EES chapter 13 - Transport

Warburton Mountain Bike Destination

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13.0 Transport

This chapter assesses the potential traffic and transport impacts associated with the construction and operation of the Warburton Mountain Bike Destination (the project). The information in this chapter is based on the impact assessment presented in **Technical Report F: Transport.**

13.1 Overview

Project construction and operation vehicles have the potential to impact the surrounding transport network, ultimately affecting network users and the community and businesses within the area. The main project components that may affect the transport network include:

- Upgrade of approximately nine kilometres of existing mountain bike trails
- Installation of approximately 164 kilometres of new mountain bike trails
- Upgrade of approximately four kilometres of existing vehicle tracks
- Construction of a 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 access point to the network would be provided at Dee Road.

Understanding how the project would impact the transport network is important to the development of effective mitigation measures to maintain the functionality, operation and safety of the transport network.

The key findings of the traffic and transport impact assessment are as follows.

Construction:

- The main potential impact during project construction would be lane and road closures during construction of the Yarra River Bridge and Old Warburton Bridge. These works could result in increased network congestion and could disrupt residential, business and emergency vehicle access as well as public bus operations. Impacts would be minimised through the implementation of a Traffic Management Plan (TMP) and a Stakeholder Communication Plan.
- While the project may result in other impacts including delays due to lane closures, an increase in crash risk or reduced pedestrian and cyclist safety, the modest scale of construction activities means that any impacts to the transport network would be minimal and temporary. Nevertheless, project construction activities would be managed through the implementation of appropriate mitigation measures in order to avoid or minimise any potential impacts to the transport network.

Operation:

- Project operation may increase the potential for crashes due to increased interactions between cyclists and vehicles on the road network, at the main trail head at the Warburton Golf Course, shuttle bus drop-off points and at intersections. Interactions between vehicles and cyclists would be minimised through road safety audits and associated implementation of safer treatments.
- During operation of the project, parking availability may be impacted at trail heads and in the Warburton town centre, which could affect the ability of local residents and businesses to find parking. An operational parking management plan would be developed and implemented to manage parking, especially during periods of peak demand.
- Operation of the project would increase vehicle and cycle traffic around Warburton due to the predicted number of visitors. A Traffic Impact Assessment was conducted to assess the potential future peak demand on the transport network as a result of the project in order to determine whether these increases would result in an unacceptable impact such as congestion. The assessment found that, despite the increase in demand, the existing transport network could accommodate this increase within its existing capacity. As this is the case, no further mitigation is recommended.

In response to the EES evaluation objective, impacts of the project on traffic and transport have been assessed and mitigation measures have been identified to avoid and minimise adverse impacts.

13.2 EES evaluation objectives

The scoping requirements for the project set out the specific environmental matters to be investigated and documented in the project's EES in order to satisfy the Commonwealth and Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives that identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project.

The following evaluation objective is relevant to the traffic and transport study:

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

The key issues of this evaluation objective include:

- 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).
- Relocation or other impacts to existing 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.
- Potential for impacts on reasonably foreseeable upgrades to public infrastructure.

This chapter and **Technical Report F: Transport** addresses the project's specific traffic and transport related matters in response to the EES scoping requirements.

13.3 Applicable legislation and policy

Table 13-1 lists the key legislation, policies, guidelines and standards relevant to the traffic and transport impact assessment.

Table 13-1 Traffic and transport legislation, policy and guidelines

Type	Applicable legislation, policy and guidelines
Legislation and policy	• *Road Management Act 2004 (Vic)* - Road Management Act (General) Regulations 2016 - Road Management Act (Works and Infrastructure) Regulations 2015 • *Transport Integration Act 2010 (Vic)* • *Road Safety Act 1986 (Vic)* - Road Safety Road Rules 2017 - Road Safety (Traffic Management) Regulations 2009
Guidelines and advisory documents	• AS1742.3 2009 – Traffic control for works on road • Austroads – Guide to Road Design Part 4: Intersections and Crossings • Towards Zero 2016-2020 – Victoria's Road Safety Strategy and Action Plan

13.4 Method

The purpose of the Traffic and Transport impact Assessment was to assess the potential traffic impacts associated with the project and inform the preparation of the EES required for the project. This was achieved by undertaking the following:

- Establishment of a study area, as defined in Section 13.6.1.
- Assessment and characterisation of the existing conditions to establish the baseline traffic volume for each road within the study area, identify relevant transport network users, understand the crash history of the area, utilisation and availability of parking and the use of the area for freight movements.
- Calculation of anticipated traffic generation, distribution and assignment to the transport network as a result of the project for both the construction and operation phases to understand potential impacts to the transport network.
- Use of a risk assessment as described in **Chapter 6: EES assessment framework** as a prioritisation tool to inform the potential impacts to be assessed and appropriately mitigated. The full risk assessment for traffic and transport is provided in **Technical Report F: Transport**.
- Assessment of traffic and transport impacts of the construction and operation phases of the project, particularly in regard to the legislation, policy and guidelines listed in Section 13.3.

- Assessment of the alternative to Trail 1 (the combination of Trail 45, Trail 46 and Trail 47) including describing existing conditions, assessment of impacts and a comparative analysis against Trail 1.
- Assessment of cumulative impacts in relation to the newly-opened Warburton Water World (WWW).
- Development of mitigation measures for the construction and operation of the project, based around the implementation of the mitigation hierarchy.
- Evaluation of the residual environmental impacts, which describe impacts once mitigation has been implemented.

13.5 Avoidance and minimisation through design

It is recognised that there are opportunities to avoid and minimise environmental impacts during the many stages of project development which has culminated in the project description presented in Chapter 3 of this EES. 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 mitigation hierarchy described in **Chapter 6: EES assessment framework**.

For transport, the key avoidance and minimisation measures that have been incorporated into the design include:

- Provision of additional parking at Warburton Golf Course and Wesburn Park to cater for peak parking demand
- Use of shuttle buses from key parking areas to minimise traffic on roads
- Building trails to achieve a balance of cut and fill in trail construction, meaning that surplus spoil requiring disposal and imported fill would be minimised.

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

13.6 Existing conditions

13.6.1 Study area

The study area for the Traffic and Transport Impact Assessment is limited to the roads and intersections that would be utilised during the construction and operation of the project by pedestrians, cyclists and motorists. The study area comprises the primary trail head located at the Warburton Golf Course, secondary trail heads on the Mount Donna Buang summit, Mount Bride Road at Mount Tugwell and Wesburn Park, and Dee Road. The study area extends from the localities of Wesburn and Millgrove to East Warburton which are within the immediate vicinity of the trail heads and include the roads used for construction and operation of the project.

The study area for the traffic and transport impact assessment is shown in Figure 13-1.

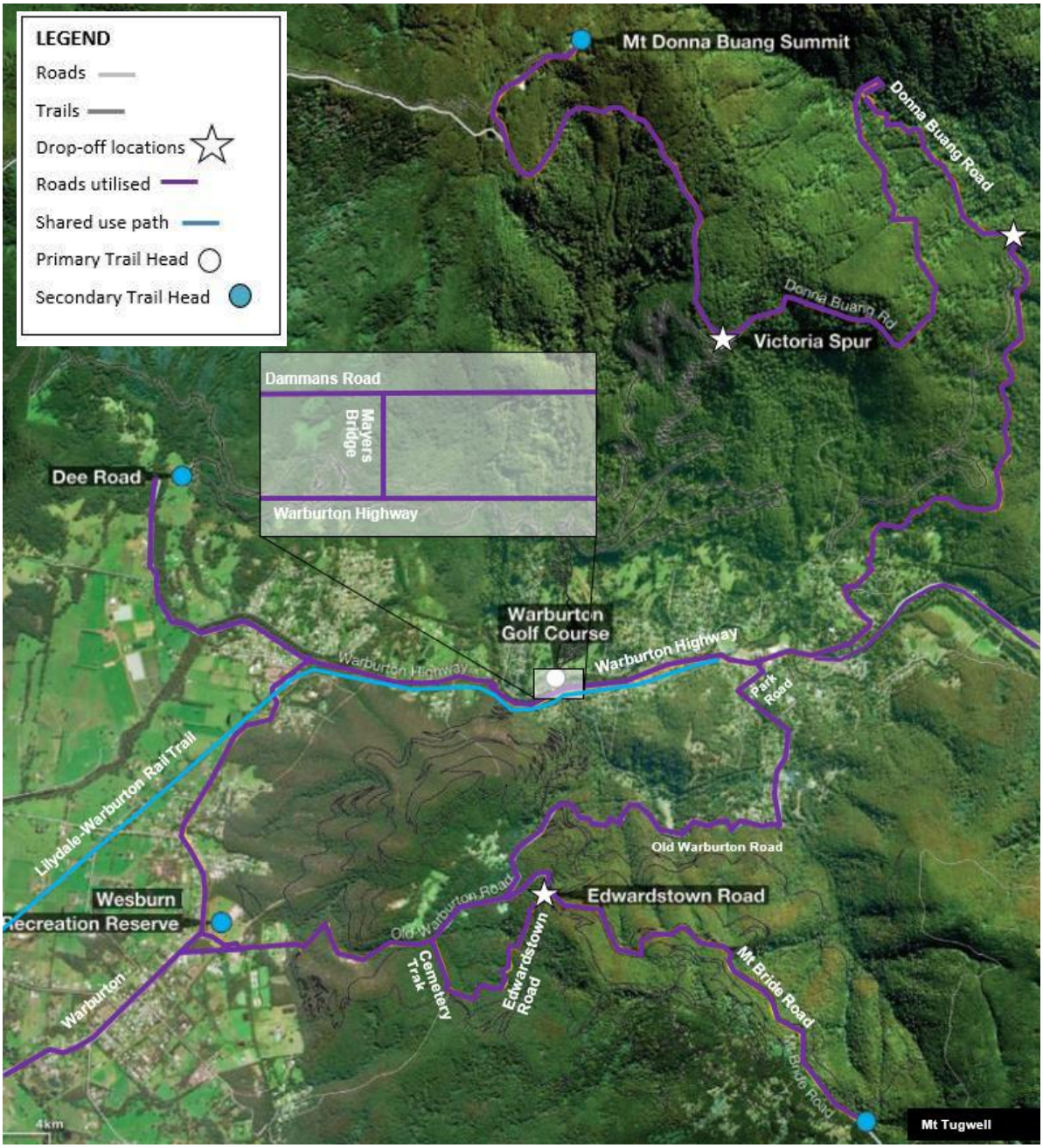

Figure 13-1 Study area

13.6.2 Pedestrians and cyclists

Warburton is a tourist and visitor township and the area features several footpaths and safe crossing points. Pedestrian and cyclist counts taken at three locations along the Lilydale-Warburton Rail Trail between 7:00 am and 9:00 pm on a Friday and Saturday showed that the peak volume was on Saturday. Daily volumes are shown in Table 13-2 along with the locations of each survey point in Figure 13-2.

