once the exact location of any new buildings is known.

If new buildings are proposed at the trail heads in the future a site assessment will be required (as part of the preparation of a Bushfire Management Plan) to determine the appropriate construction standard, defendable space, access and water supply requirements. The Bushfire Management Plan requirements in the PSA should mirror the requirements in the BMO.

11.3.1 Bushfire protection measures

The planning scheme should include a requirement for the preparation of a Bushfire Management Plan for any new building (that would normally trigger a planning permit under the BMO). The requirement for the Bushfire Management Plan should broadly mirror the provisions of the BMO and clause 53.02 of the Planning Scheme.

Where a new building or structure is proposed that would not normally trigger a planning permit under the BMO, it is recommended that the principles of bushfire resilient design should be adopted, such as:

- Providing an area of defendable space around new structures (e.g. using distances in AS3959 as an indicative guide).
- Installing water supply for fire-fighting purposes (e.g. at trail heads as a last resort measure).
- Ensuring any new native vegetation offsets are proposed within (or close to) the project area should not be located within 150 metres of trail heads or new buildings associated with the network, unless otherwise agreed by the relevant fire authority.
- Ensuring any new landscaping around structures or trail heads is classified as 'low threat' under AS3959. The landscaping designers could consult the CFA's publication *Landscaping for Bushfire: Garden Design and Plant Selection* which provide useful guidance on different landscape design techniques which can reduce the risk from bushfire.

These requirements should be integrated into a requirement for a generic trail head Bushfire Management Plan.

[6] Using the methodology at Clause 44.06 and Clause 53.02 of the Planning Scheme for bushfire hazard site assessments

12 Summary and conclusions

12.1 Risk assessment

The project area is located in a relatively high risk location. The most likely (and significant) fire scenario to impact on the project area is a landscape fire that develops from the north or north-west of the project area. This is a rugged forested area with steep slopes, vegetation that is likely to carry a fire and limited access for emergency service vehicles.

This represents a relatively high bushfire risk as it is likely to result in ember attack, direct flame contact and radiant heat. Strong winds would also be expected which could create localised damage (e.g. trees falling on roads).

The highest risk elements of the Project are the trail heads located at Mount Tugwell and Mount Donna Buang, given the single road access into those locations.

Visitors using the lower parts of the network, closer to Warburton and Wesburn townships are at a lower risk. These visitors would have easier options for egress in the event of a fire and slightly easier access to neighbourhood safer places in Warburton, Millgrove and Yarra Junction.

This level of bushfire risk exists and already impacts on the existing community, including the residents of Warburton and Wesburn. By attracting additional visitors to the project area, the risk is expected to increase to a degree if no mitigation was implemented.

12.2 Proposed bushfire mitigation

The key residual risks associated with the Project include:

- Increased visitation to a high risk area.
- Demand on the transport network (for existing community and emergency services).
- Future construction standard of new structures.

To mitigate these risks it is recommended that:

- A comprehensive Bushfire Emergency Management Plan (BEMP) be prepared for the construction and operational phases of the Project. This plan must be integrated with other management plans, such as pre-existing emergency management plans utilised by Parks Victoria, DELWP and Council and proposed Stakeholder Communication Plan and Traffic Management Plan. The BEMP should be prepared in consultation with the relevant fire authority (CFA, FRV or DELWP).
- The transport management and stakeholder communication plans recommended in the Transport Assessment be prepared in concert with the BEMP.
- The planning scheme should include a requirement for the preparation of a tailored Bushfire Management Plan at trail head locations.
    - The Bushfire Management Plan requirement for buildings that would normally trigger a permit under the BMO, should mirror the requirements in the BMO and Clause 53.02 (e.g. site assessment, construction standards, water supply).

- The Bushfire Management Plan requirement for buildings that would not normally trigger a permit under the BMO, should incorporate the principles of bushfire resilient design (outlined in section 11.3.1 of this report).

- Any new native vegetation offset sites should not be established:
  - within 150 metres of proposed trail heads, unless otherwise agreed with the relevant fire authority.
  - in any Fuel Management Zone (FMZ) where fuel reduction or planned burning is a specified management requirement under other relevant emergency management legislation.
- The CEMP for the construction phase includes measures to mitigate the risk of ignition from hot works, machinery or workers smoking in forested areas.

12.3 Conclusions

This report has considered the EES scoping requirements:

> *Describe the bushfire hazard for the immediate project area and broader landscape conditions and undertake appropriate risk assessment that considers the potential for increased risk of bushfire to people, property and community infrastructure due to the project.*

The hazard for the project area and within the landscape is described in section 7 of this report. A risk assessment was completed in section 10 of this report, relying on information available about the project at the strategic planning phase. Mitigation measures are recommended at section 11 of this report, many of which relate to the form of future planning controls and suitable emergency management arrangements.

Subject to the adoption of the recommendations in section 11 of this report, it is considered the risk from bushfire for future and existing communities can be managed to an acceptable degree. It is considered the Project can achieve the bushfire policy objectives at Clause 13.02 of the Planning Scheme.

13 References

Advisory Note 46, Bushfire Management Overlay Mapping Methodology and Criteria, Victorian Government, August 2013

Advisory Note 68 – Bushfire State Planning Policy Amendment VC140

Planning Practice Note 64 - Local planning for bushfire protection, Victorian Government, September 2015

Technical Guide Planning permit Applications Bushfire Management Overlay, Victorian Government, September 2017

DELWP 2017. Guidelines for the removal, destruction or lopping of native vegetation, https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/91146/Guidelines-for-the-removal,-destruction-or-lopping-of-native-vegetation,-2017.pdf.

Standards Australia 2018. *Australian Standard AS.3959-2018 – Construction of buildings in bushfire prone areas (AS.3959-2018)*, Council of Australian Standards.