Table 13-2 Lilydale-Warburton Rail Trail survey Saturday 26 October 2018 (Source: SALT, 2018)

Location on rail trail	Type	Eastbound	Westbound	Total
Scotchmans Creek Road	Pedestrian	24	24	48
	Cyclist	112	85	197
Station Street	Pedestrian	34	28	62
	Cyclist	112	87	199
Warburton Highway	Pedestrian	39	29	68
	Cyclist	24	18	42

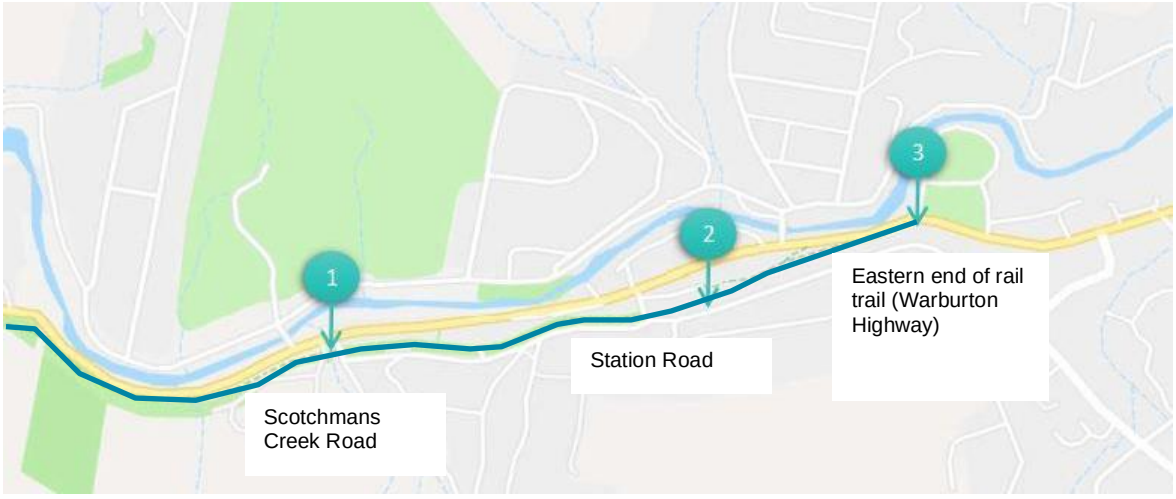

Figure 13-2 Locations of Lilydale-Warburton Rail Trail cyclist and pedestrian survey (Source: SALT 2018)

Cyclists also use the road network in the study area and normally travel along the arterials and collector roads in the area. Donna Buang Road is popular in the Yarra Ranges road cycling community, with cyclists ascending from Warburton.

There are no bicycle lanes on any roads in the study area, however, there are several existing off-road bicycle trails and shared use paths including:

- The Lilydale-Warburton Rail Trail, a popular tourist trail that is 40 kilometres in length. The trail is used by pedestrians, cyclists and horse riders. In 2018, nearly 84,000 cyclists travelled along the trail in Warburton (SALT 2018). The trail is in proximity to the study area and is located on the south side of the Warburton Highway.
- The O'Shannassy Aqueduct Trail, located within the study area, approximately two kilometres east of the Warburton Golf Course. This trail starts at Warburton Main Street and heads east from Warburton. It crosses Mount Donna Buang Road east of the trail.

While there are pedestrian routes connecting to destinations within Warburton, they are in poor condition and form discontinuous pedestrian routes towards the Warburton Golf Course. There are no footpaths along Dammans Road, however, there is a footpath connecting the Warburton Golf Course Yarra River Walk located to the south of Dammans Road.

Warburton Highway does not have pedestrian footpaths except within the townships of Warburton and Wesburn where there are community facilities and shops. Some sections of footpath between the two commercial areas of Warburton are too narrow to allow safe bidirectional pedestrian traffic, specifically for wheelchairs or prams to pass one another.

There are no footpaths along Donna Buang Road, Old Warburton Highway or Mount Bride Road. As such, the potential project trail heads at Mount Tugwell and Mount Donna Buang cannot be formally

accessed by pedestrians. The primary trail head at the golf course will be accessible via the Lilydale-Warburton Rail Trail and the proposed Yarra River Bridge which will connect into the trail head.

There are only three signalled pedestrian crossings in proximity to Warburton on the Warburton Highway including:

- Western section of the town centre of Warburton over Warburton Highway
- East of the town centre of Warburton in proximity to Donna Buang Road over Warburton Highway
- West of Warburton where the Lilydale-Warburton Rail Trail crosses Warburton Highway.

Photos of the existing transport network are shown in Figure 13-3 through to Figure 13-8.

Figure 13-3 Dammans Road (facing west) *Source: SALT TIA 2019*

Figure 13-4 Dammans Road (facing east) *Source SALT TIA 2019*

Figure 13-5 Warburton Highway & Mayer Bridge Intersection (facing west) *Source: SALT 2019 TIA*

Figure 13-6 Cemetery Track *Source: YRC*

Figure 13-7 Mayer Bridge (facing south) *Source: SALT 2019 TIA*

Figure 13-8 Donna Buang Road *Source: Google Maps*

13.6.3 Bus routes

There is one bus route currently operating in the vicinity and within the study area. Bus route 683 travels between Chirnside Park and Warburton via Lilydale Station and extends to East Warburton for a small number of services on weekdays. The bus route connects the study area to train services

towards Melbourne at Lilydale Station. There are 29 bus stops along this route on Warburton Highway within the study area. The bus line operates an hourly service approximately 6:00 am – 10:30 pm during weekdays with a 30-minute frequency during peak hours and an hourly service9:00 am – 10:30 pm on Saturdays and 11:00 am – 10:30 pm on Sundays.

13.6.4 Road network

13.6.4.1 Declared road network and traffic volumes

The responsible authority for the operation and management of the declared road network is VicRoads. Declared roads are classified as Freeways, Arterial Roads and Non-Arterial State Roads under the *Road Management Act 2004*.

The declared road network within the study area is as follows:

- Warburton Highway is classified by VicRoads as a B Class road. It is sealed with a single 3.5-metre wide lane each way and has gravel shoulders through Warburton and sealed shoulders through Wesburn. There is parking on either side of Warburton Highway in the Warburton town centre catering to businesses on the northern side. There are also several Yarra River bridges which the road crosses and guard railing provided on the north side of the road.
- Donna Buang Road is classified as a C Class road. This road is sealed and has approximately a 2.8-metre wide lane in each direction. It has a sealed shoulder on the southern side of the road. The road is seen to be mountainous in type and has several sharp curves along its length. Donna Buang Road to the west of the intersection with Donna Buang Summit Road becomes a gravel road shortly after which is signed as narrow.
- Donna Buang Summit Road is classified as a C Class road. The road is sealed and has approximately a 2.8-metre wide lane in each direction. There are no shoulders along its length.

The posted speed limits within the study area are:

- Warburton Highway, Warburton has a speed limit of 50 kilometres per hour through the Warburton township and 60 kilometres per hour outside of the township.
- Warburton Highway, Wesburn is 70 kilometres per hour, 50 kilometres per hour in the town centre, 80 kilometres per hour to the north of the town centre and is reduced to 60 kilometres per hour before entering Warburton.
- The Donna Buang Road speed limit between Warburton Highway and Acheron Way is 100 kilometres per hour with the speed reducing down to 70 kilometres per hour and 60 kilometres per hour as the road approaches the intersection with Warburton Highway. Between Acheron Way and Donna Buang Summit Road the speed limit is 80 kilometres per hour.
- Donna Buang Summit Road has a speed limit of 100 kilometres per hour.

Declared road traffic volumes are summarised in Table 13-3. They indicate that the vehicle volumes for roads in the study area are within their capacity.

Table 13-3 Summary of declared roads traffic volumes (Source: SALT, 2018)

Road name	Friday daily traffic volumes	Saturday daily traffic volumes	Heavy vehicles
Warburton Highway (Warburton)	6,600	7,000	7.1%
Warburton Highway (Wesburn)	7,100*	7,100*	9.9%
Donna Buang Road	900	1,300	2.8%
Donna Buang Summit Road	4,200*	4,200*	14%*

* Source: VicRoads 2020 AADT OpenData

13.6.4.2 Local road network and traffic volumes

The local road network comprises non-declared roads that are the responsibility of Yarra Ranges Council or the Department of Environment, Land, Water and Planning (DELWP). These roads are generally used to provide local access and connect abutting properties to the road network.

The local roads that will be used for the project are listed and described in Table 13-4. Mount Bride Road, Cemetery Track and Edwardstown Road are narrow and do not provide for two-way traffic. Vehicles are required to slow to pass each other in the available space.

Warburton Highway is the primary traffic entry and exit point to Warburton. According to traffic counts conducted by SALT in 2018, Saturday has the highest volume of traffic on the weekend and out of all the days of the week. Friday has the highest volume of traffic on weekdays. Saturday has a daily peak hour at 11:00 am and Friday has an AM peak at 9:00 am and a PM peak at 4:00 pm. A summary of the local roads is shown in Table 13-4. They indicate that the vehicle volumes for roads in the study area are within their capacity.

Table 13-4 Local road network in the study area

Road name	Responsibility	Posted speed (km/hr)	Surface	Saturday daily traffic volumes	Heavy vehicles[1]
Mayer Bridge	Yarra Ranges Council	50	Sealed	1,110	5.1%
Park Road	Yarra Ranges Council	50	Sealed	1,150	4.5%
Old Warburton Road (East of Warburton Highway)	Yarra Ranges Council	60	Sealed	390	6.6%
Old Warburton Road (East of Mount Bride Road)	Yarra Ranges Council	60	Sealed	170	6.3%
Old Warburton Road (South of Park Road)	Yarra Ranges Council	50	Sealed	500	8.4%
Dammans Road	Yarra Ranges Council	50	Sealed	1,110	-
Mount Bride Road	DELWP	100	Gravel	40	-
Cemetery Track	DELWP	100	Gravel	10	-
Edwardstown Road	DELWP	100	Gravel	50	-
Dee Road	Yarra Ranges Council	50	Partially sealed and gravelled	420	-

[1] Seven-day average heavy vehicle percentage (SALT 2018)

13.6.5 Crash history

The crash analysis was based on the most recent available data, being casualty crashes recorded over the five-year period (2014 – 2019) in the VicRoads CrashStats database. There were no fatal accidents recorded in the study area over this period.

During the period, 16 crashes were recorded along Warburton Highway (between Wesburn Park and Donna Buang Road). These are shown in Figure 13-9.

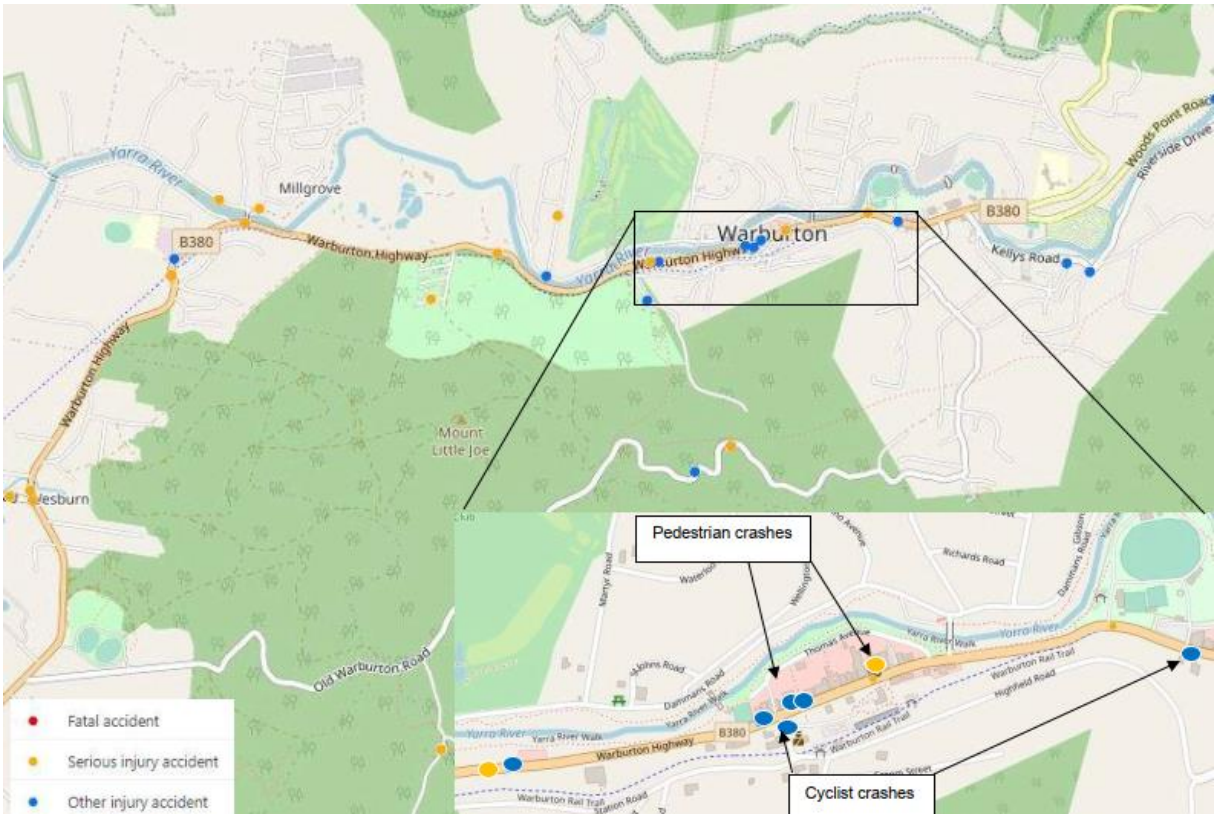

Figure 13-9 Crash locations (2014-2020) Warburton Highway and surrounds

Four crashes were recorded in the Warburton town centre, comprising:

- Two crashes involving cyclists – one was a strike with the door of a parked/stationary vehicle which resulted in an 'other injury' crash (an injury sustained in a road crash for which a person did not require hospitalisation) and the other was on Station Street which provides access to the Lilydale-Warburton Rail Trail
- Two crashes involving pedestrians – both pedestrians were hit by vehicles within the shopping strip area with one resulting in an 'other injury' and the other resulting in a 'serious injury' (an injury sustained in a road crash for which the person was admitted to hospital).

Along Donna Buang Road and Donna Buang Summit Road (between Warburton Highway and Donna Buang summit) 11 crashes were recorded, including:

- Five 'serious injury' crashes and six 'other injury' crashes
- No pedestrian, cyclist or heavy vehicle crashes
- Six motorcycle crashes
- Nine run-off road crashes
- Donna Buang Summit Road has had three crashes in the first 340 metres, these consist of a 'serious injury' off road left bend crash, a 'serious injury' off road right bend crash and an 'other injury' out of control crash
- Old Warburton Road has had three crashes recorded between Mount Bride Road and Park Road – two were an 'other injury' crash and the third was a 'serious injury' crash
- Mount Bride Road had two 'other injury' crashes, both involving motorcycles.

13.6.6 Parking

Parking surveys of the Warburton township were conducted by SALT between 25 October and 3 November 2018 (which included a long weekend). The surveys were conducted between 7:00 am and 7:00 pm at hourly intervals. The following findings were made:

- 416 formalised public parking spaces are available.
- 300 parking spaces are located on-street with the remaining 116 spaces located in off-street car parks.

- Parking restrictions include time limited parking, loading zones, taxi zones, disabled parking, and no stopping restrictions.
- Parking in the area is typically unrestricted after 6:30 pm Monday to Saturday.
- Peak parking demand occurred at 12:00 pm on Saturday 27 October 2018. 207 vehicles were observed to be parked within the study area, representing a parking occupancy rate of 50 per cent. Generally, car parking occupancy is considered 'at capacity' when occupancy reaches 85 per cent during the peak period.

At the locations of the proposed trail heads there is existing parking at Mount Donna Buang and Wesburn Park only. Mount Donna Buang parking is gravelled and there are two areas which are mainly used for snow season car parking (and underutilised outside of this time). Parks Victoria advised that the secondary car parks each hold 120 car parks. The existing parking area at Wesburn Park is gravelled and there are approximately 100 spaces. Dee Road has approximately 20 gravelled car parking spaces.

13.6.7 Freight

Restricted B-Double and higher mass limits (HML) approved roads within the study area are shown in Table 5.

Table 13-5 B-double and HML approved roads

Road	Road authority	B-doubles	HML
Donna Buang Road	VicRoads	Restricted	Approved
Warburton Highway	VicRoads	Approved	Approved

Source: Victoria's gazetted B-Double Network, Victoria's HML Network Map and Victoria's Oversize/Overmass (OSOM) Network Map

13.7 Project traffic generation, distribution and assignment

13.7.1 Construction

The construction activities related to transport are:

- Construction of new trail heads at Warburton Golf Course and Mount Tugwell
- Construction of new cyclist bridges over Old Warburton Road and shared use bridge over Warburton Highway
- Upgrades of existing facilities at Mount Donna Buang and Wesburn Park trail heads
- Upgrade and construction of existing and new mountain bike trails.

The traffic generation for the construction phase of the project would be made up of the construction workforce which is anticipated to generate light vehicle movements and the movement of plant and equipment which would generate heavy vehicle movements. A conservative approach has been taken for the traffic and transport impact assessment by assuming that all construction activities would occur at the same time. The following construction activities were considered:

- Construction of new trail heads at Warburton Golf Course and Mount Tugwell
- Construction of new shared use bridges over Old Warburton Road and Warburton Highway (Yarra River)
- Upgrades of existing facilities at Mount Donna Buang and Wesburn Park trail heads
- Upgrade and construction of existing and new mountain bike trails.

The construction workforce would originate in Warburton and travel to their construction site via the study area roads (listed in Table 13-3 and Table 13-4) in the morning peak period and depart site in the early evening peak period. Heavy vehicles would originate from the west of Warburton and travel to site via Warburton Highway. Heavy vehicle movements would occur throughout the day to deliver plant, equipment and deliveries to the main construction sites (the trail heads and bridges). Construction of the trails is not expected to require any heavy vehicles movements as equipment, including the excavator, would be taken to site via a car trailer and left on-site.

The total daily traffic generation during construction is anticipated to be 166 movements (including return trips). A breakdown of the overall increase in traffic volumes for each project construction activity is shown in Table 13-6. The roads that would be used by the construction workforce for each construction activity are summarised in Figure 13-10.

Table 13-6 Construction daily traffic generation (including return trips)

Construction activity	Light vehicle traffic generation	Heavy vehicle traffic generation
Trail construction	64	0
Warburton Golf Course trail head	16	26
Mount Donna Buang trail head	8	4
Mount Tugwell trail head	8	4
Wesburn Park trail head	8	4
Yarra River Bridge	8	4
Old Warburton Road Bridge	8	4
Total	**120**	**46**

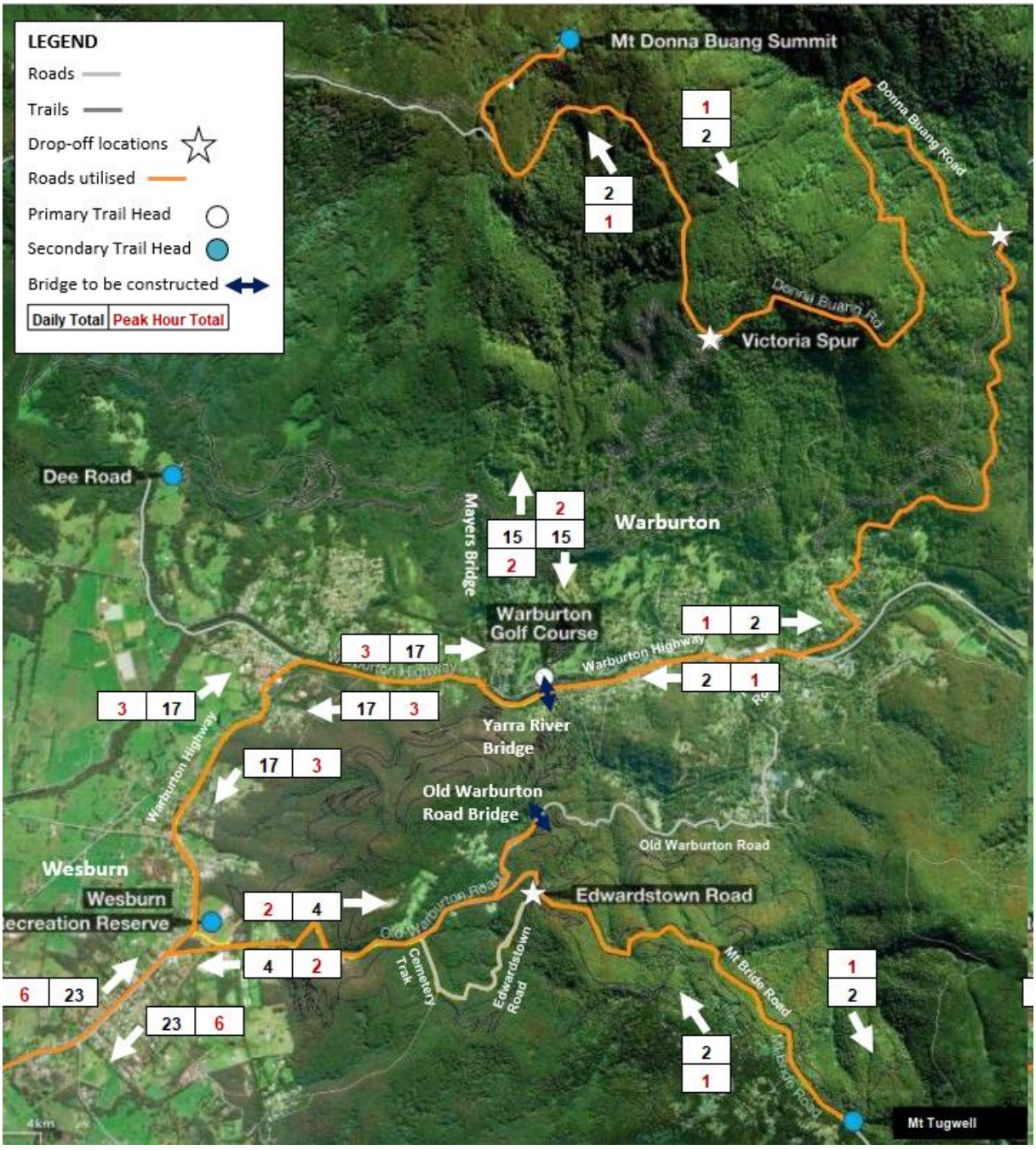

Figure 13-10 Construction heavy vehicle volumes – distribution and assignment

13.7.2 Operation

The traffic generation for the operation phase of the project would be made up of the following:

- Day visitors who drive directly to each trail head
- Day visitors considered intermediate, advanced and expert mountain bikers within Yarra Ranges who cycle directly to the trails
- Shuttle buses operating between trail heads
- Workforce trips at the primary trail head
- Overnight visitors staying within the area and cycling to the trails the following day.

The operation impact assessment has been based on a weekend day in January in the year 2031 (10 years post opening) as this is anticipated to be the annual peak day. This reflects the tourism analysis undertaken which balances the reliability of predictive data and planning. For assessment purposes, we have assumed:

- Day visitors would drive directly to a trail head to park their car and then utilise the trails or shuttle buses to move between trail heads
- Overnight visitors would travel from their accommodation to the trails via their mountain bikes, having arrived in their place of accommodation via driving on a previous day and leaving their vehicles at their place of accommodation
- Intermediate, advanced and expert mountain bike riders who are day visitors from within Yarra Ranges would cycle to the trails.

The peak traffic generation by mode during project operation is summarised in Table 13-7.

Table 13-7 Peak traffic generation during project operation by mode

Mode	Trip (one way) per day	Daily trip generation
Car	305	610
Shuttle bus	80	160
Cycling	664	1327

The predicted daily traffic volumes for roads within the study area are listed in Table 13-8 and shown in Figure 13-11. Note that roads with predicted volume differences of 10 or less have not been included.

Table 13-8 Destination volumes per day during project operation

Roads	Road Authority	Peak weekend day	
		2031 base case	2031 project case
Mayer Bridge	YRC	1,236	1,650
Old Warburton Road – East	YRC	428	490
Dammans Road	YRC	1,236	1,650
Dee Road	YRC	470	485
Mount Bride Road	DELWP	46	108
Cemetery Track	DELWP	11	43
Edwardstown Road	DELWP	56	88
Warburton Highway – Warburton (west)	VicRoads	7,828	8,241
Warburton Highway - Warburton (east)	VicRoads	7,828	7,922
Warburton Highway – Wesburn (south)	VicRoads	7,881	8,474
Warburton Highway – Wesburn (north)	VicRoads	7,881	8,477

Donna Buang Road	VicRoads	1,404	1,483
Donna Buang Summit Road	VicRoads	4,662	4,741

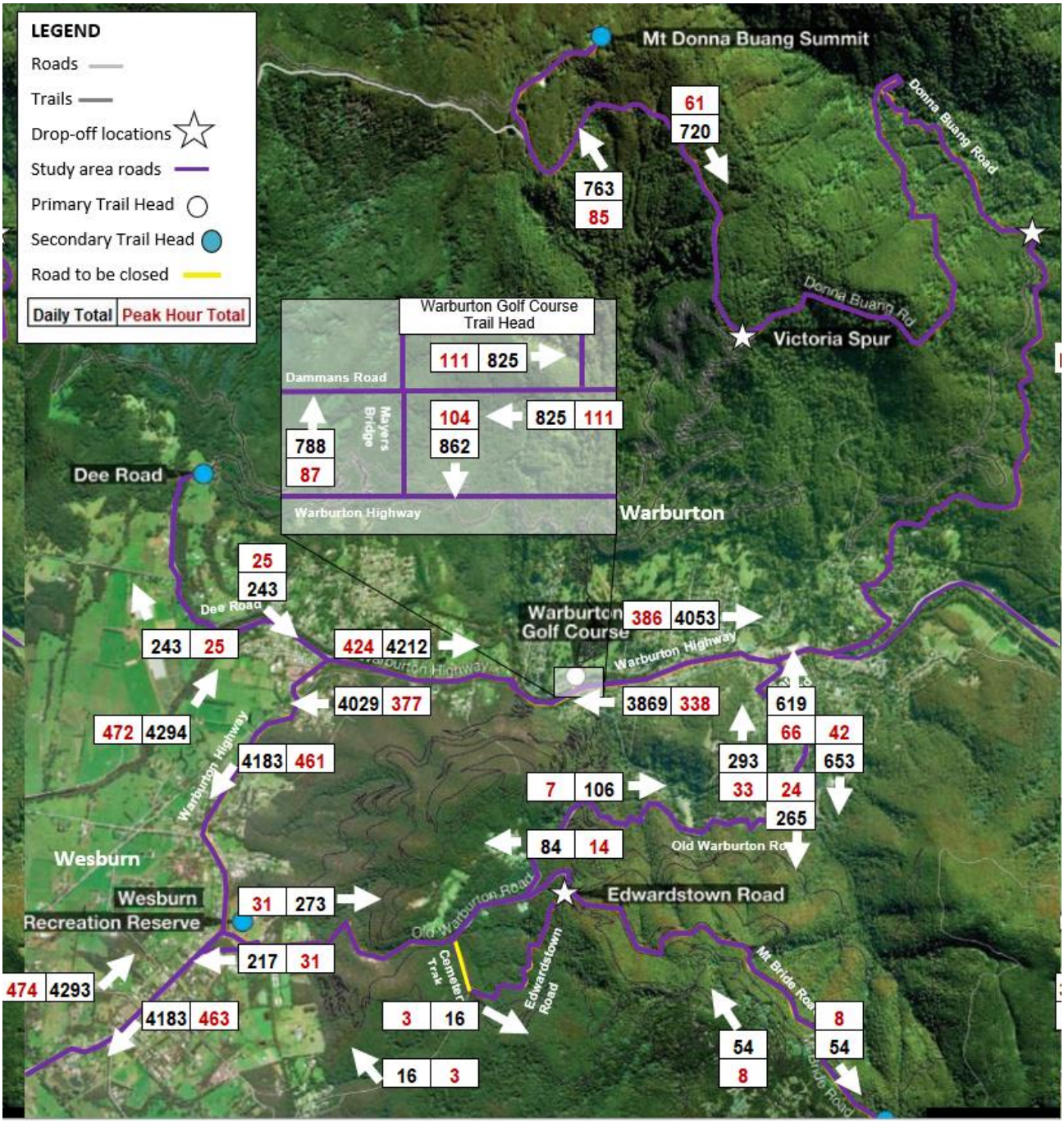

Figure 13-11 2031 traffic volumes with project traffic

Overnight visitors who cycle to trail heads are anticipated to use available cycle routes or the public road network depending on the location of their accommodation. The mountain bike visitors who reside in Warburton or the nearby townships are anticipated to cycle from their place of residence to the trails. The anticipated cyclist distribution during project operation is shown in Figure 13-12.

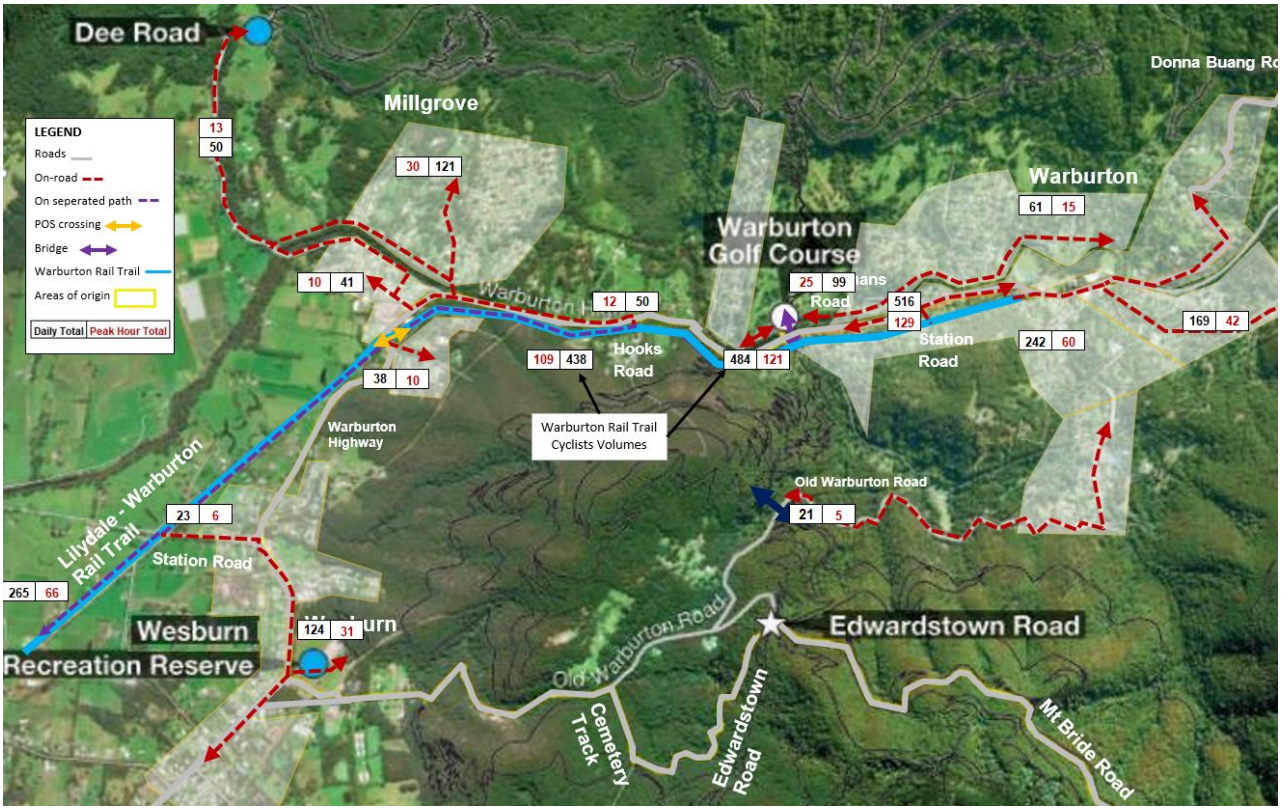

Figure 13-12 Cyclist distribution during project operation

13.8 Construction impact assessment

The construction impact assessment is based on the project traffic generation, distribution and assignment described in Section 13.7.1.

For transport, all anticipated impacts as a result of the construction activities were assessed in **Technical Report F: Transport**. Overall, with the implementation of appropriate mitigation measures to manage these impacts, none were found to have significant impacts to the transport network.

Nevertheless, the following issues are of most interest to stakeholders and the community and therefore assessment of these potential impacts are described further in the following subsections of this chapter:

- Increased congestion due to additional traffic during construction
- Traffic impacts during lane and road closures.

Other matters assessed are set out in Table 13-9. With the implementation of appropriate mitigation measures (refer to Section 13.12) such as a TMP, a stakeholder communication plan, heavy vehicle pre-construction on-site checks and pavement condition surveys, these impacts would not contribute to a noticeable change to existing conditions. Further information on these impacts can be found in **Technical Report F: Transport**. Impacts with regards to noise and air quality generated from construction traffic would be managed through the implementation of a Construction Environmental Management Plan (CEMP) and the associated mitigation measures listed in **Chapter 11: Land use and planning**. These impacts are assessed in detail in the reports appended to **Technical Report D: Land Use and Planning**.

Table 13-9 Other potential impacts assessed

Potential impact	Findings
Increased crash risks to road users as a result of the Yarra River Bridge construction activities	Road closures are recommended to occur during off-peak periods and be short in duration. These are expected to occur for no more than a few hours at a time. A TMP would include traffic management measures to manage safe bidirectional vehicular passage during any temporary closures resulting in temporary minimal impacts that do not result in a significant change to the existing conditions of the area.
Reduced pedestrian and cyclist safety and loss of amenity as a result of temporary closures of the Lilydale-Warburton Rail Trail and heavy vehicle movements within the area	Partial closures of the Lilydale-Warburton Rail Trail are not anticipated to last more than three hours and a path diversion would be available around the works. The Lilydale-Warburton Rail Trail may need to be closed in one or both directions for a short period (minutes) and appropriate signage and manual traffic controls would be used. No significant impact is anticipated with the implementation of appropriate traffic management and diversions.
Release of construction debris onto public roads from plant and spoil trucks leading to dust generation and perceived loss of amenity as well as public health and safety issues	There is limited removal of surplus spoil anticipated to be required from construction of the trails. A TMP and CEMP would include dust suppression methods such as covering vehicle loads, therefore residual impacts are not anticipated.
Impacts to bus operation and safety during lane closures for Yarra River Bridge construction on Warburton Highway	Construction traffic is not anticipated to impact the operation of bus route 683 or significantly increase congestion as lane closures along Warburton Highway would occur during off-peak periods and therefore are not expected to have residual impacts.
Insufficient road and intersection infrastructure to accommodate safe movement of heavy vehicles, over-dimensional and over-mass loads	The movement of heavy, over-dimensional and over-mass load vehicles would be required at several locations including the Warburton Golf Course trail head, Mount Tugwell and bridge construction at Warburton Highway and Old Warburton Road. Construction works undertaken at the Warburton Golf Course trail head are expected to involve the highest volume of heavy vehicle movements. The TMP will include traffic management measures such as pre-construction on-site checks to ensure that construction vehicles are able to make turns safely and successfully at existing intersections. Residual impacts would be limited to delays of up to two minutes for light vehicles that may be required to stop for heavy vehicle movements. This is considered to be insignificant.
Deterioration of road surface/pavement due to the movement of heavy vehicles, machinery and plant on local roads	Local roads may experience deterioration in the quality of surfaces due to heavy vehicle movements during the construction period. A survey being undertaken as part of the TMP would ensure that the roads are restored to existing or better than existing conditions after construction and no residual impacts are anticipated. Deterioration of road surface / pavements may also result in potential impacts to air quality. This is considered in **Chapter 11: Land use and planning** (air quality impact assessment) and managed through the CEMP.

13.8.1 Increased congestion due to additional traffic during construction

The light vehicle movements of the workers are very low in comparison to the existing traffic volumes and would result in a negligible traffic volume increase to the study area roads and intersections.

Additional traffic during construction is not expected to increase congestion on the public road network beyond acceptable levels. As the road network has ample capacity to absorb the small number of additional vehicles, the impacts are anticipated to be low and the residual impact to the road network would not be significant.

13.8.2 Traffic impacts during lane and road closures for bridge construction

Lane and road closures would be necessary to enable the construction of the pedestrian/cyclist crossing bridges over the Yarra River (at Warburton Highway and Dammans Road) and Old Warburton Road. If not carefully managed, these closures may cause localised transport delays and compromise road safety. Accordingly, traffic would be managed for these activities according to the TMP described in Section 13.12.

13.8.2.1 Lane closures

Lane closures on Warburton Highway are anticipated to last a maximum of two hours, for up to three occasions during construction of the Yarra River Bridge over a period of six months. Only one lane would be closed at a time to allow vehicle passage to continue and to minimise disruption. Appropriate traffic passage and signals would be positioned at each end of the closure. Potential height restrictions may also be required as well as further controls as per VicRoads requirements. Additionally, closure of Warburton Highway is anticipated to have similar temporal impacts. During closure of Warburton Highway alternate access would be available via Old Warburton Road located approximately 10 kilometres away from the point of closure which would result in relatively small numbers of road users experiencing significant delays due to longer travel distances.

Lane closures along Dammans Road would be required during the pylon and cable stringing operations with safety barriers and manual traffic control in place which may result in minor delays. Additionally, Dammans Road would be closed for a maximum duration of two to three hours on two occasions. During closure of Dammans Road, alternate access would be available via Brett Road located approximately two kilometres away from the point of closure, which would result in road users experiencing minor delays due to longer travel distances.

13.8.2.2 Road closures

Warburton Highway would require closure for a maximum duration of two to three hours on three occasions during construction of the Yarra River Bridge. Old Warburton Highway would be used as the alternative route which would add approximately 10 kilometres to a trip from the point of closure. Road users would experience major delays as a result of the longer travel distance. Similarly, Dammans Road would also be closed in addition to Warburton Highway during bridge construction. It would require a two to three-hour closure on two occasions. These closures would occur during off-peak periods to reduce the number of road users potentially impacted.

Old Warburton Road would be closed for a maximum of four hours on three occasions during the six-month construction period for the Old Warburton Road Bridge. These closures would be required during the pylon and cable stringing operations that are necessary for placement of the bridge. During closure alternate access would be available to road users via Warburton Highway which would add approximately 10 kilometres to a trip from the point of closure. Road users would experience major delays as a result of the longer travel distance, however, Old Warburton Highway is a collector link in the area and has low traffic volumes (132 movements per day) which means the road closure would only impact a small number of people.

13.8.3 Proposed mitigation measures

To minimise the extent, duration and severity of disruption during road and lane closures as a result of bridge construction, a TMP (refer to mitigation measure MM-TP1) would be developed and implemented during construction. The TMP would include temporary measures such as:

- Management of alternate routes during lane and road closures
- Provision of signage and traffic controllers
- Placement of Variable Message Signs (VMS) ahead of closures detailing the detour route to inform road users
- A requirement to not close Warburton Highway and Old Warburton Road at the same time and to close no more than one road a day to minimise disruption
- A requirement to only close lanes and roads during off-peak periods.

In addition, a stakeholder communication plan (MM-TP2) would be developed and implemented. This plan would include a requirement to notify impacted residents, emergency services and the public transport network of road and lane closures.

13.8.4 Summary of residual impacts for construction

Given the existing capacity of the transport network to easily accommodate the limited workforce required to deliver the project, impacts associated with the increase in construction traffic are likely to be minimal and manageable. Following implementation of mitigation measures, residual impacts on traffic and transport due construction of the project would not be significant. The effects of the project would be mitigated by ensuring road and lane closures as a result of bridge construction are limited to a few hours across a number of separate occasions, meaning that road users would only be impacted for a small period of time. In addition, the number of road users that are impacted would be minimised by only closing lanes and roads during off-peak periods. Road users would be notified prior to closures

and would have access to alternate lanes or routes during these closures. With the implementation of careful and considered traffic management through the limitation of road and lane closures, residual impacts are not anticipated to be significant.

13.9 Operation impact assessment

The operation impact assessment is based on the project traffic generation, distribution and assignment described in Section 13.7.2.

For transport, all anticipated impacts as a result of the operation activities were assessed in **Technical Report F: Transport**. Overall, with the implementation of appropriate mitigation measures to manage these impacts, none were found to have ongoing significant impacts to the transport network.

Nevertheless, the following issues are of most interest to stakeholders and the community and therefore assessment of these potential impacts are described further in the following subsections of this chapter:

- Higher risk of crashes between cyclists and vehicles
- Increased congestion due to additional traffic during operation
- Potential impacts to parking supply at trail heads and in Warburton Town Centre due to insufficient capacity
- Increased congestion and potential parking impacts as a result of events.

When proposed mitigation measures are implemented, the potential for crashes to occur due to increased interactions between cyclists and vehicles would be reduced, as they would be unlikely to occur, and the severity of crash would be reduced.

Other matters assessed are set out in Table 13-10. With the implementation of appropriate mitigation measures (refer to Section 13.12) such as road safety audits and cyclist and pedestrian safety improvement works, these impacts would not contribute to a significant change to existing conditions. Further information on these impacts can be found in **Technical Report F: Transport**.

Table 13-10 Other potential impacts assessed

Potential impact	Findings
Inadequate end of trip facilities (e.g. bike parking, drink taps, toilets, bike wash stations etc.) causing safety and amenity issues to pedestrians and cyclists	Trail heads are anticipated to have sufficient bike parking and facilities to accommodate the projected number of visitors. An assessment of bike parking facilities after 12 months of operation would ensure that adequate bike parking is available to visitors.
Emergency vehicle access and evacuation during project operations	All trail heads would remain accessible via the existing public roads which would be used by emergency services. Road width at Edwardstown Road and Cemetery Track would be sufficient, provided that vehicles slow down to allow emergency services to pass and the surface conditions are monitored and improved as necessary. An evacuation plan will be detailed as part of an emergency management plan to be developed by Yarra Ranges Council in consultation with stakeholders (including the CFA).
Deficient width and road surface along Cemetery Track and Edwardstown Road for shuttle buses	Cemetery Track and Edwardstown Road are two-way unsealed surfaces with no shoulders along its length. The surface conditions require monitoring and improvement as deemed necessary.
Road surface/pavement deterioration due to the movement of shuttle buses and visitor vehicles on local roads	Traffic during operation is expected to be light vehicle movements of relatively low daily volumes. It is not anticipated that there will be residual impacts to the quality of pavements.

13.9.1 Cyclist and vehicle interaction impacts

Increased volumes of cyclists are expected within the study area due to visitors cycling between trails, trail heads and places of accommodation. This impact assessment considers cyclists travelling between accommodation or residences to and from trails only. There is potential for crashes to occur due to increased interactions between cyclists and vehicles on the road network, at the main trail head at Warburton Golf Course, shuttle bus drop-off points and at intersections.

13.9.1.1 Road network

An increased volume of cyclists is anticipated to use the road network in and around Warburton to access the various trail heads and bike trails within the study area.

Road sections where vehicles travel at high speeds, in large volumes and with minimal cyclist provisions have an increased crash risk. This risk would be compounded by increased cyclist volumes over the lifespan of the project. Warburton Highway between Mount Donna Buang Road and Lilydale-Warburton Rail Trail in the eastern section of Warburton, Warburton Highway through Wesburn and Warburton Highway west of the Golf Course are sections of roads where there is a high potential for an incident to occur.

The roads anticipated to be used by cyclists are provided in Table 13-11 along with the AustRoads AP-G88-14 Cycling Aspects guidelines for cyclist facilities.

Table 13-11 Anticipated roads used by cyclists during operation of the project

Road	Daily traffic 2031 (weekend)	Posted speed (km/hr)	Existing cyclist facilities	Guideline[1]	Estimated existing cyclists per day	Anticipated project cyclists per day
Station Road	150	50	None	Mixed traffic	157	22
Dammans Road	1,650	50	None	Mixed traffic	Unknown	149
Old Warburton Road (south of Park Road)	560	60	None	Mixed traffic	Unknown	21
Riverside Drive	Unknown - up to 3,000	50	None	Mixed traffic	Unknown	242
Warburton Highway, Wesburn (south Wesburn Park)	8,480	70	None	Separated path	Unknown	124
Warburton Highway, Wesburn (town centre)	8,400	50	Partial paved shoulders	Separated path	Unknown	23
Warburton Highway, Wesburn (north Wesburn Park)	8,480	80	None	Separated path	Unknown	23
Warburton Highway, Warburton (west of golf course)	8,240	60	None	Separated path	Unknown	122
Warburton Highway, Warburton (east of golf course)	7,920	50	None	Bicycle lanes	42	516
Donna Buang Road	1480	80	None	Separated path	Unknown	61
Dee Road	490	50	None	Mixed traffic	Unknown	50

1 - *AustRoads AP-G88-14 Cycling Aspects* provides a guideline for the type of bicycle facility that may be required depending on the road speed and traffic volume

Many cyclists use Donna Buang Road which has a posted speed of 80 kilometre per hour and mountainous terrain and tight corners. Multiple serious injury crashes have occurred along the length of this road.

13.9.1.2 Warburton Golf Course trail head and shuttle bus drop-off points

Shuttle bus drop-off points would be located outside of the trail heads at two separate points on Donna Buang Road (Victoria Spur and one other unnamed road) and at the intersection of Mount Bride Road and Edwardstown Road. There is a potential for crashes to occur between cyclists using the shuttle buses and vehicles using these roads.

The Warburton Golf Course trail head would supply car parking, shuttle bus access, access to the Lilydale-Warburton Rail Trail and to northern mountain bike trails among other facilities. The proposed layout for the trail head does not supply a direct or clear path for cyclists who are travelling between the car park to/from the shuttle buses or Yarra River Bridge and the northern trails. The design has the mountain bike visitors travelling to a path on the north and then through the golf course car park to get to the shuttle bus bays and bridge access. Alternatively, the riders may use Dammans Road to travel to the shuttle bus bays and the bridge. These arrangements create potential conflict between cyclists

and cars within the golf course car park or on Dammans Road. This will be addressed in the detailed design stage.

13.9.1.3 Intersection points

There are several intersection points cyclists would encounter as visitors to the Warburton Mountain Bike Destination including:

- Where the Lilydale-Warburton Rail Trail shared use path intersects with the public road network
- Intersections on the road network used by cyclists
- Mountain bike trails crossing the public road network.

Lilydale-Warburton Rail Trail intersections

Currently the Lilydale-Warburton Rail Trail crosses the following roads in the study area which have no road crossing treatments:

- Station Road, Wesburn
- Hooks Road, Warburton
- Station Road, Warburton
- The eastern end point of the Lilydale-Warburton Rail Trail at Warburton Highway, Warburton.

For the roads listed above, daily vehicle and cyclist volumes are outlined in Table 13-12.

Table 13-12 Anticipated cyclist volumes at Lilydale-Warburton Rail Trail intersections during operation

Intersection with Lilydale-Warburton Rail Trail	Road volumes 2031 (weekend daily)	Cyclists		
		Existing daily cyclist volumes	Project case daily cyclist volumes	Total
Station Road, Wesburn	Unknown – collector road – up to 8,000	200	265	465
Hooks Road, Warburton	Unknown – local road – up to 3,000	200	438	638
Station Road, Warburton	170	200	484	684
Warburton Highway, Warburton	7,900	40	516	556

Along Warburton Rail Trail the volumes of cyclists would increase by up to three times the existing numbers on a weekend day (in January 2031). In proximity to Hooks Road this is equivalent to one cyclist every 20 seconds from either direction.

There has been one serious injury crash in the last five years on Station Road, Warburton which occurred when a vehicle hit a cyclist. Adequate safety measures and priority at intersections are in place to prevent crashes between vehicles and cyclists.

Road network intersections

The intersections which cyclists may use as part of their travel to/from the trail heads are listed in Table 13-13. The volumes of the major roads that cyclists would need to cross, and estimated cyclist volumes from the project are also shown.

Table 13-13 Anticipated cyclist volumes on road intersections during project operation

Intersection	Major road volume 2031 (weekend daily)	Project case daily cyclist volumes
Warburton Highway / Wesburn Park access road	8,400	124
Warburton Highway and Station Road, Wesburn	8,400	23
Gillis Street / Dee Road / Warburton Highway	8,200	41
Bacchus Crescent / Hearse Road / Warburton Highway	8,200	38
McKenzie King Drive / Warburton Highway	8,200	121
Warburton Highway / Hooks Road	8,200	122
Station Road, Warburton / Warburton Highway	8,000	22
Riverside Drive / Warburton Highway	8,000	242

Mountain bike trail crossing points

There are several crossing points between the proposed bike trails and the road network. Roads where these crossing points would be located are summarised in Table 13-14.

Table 13-14 Location of bike trail crossing points with the road network

Trail	Road	Cyclist crossing direction	Location	Daily traffic volume (weekend)	Posted speed limit (km/hr)
1	Donna Buang Road	Southbound	West of Donna Buang Summit Road	1500	80
38	Mount Bride Road (south)	East and westbound	Mount Tugwell trail head	120	100
22, 23	Mount Bride Road (north)	East and westbound	Junction with Edwardstown Road		
30, 35	Edwardstown Road	North and south bound	Junction with Mount Bride Road	90	100

For safe operation, adequate sight distances are required at trail road crossing points, especially because of the high posted speed limits on these narrow rural roads and the potential for high-speed conflicts to occur. Both motorists and cyclists require sufficient visual and/or physical cues to advise them of the approaching road crossing.

13.9.2 Increased congestion due to additional traffic during operation

The road network is expected to be able to comfortably accommodate the additional traffic volumes anticipated to be generated by the project due to the relatively low traffic volumes anticipated during operation. The highest increase in traffic volume due to the project is expected on Warburton Highway where an additional 70 vehicles are predicted during peak hour.

As the typical mid-block capacity of a single lane of traffic is 1,800 vehicles per hour, impacts on the road network performance within the study area is expected to be low and no mitigation measures would be required.

13.9.3 Parking impacts

A parking assessment has been undertaken to determine the capacity of the proposed car parks at each of the trail heads. It is assumed for the purpose of this assessment that visitors on-site at any one time is 75 per cent of the peak day visitor volumes on a weekend day in January 2031.

The parking requirement assessment considers the anticipated peak parking demand against the parking spaces which are to be provided. This is compared to the current trail head design provided by Yarra Ranges Council shown in Table 15.

Table 15 2031 parking assessment trail heads

Trail head	Anticipated visitors driving	Vehicles parking	Parking spaces available
Main Golf Course	354	127	165
Mount Tugwell	32	12	7 (pick-up and drop-off only)
Mount Donna Buang	48	17	240
Wesburn Park	193	69	340
Dee Road	16	6	20
Total	**644**	**230**	**765**

The assessment has shown that there would be capacity available at the trail heads, with the exception of minimal spaces at Mount Tugwell, which would be for pick-up and drop-off only. If the Golf Course trail head reaches capacity, visitors would be able to park at Mount Donna Buang or Wesburn Park instead where they can utilise the shuttle buses.

The SALT 2019 Movement and Transport Strategy had a parking count survey commissioned in October 2018. For the survey the Warburton town centre was split into four precincts as shown in Figure 13-13.

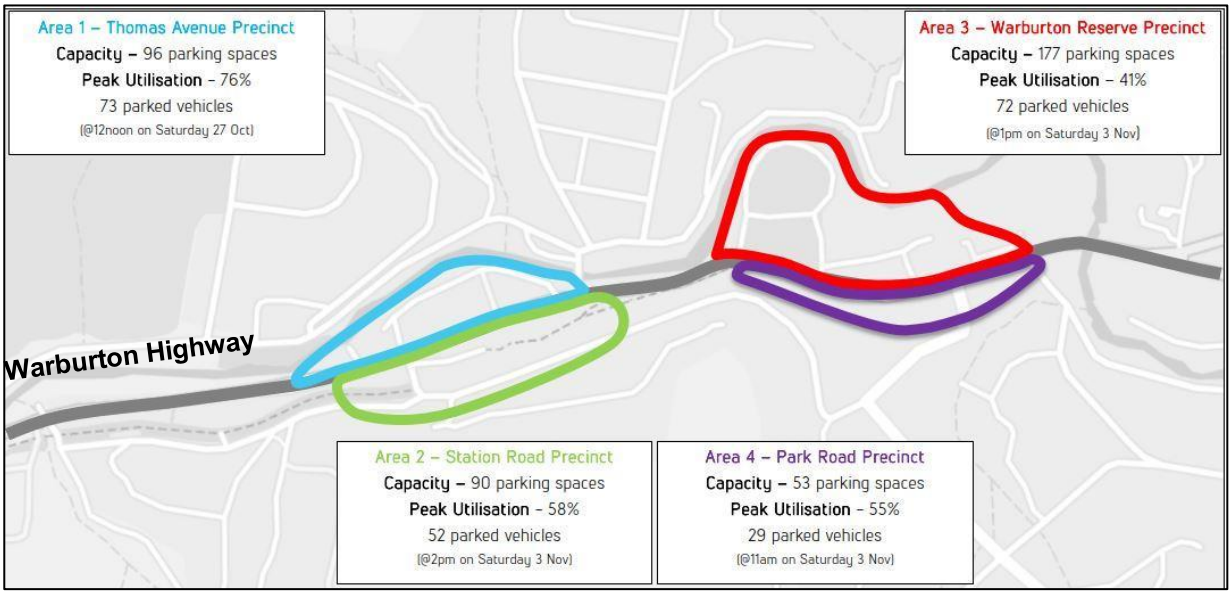

Figure 13-13 SALT 2019 parking survey area and results *Source: SALT 2019*

The car parking survey shows that the current total capacity of surveyed parking districts is 416. Of those 416 car parks, 226 were occupied during the weekly peak period, representing approximately an average occupancy of 59 per cent across the precincts. This average occupancy would, however, be less as each precinct has a different peak hour.

Analysis of anticipated Warburton Mountain Bike Destination visitor volumes during operation shows that the peak day visitor volume on a weekend day in January 2031 is 859. With consideration of a car parking generation rate of 0.35 vehicles per user, this would represent 301 daily car parking spaces required to accommodate Project related visitors.

As a worst-case it is assumed that 25 per cent of the daily visitor volume may leave within the same hour and park within Warburton town centre, which would represent 75 additional car parking spaces during peak hours.

Applying the additional car parking spaces required equally to each of the four precincts the analysis shows that there will be sufficient parking spaces available to accommodate project-related visitors during peak periods. The average occupancy during peak periods within the precincts will be 79 per cent as shown in Table 16, under the 85 per cent acceptable parking occupancy benchmark.

Table 16 Town centre car parking capacity

Location	Parking supply available for the project	Parking demand	Occupancy
Thomas Avenue Precinct	23	19	96%
Station Road Precinct	38	19	79%
Warburton Reserve Precinct	105	19	51%
Park Road Precinct	24	19	90%
		Total	**79%**

Consideration was also given to future land use development and growth of Warburton as this may impact the capacity of existing car parking within Warburton. As the proposed Warburton Mountain Bike Destination develops over the years, it may encourage further development within the township such as accommodation and food and drink related services. A high-level analysis of future development was undertaken by SALT within the Local Movements and Transport report. Results from this assessment show that there will be a low increase in demand related to commercial growth in Warburton.

While the existing parking capacity is currently sufficient to accommodate existing visitors to Warburton, the need for improved infrastructure in and around the town centre would be monitored into the future. As part of Council's standard asset management process, the suitability of wider transport infrastructure around Warburton would be periodically reviewed, including consideration of the SALT report recommendations.

13.9.4 Increased congestion and potential parking impacts as a result of events

The Warburton Mountain Bike Destination is expected to hold events at various times through the year. These events would range from local events to national events.

It is anticipated that participants and spectators would drive to the trail heads. The main trails heads which would be used for events are the Golf Course trail head and Wesburn Park.

Table 13-17 Anticipated events and vehicle movements

Event type	Frequency	Participants	Spectators	Total visitors per day	Total vehicles per day
Local events	30 per year	300	50	350	125
Regional events	10 per year	400	600	1000	357
State events	Every two years	1400	1600	3000	1071
National events	Every four years	2700	4500	7200	2571

Peak and daily one-way vehicular volumes for regional events were determined and compared to the volumes assessed for a peak weekend day in January 2031 in Table 13-18. The regional events traffic volumes are 14 per cent higher than for the weekend peak day assessment. However, the roads utilised to access the trail heads have the capacity for these additional vehicles.

Table 13-18 Regional event traffic comparison

Event type	Peak hour one-way	Daily one-way
Regional events	89	357
Operations peak weekend day (January 2031)	77	307
	Additional traffic volumes	**+50**

A parking assessment for regional events has also been undertaken and is summarised in Table 13-19. The assessment demonstrates that there is anticipated to be ample parking spaces available at the trail heads for local and regional events.

Table 13-19 Regional event parking assessment

Trail head	Vehicles parking	Parking spaces available
Main Golf Course	159	165
Mount Donna Buang	22	240
Wesburn Park	87	340
Total	**268**	**745**

State and national events would require additional traffic assessment per event given their scale and this would be part of specific event management plans developed by the council when further details of the events are known.

13.9.5 Proposed mitigation measures

To reduce the likelihood of crashes between cyclist and vehicles

In order to reduce the likelihood of crashes between cyclists and vehicles, a number of design measures for the transport network will be implemented.

A Road Safety Audit would be undertaken prior to project opening and would include:

- Detailed design of the Lilydale-Warburton Rail Trail/road crossings being proposed. Consideration will also be given to reduced speed limit on roads in the vicinity of the crossings
- Existing Warburton Highway signalised crossing at Millgrove
- Key road intersections that will experience an increase in cyclist volumes (given aspects of these intersections are unknown, such as sight lines)
- At the trail/road crossing points – consideration to be given to visual obstructions to ensure a safe crossing location for cyclists
- The Lilydale-Warburton Rail Trail between Station Road, Wesburn and the eastern end of the rail trail at Warburton Highway, Warburton – the audit would focus on surface quality, areas of narrow width and poor sight distance.

Further to this, design elements would be implemented in order to reduce the likelihood of crashes between cyclists and vehicles, including the following:

- The Lilydale-Warburton Rail Trail is part of both the Principal Cycling Network and the Strategic Cycling Corridor. Given the scale of this project on cyclist-generated trips, it is proposed that the Lilydale-Warburton Rail Trail road crossings including Station Road, Wesburn; Hooks Road, Warburton; Station Road, Warburton; and the eastern end point of the Lilydale-Warburton Rail Trail at Warburton Highway, Warburton would be upgraded to meet the Strategic Cycling Corridor standards.
- Given the scale of this project on cyclist-generated trips, Yarra Ranges Council would develop a plan to upgrade road crossings along the Lilydale-Warburton Rail Trail to the Strategic Cycling Corridor (SCC) standard, beginning with crossings deemed more critical. This plan would identify critical crossings which need upgrading prior to opening of the project and less critical crossing upgrades that can be implemented in a staged approach post opening.
- For safe operation, adequate sight distances are required at trail road crossing points, especially because of the high posted speed limits on these rural roads and the potential for high-speed conflicts to occur. Both motorists and cyclists require sufficient visual and/or physical cues to advise them of the approaching road crossing. As such, prior to opening of the project, signage would be installed to warn drivers of cyclist presence in accordance with road standards.
- Implementing wayfinding to guide cyclists to formal safer intersections and links.
- Proposed shuttle drop-off locations would be selected in consideration of the sight distance of road traffic and their ability to see the drop-off points to avoid the risk of crashes.
- At the Golf Course trail head a designated shared use path (not mixed with golf users) would be provided. This would capture desire lines for trail users and include raised priority treatments at intersections with the private roads. Path(s) would be wide enough to accommodate golf carts, pedestrians and cyclists. The design of the paths would be developed in consultation with stakeholders and would likely have a minimum width of 3.5 metres.

Ongoing review and investigation of the effectiveness of the operational performance of the upgrades would be undertaken to ensure a focus on continuous improvement. These measures include:

- Implementation of the Yarra Ranges Council Paths and Trails Strategy, to collect data and monitor cyclist road crossing locations. This data would enable Yarra Ranges Council to investigate:
  - If future formalised crossings or upgrades for cyclists need to be implemented
  - Other mitigation measures where there are risks of cyclist interactions with vehicles
  - Shared streets along local roads within Warburton
  - Safe cyclist connections between Wesburn, East Warburton, Warburton, and Millgrove to/from the trails
- A sealed shoulder feasibility study along the length of Mount Donna Buang Road to advocate for safer cyclist connections with the Department of Transport.

To reduce the likelihood of parking impacts

The operational parking management plan would include:

- Using the Wesburn Park car park as an overflow car park. Appropriate signage and wayfinding would be provided to adequately direct visitors. VMS boards would be placed at key locations to inform visitors on where to park in peak periods when the car parks are expected to be full.
- Installation of bike parking in the town centre to allow visitors to safely park their bikes.
- A monitoring plan to monitor the occupancy of the town centre parking against the 85 per cent threshold quarterly in the first 12 months of the project opening and yearly after this period.
- SALT's actions and strategy on improving car parking in Warburton would be considered to improve the utilisation of parking currently and into the future.

As part of the Yarra Ranges Council Paths and Trails Strategy for cyclist and pedestrian safety improvements would include investigation into a connection between the Lilydale-Warburton Rail Trail at Station Road and the northern side of Warburton Highway.

To reduce the likelihood of impacts due to events

All events would require a specific Traffic Management Plan (MM-TP1) and in the case of state and national events, specific traffic impact assessments would also be required.

Summary

Following implementation of mitigation measures, potential for crashes between cyclists and vehicles and impacts to parking supply at trail heads and in the Warburton town centre due to the project would be minimised to as low a level as possible.

Implementation of these measures would result in improved safety conditions by diverting cyclists to formal intersections and minimising the interactions between cyclists and vehicles, warning vehicles and cyclists about an upcoming intersection and putting measures in place to slow vehicles and cyclists down before an intersection. Furthermore, alternate car parking locations would be made available to visitors at trail heads during peak periods, improved infrastructure would be investigated and implemented where appropriate to encourage people to walk and cycle, and monitoring of the town centre would be conducted in the first 12 months of operation to better understand car parking impacts and to develop appropriate solutions to address identified issues.

13.9.6 Summary of residual impacts for operation

The operation of the project would likely generate an increase in demand on the surrounding transport network. An assessment of the existing road capacity has determined that increases in traffic and parking could be generally accommodated within the existing network capacity. In addition, mitigation measures would be implemented to ensure residual impacts are avoided or minimised. The effects would be mitigated by:

- Conducting a road safety audit to inform safety and connectivity improvements for both pedestrians and cyclists within the study area (including along the Lilydale-Warburton Rail Trail) prior to commencement of works.
- Appropriately prioritising cyclists along key cyclist routes shared with vehicles in order to minimise vehicle and cyclist interactions.

- Identifying locations with potential geometric or safety issues so improvements can be made to ensure safe bidirectional vehicular movements and improved emergency accessibility.
- Provision of vehicle car parking and upgraded access and facilities to cycle to/from the town centre as part of the project to avoid exceedance of the acceptable parking occupancy benchmarks.
- Ensuring that during local and regional events there is additional visitor capacity with respect to both the road network and parking availability. Events would be short in duration and infrequent, however each event would require a specific traffic management plan to manage impacts. State events are anticipated every two years and national events every four years. Specific TMPs would be developed for each event to further manage transport impacts.

Following implementation of mitigation measures, residual impacts to the transport network due to operational activities are expected to be minimal. Where residual impacts are expected, they would be localised, infrequent and short term (for example the duration of an event).

13.10 Assessment of alternative to Trail 1

The Transport Impact Assessment assumes that the visitor volumes would be the same or potentially less for the alternative trail alignment and thus does not require additional assessment. Therefore, traffic generation and impacts for construction of Trail 1 and the alternative to Trail 1 are expected to be the same.

The alternative trails to Trail 1 would include a trail crossing point on Donna Buang Road to connect Trails 45 and 47. The location of this crossing point is at the shuttle bus drop off point at Victoria Spur.

Donna Buang Road has a posted speed limit of 80km/hr and volumes of 1480 vehicles/day two-way. If an at-grade crossing solution were to be used extensive mitigation measures would be required given the high-speed and high-volume nature of Mt Donna Buang Road, as well as extensive crash history and mountainous surrounds. These mitigation measures would include reduced speeds on approach to the cyclist crossing, signage and warnings to motorists and extensive removal of trees for cyclist sight distance. Following an audit, it may be concluded that an at-grade crossing is not acceptable at this location.

The crossing is in a different place to that for Trail 1 and due to having a posted speed of 80km/h and compromised sight lines, substantial mitigation measures are likely to be needed to ensure safety at a crossing at this location. If following further investigation an at grade crossing is not considered desirable, a bridge crossing could be contemplated.

Therefore, due to the safety challenges with the crossing of Mount Donna Buang Road associated with the alternative to Trail 1, Trail 1 is slightly preferred from a transport perspective.

13.11 Cumulative impacts

Warburton Water World (WWW) opened in September 2020 in Warburton on Woods Point Road. The park is opened between 10am-7pm on weekdays and weekends.

It is deemed necessary to determine the cumulative impact on the transport network on a weekend day in 2031 for the Warburton Mountain Bike Destination and Warburton Water World as there is potential for impacts to the roads and town parking. The visitor volume assumptions were provided by Yarra Ranges Council and are based on daily temperature, with the highest visitor volumes occurring over 35 degrees. It is expected that mountain bike visitors would be less likely to undertake mountain bike activities in this weather due to physical discomfort and safety risks.

The WWW visitor volumes are provided in Table 13-20.

Table 13-20 Warburton Water World visitor volume estimates (source: Yarra Ranges Council)

Timing	Estimated visitor numbers (per day)		
	< 30 degrees	30 - 35 degrees	> 35 degrees
Dec, Feb & Mar mid-week	500 - 1,000	1,000 - 2,000	2,000 - 3,000
Jan mid-week	1,000 – 2,000	2,000 – 3,000	3,000 – 4,000
Weekends	1,500 – 3,000	3,000 – 4,000	4,000 – 5,000

Applying 2.6 visitors per vehicle, it is estimated that 1,538 vehicles would travel to WWW on a weekend day (in January 2031). The WWW visitor arrival peak is assumed to be 25 per cent of the total daily arrival and thus it is estimated that 385 vehicles would arrive in the peak hour.

The operational traffic peak for the Warburton Mountain Bike Destination and WWW is assumed to occur for both visitor destinations within the same peak hour on a Saturday in January. WWW would have 385 vehicles arriving in the peak hour. Using the same assumptions used for the Warburton Mountain Bike Destination assessment, 99.15 per cent would arrive from the west via Warburton Highway and Woods Point Road.

Roads impacted by both projects are shown in Table 13-21 with the daily and peak hour traffic volumes expected from both projects.

Table 13-21 2031 Cumulative impact to study area roads

Road	Type	Daily vehicles				Peak hour (2-way)			
		2031 base volumes	WMBD	WWW	Total	2031 base volumes	WMBD	WWW	Total
Warburton Highway (west)	VicRoads B-Class arterial road	7,828	+413	+3,051	10,879	702	+99	+763	1,564
Warburton Highway (east)		7,828	+94	+3,051	10,879	702	+23	+763	1,487
Warburton Highway (south)		7,881	+593	+3,051	10,932	788	+148	+763	1,699
Warburton Highway (north)		7,881	+596	+3,051	10,932	788	+145	+763	1,696
Donna Buang Road	VicRoads C-Class arterial road	1,404	+79	+7	1,411	156	+16	+3	175

The WWW would add traffic to the arterial roads that would also be utilised by the visitors to the mountain bike trails. Road infrastructure upgrades may be required due to the high visitor volumes Yarra Ranges Council anticipate from WWW.

The WWW would also impact on parking in the town centre. An updated assessment with assumptions as per the Warburton Mountain Bike Destination is shown in Table 13-22. The town parking exceeds the 85 per cent acceptable parking occupancy benchmark when the WWW visitor volumes are considered.

Table 13-22 Cumulative impact town centre parking

Location	Remaining capacity	Warburton Mountain Bike Destination usage		Warburton Water World usage	
		Car parks used	Percentage car parks used	Car parks used	Percentage car parks used
Thomas Avenue Precinct	23	4	96%	-34	136%
Station Road Precinct	38	19	79%	-19	121%
Warburton Reserve Precinct	105	86	51%	48	73%
Park Road Precinct	24	5	90%	-33	163%
Total	**190**	**115**	**79%**	**-39**	**123%**

Parking shortages will likely be exacerbated during peak periods when WWW is busy. Yarra Ranges Council has established strategies for overflow parking during busy, hot days to cater for these peak periods. It is envisaged that when WWW is very busy, mountain bike users would likely use the

parking available at Wesburn Park which is some distance from WWW on the western side of Warburton.

13.12 Summary of mitigation and contingency measures

Table 13-23 summarises the mitigation measures developed to avoid and minimise the traffic and transport impacts within the project area as described in the construction and operation impact assessment sections. Mitigation measures for noise and air quality associated with construction and operation traffic are detailed in **Chapter 11: Land use and planning**.

Table 13-23 Mitigation and contingency measures

Mitigation measure number	Project phase	Mitigation and contingency measures
MM-TP1	Construction	**Traffic Management Plan (TMP)** Prior to the commencement of construction, a TMP would be developed and implemented to minimise disruption to existing land uses, traffic, car parking, on-road public transport, pedestrian and bicycle movements and existing public facilities during construction. The TMP would be developed in consultation with the relevant road management authorities and would include: ● A program to monitor impacts of construction activities on all modes of transport. Where monitoring identifies adverse impacts, practicable mitigation measures would be developed and implemented ● Consideration of cumulative impacts of any other major projects occurring concurrently in the local area ● Route options for construction vehicles travelling to and from the construction sites, recognising sensitive receptors and minimising the use of local streets where practicable ● Pre-construction on-site checks to assess route options for safety and clearance to potential obstructions, such as wires, structures and trees for OSOM vehicles ● Survey to document the condition of pavements and other road infrastructure such as bridges and culverts prior to construction commencement for roads that are not B-Double approved including: - Mayer Bridge - Dammans Road - Old Warburton Road - Mount Bride Road ● Measures to minimise disruption due to road and lane closures including limiting the number and duration of road closures and planning closures to occur outside of peak traffic periods. Temporary alternative routes would be identified during road closures to maintain local access to properties. Warburton Highway and Old Warburton Road would not be closed at the same time and no more than one road closure would occur each day to minimise any impact. Road closures must consider emergency situations such as bushfire season. Management measures would include detours as required for the following roads: - Warburton Highway - Old Warburton Road - Dammans Road ● Management of the Lilydale-Warburton Rail Trail partial closure by maintaining connectivity for road and footpath users in accordance with relevant design standards and in consultation with landholders and other relevant third parties ● Traffic management measures including localised and temporary speed limit reduction and signage as appropriate ● Traffic management and controllers to restrict vehicles entering Mayer Bridge during heavy vehicle movements

Mitigation measure number	Project phase	Mitigation and contingency measures
		● Traffic management measures to manage the risk associated with heavy vehicles, including over dimensional vehicle movement ● Consultation with Public Transport Victoria (PTV) and private bus operators to inform them of transport changes anticipated as a consequence of construction ● Measures developed in consultation with emergency services to ensure emergency service access is maintained, especially during any public road closures ● Provision of safe access points to laydown areas and site compounds ● Provision of segregated access points for construction vehicles and public vehicles where appropriate ● Protocols to give the community and other stakeholders adequate notice of any anticipated changes to transport conditions ● Specified working hours and periods within which heavy goods vehicles can access the work sites and make deliveries ● Minimisation of dirt and debris on roads by measures such as street sweeping, covering vehicle loads and vehicle cleaning ● Minimisation of the need to transport waste from the site by reuse of materials wherever possible. The TMP would include specific measures for discrete components or stages of the works as appropriate. The above list is indicative and further measures may be identified during the development of the TMP.
MM-TP2	Construction and operation	**Stakeholder communication plan** Prior to commencement of the construction works and any temporary road or lane closures, stakeholder consultation would be carried out and advanced notice given to affected residents, businesses or industries and emergency services. This includes measures such as letter notification to inform residents and businesses of upcoming works and road closures. Stakeholder engagement and communications strategies would be established in the TMP for the project. Stakeholders may include road authorities, bus operators, business operators and residents among others. At the end of the construction phase, a close-out meeting between Yarra Ranges Council and relevant road authorities (VicRoads and DELWP) would occur to discuss the management and restoration of roads to their prior existing (or improved) condition. During operation, regular meetings would occur and an agreement would be reached with DELWP to confirm pavement upgrades of impacted local roads around the study area, subject to the pavement strength survey results. Regular road maintenance and inspections would also be discussed for declared roads with VicRoads.
MM-TP3	Operation	**Road Safety Audit** To verify that the risks in this TIA can be managed a Road Safety Audit (RSA) will be undertaken by a VicRoads accredited Road Safety Auditor independent of the project team for the following aspects prior to project opening: ● Detailed design of the Lilydale-Warburton Rail Trail/road crossings proposed. ● Existing Warburton Highway signalised crossing at Millgrove. ● Key road intersections that would experience an increase in cyclist volumes (given aspects of these intersections are unknown such as sight lines). ● At the trail/road crossing points. Consideration to be given to visual obstructions to ensure a safe crossing location for cyclists. ● The Lilydale-Warburton Rail Trail between Station Road, Wesburn and the eastern end of the rail trail at Warburton Highway, Warburton. The audit

Mitigation measure number	Project phase	Mitigation and contingency measures
		would focus on surface quality, areas of narrow width and poor sight distance. ● At the proposed shuttle drop-off locations. Consideration would be taken into the sight distance of road traffic and their ability to see the drop-off points to avoid the risk of crashes. ● Along the length and intersections of Edwardstown Road and Cemetery Track to confirm adequate emergency access and identify any sight and surface issues.
MM-TP4	Construction and operation	**Improvement works** ● The need for construction restoration of the road pavement, bridges, and culverts within the study area would be assessed and where required assets would be restored to existing or better than existing condition if damage has occurred. The need for restoration would be based on pre and post construction surveys. ● The road surface conditions along Cemetery Track and Edwardstown Road would be surveyed pre and post construction and restored to existing condition or better where required. ● Subject to the results of the RSAs undertaken at various locations in the study area, improvements may be required prior to project opening.
MM-TP5	Operation	**Cyclist and pedestrian safety improvements** A number of mitigation measures are proposed to ensure safe pedestrian and cyclist movements within the study area during the operational phase of the project. These include: ● Yarra Ranges Council to assess bike parking provision after 12 months of operation in busier summer months to ensure that adequate bike parking is available to visitors. Additional bike parking would be provided, subject to the results of this assessment. ● Drink taps/water bottle filling locations would be located in close proximity to the car park and bike path for the Golf Course and Wesburn trail heads to prevent dehydration ● Prior to opening of the project, signage would be installed to warn drivers of cyclist presence in accordance with road standards ● Given the scale of this project on cyclist-generated trips, Yarra Ranges Council would develop a plan to upgrade road crossings along the Lilydale-Warburton Rail Trail to Strategic Cycling Corridor (SCC) standard beginning with crossings deemed more critical. This plan would identify critical crossings which need to implemented prior to opening of the project and less critical crossings that can be implemented in a staged approach post opening ● The Yarra Ranges Council Paths and Trails Strategy would investigate collection of data and monitoring cyclist road crossing locations to determine when and what type of formalised crossing is required at the following locations: - Station Road, Wesburn - Hooks Road, Warburton - Station Road, Warburton - Warburton Highway, Warburton (This treatment would require approval from DoT) ● Collection of data and monitoring cyclist road locations to determine if future formalised crossings or upgrades for cyclists need to be implemented. This would also help inform other mitigation measures in the future where there are risks of cyclist interactions with vehicles ● Implement wayfinding to guide cyclists to formal safer intersections and links

Mitigation measure number	Project phase	Mitigation and contingency measures
		● The Yarra Ranges Council Paths and Trails Strategy would investigate how and when to implement: - shared streets along local roads within Warburton - safe cyclist connections between Wesburn, East Warburton, Warburton, and Millgrove to/from the trails ● A sealed shoulder feasibility study would be undertaken in relation to Mount Donna Buang Road to advocate for safer cyclist connection with the DoT ● At the proposed shuttle drop-off locations consideration would be given to the sight distance of road traffic and the ability to see the drop-off points to avoid the risk of crashes. ● At the Golf Course trail head a designated shared use path (not mixed with golf users) which matches the desire lines of those heading to the trails would be provided, including raised priority treatments at intersections with the private roads. Path(s) would be wide enough to accommodate golf carts, pedestrians and cyclists. The design of the paths would be developed in consultation with stakeholders and would likely have minimum width of 3.5 metres. ● The shared path bridges would provide a minimum of 2.5 metres between the handrails. ● The Yarra Ranges Council Paths and Trails Strategy would investigation into a connection between the Lilydale-Warburton Rail Trail at Station Road and the northern side of Warburton Highway.
MM-TP6	Operation	**Operational parking management** Yarra Ranges Council would establish a parking management plan for the operation of the project to ensure that parking congestion does not exceed acceptable limits for visitors or residents. It would address the following: ● Arrangements for overflow car parking to include using the Wesburn Park car park as an overflow car park. Appropriate signage and wayfinding would be provided to adequately direct visitors. VMS boards would be placed at key locations to inform visitors on where to park in peak periods when the car parks are expected to be full ● Installation of bike parking in the town centre to allow visitors to safely park their bikes ● A monitoring plan to be implemented to monitor the occupancy of the town centre parking against the 85% threshold quarterly in the first 12 months of project opening and yearly after this period ● SALT's actions and strategy on improving car parking in Warburton would be considered to improve the utilisation of parking currently and into the future.
MM-TP7	Operation	**Emergency management plan** An emergency management plan for the Project would be established and approved before Project opening in consultation with stakeholders. This includes staff training for the Project and an evacuation plan.

13.13 Conclusion

The transport assessment has shown that the construction and operation phases of the project can be managed such that the objective of minimising potential adverse social, economic, amenity and land use effects at local and regional scales can be achieved.

To avoid and minimise impacts on transport due to the project, there would be additional parking provided at Warburton Golf Course and Wesburn Park to cater for peak parking demand. Shuttle buses would be used from key parking areas to minimise traffic on roads.

The assessment considered potential impacts to transport in Warburton during both construction and operation of the project including on safety, parking, congestion, the road network, end of trip facilities

and emergency vehicle access, finding that there are not anticipated to be significant impacts due to the project.

A summary of the impacts anticipated from the project is included below. Following the implementation measures described in Section 13.12, it is not anticipated that any residual impacts would be significant.

- Construction impacts:
  - Additional traffic during construction is anticipated. It is not expected to increase congestion on the public road network above the existing capacity. As the road network has ample capacity to absorb the small number of additional vehicles, there is not anticipated to be a substantial increase in congestion impacting road users due to construction. Residual impacts are not expected.
  - Road and lane closures are likely to be necessary to facilitate the safe and efficient construction of the project. Road and lane closures as a result of bridge construction would be limited to a few hours on a number of separate occasions, meaning that road users would only be impacted for a small period of time. In addition, the number of road users that are impacted would be minimised by ensuring that the closing of lanes and roads is only undertaken during off-peak periods. Road users would be notified prior to closures and would have access to alternate lanes or routes during these closures. As such, it is not anticipated that road closures would result in significant impacts to transport network users as they would be limited, infrequent and reduce safety risks associated with construction traffic.
  - Construction activities may lead to an increased risk of interactions between vehicles and cyclists. This would be minimised through conducting Road Safety Audits prior to the commencement of construction to identify improved safety and connectivity for both pedestrians and cyclists within the study area including along the Lilydale-Warburton Rail Trail, to be implemented prior to the construction period. Careful consideration with regards to transport network safety through these measures would reduce the likelihood and severity of vehicle / cyclist interactions.
- Operation impacts:
  - Operation would generate additional vehicle and cycle traffic around Warburton, however, traffic volumes during operation would be sufficiently catered for by the existing road network. Locations identified to have geometric or safety issues would be improved to ensure safe bidirectional vehicular movements and improved emergency accessibility.
  - As a result of the project, there would be a decrease in parking availability. To manage this, vehicles would be able to park in the overflow car park or informal parking at the trail heads or town centre which would avoid impacts associated with parking congestion. The project would provide better access and facilities to cycle to/from the town centre, reducing the amount of people driving and parking vehicles, and constant improvements to parking availability would be investigated as per the operational parking management plan to maintain parking availability in the town centre. Overall, impacts to parking would be minimal and would be managed on an ongoing basis.
  - During local and regional events there is capacity for additional visitors with respect to both the road network and parking availability. Events would be short in duration and infrequent, however, to manage these impacts, each event would require a specific traffic management plan. State events would be held every two years and national events would be held every four years. Should state or national events be held, further assessment of impacts would be undertaken to determine and apply appropriate transport management measures. This would unlikely result in a significant impact overall as these events are infrequent and short in duration, and would be managed through specific TMPs.
  - Cumulative impacts as a result of the operation of WWW may result in exceedance of the acceptable parking occupancy benchmark during the anticipated busiest WWW days (days where temperatures exceed 35 degrees). During this time, it is not anticipated that many cyclists would be undertaking mountain bike activities in these weather conditions due to physical discomfort and safety risk. Therefore, exceedance of acceptable parking occupancy benchmarks during this time would likely result from visitors of WWW. This impact is managed by Yarra Ranges Council and no further mitigation measures are proposed to manage this impact.

All other potential impacts would not contribute to a significant change to existing conditions and are able to be managed through mitigation measures.

In response to the EES evaluation objective described at the beginning of this chapter, impacts of the project on traffic and transport have been assessed and mitigation measures have been identified to avoid and minimise adverse impacts.