Proposed Lithgow Mountain Bike Project in Lithgow, NSW

Traffic impact and parking assessment study

May 2025

Central Tablelands Mountain Bike Club

Traffic Engineering Centre
Our clients are our partners

10 YEARS ANNIVERSARY 2012-2022

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Executive Summary

Traffic Engineering Centre was commissioned by Central Tablelands Mountain Bike Club to undertake a traffic impact and parking assessment for the proposed Lithgow Mountain Bike Project in Lithgow, NSW.

The particular study tasks included:

- review the current traffic arrangements within the vicinity of the development site
- compare the existing traffic levels on the streets around the development site with the anticipated road usage levels once the development is complete, and likely traffic and parking generation from proposed operations during day to day activities.
- assess a potential impact on the existing public transport (including the review of proposed shuttle bus (and trailer) services within the site and along State Mine Gully Road), including bus stops and turn around points, pedestrian or cyclist' amenities, traffic safety, and residential amenities
- assess the sight distance toward the location of the newly proposed driveway crossing
- assess any potential traffic safety impact that may be created because of the proposed development
- an assessment of the adequacy of the car park capacity
- bus stops on State Mine Gully Road
- the safety of the bus stops on State Mine Gully Road
- review of safety of Mountain Bike Lane crossing State Mine Gully Road (public road)
- consider the proposed car parking arrangement and onsite manoeuvrability for the proposed development and existing land uses.
- recommendation (if any) to alleviate any traffic and parking impact arising from the change

The study found:

The proposed development would not have unacceptable traffic implications for the adjacent road network in terms of road capacity or traffic safety.

The development would not have an unacceptable impact on public transport, pedestrian or cyclist amenities, or safety.

Required mitigation measures:

The study identified the following main traffic safety issues:

- poor condition of the road surface

- lack of proper delineation
- narrow roadway
- short forward visibility/sight distance and tight corners

Mitigating **short forward visibility, limited sight distance, and tight corners** will include a combination of engineering solutions and traffic management strategies to enhance safety and operational efficiency.

Key measures include:

- Sight Distance Improvements: remove obstructions such as vegetation to improve visibility along curves
- Advance Warning Systems: install signage, or road markings to alert drivers of upcoming visibility restrictions
- Speed Management: implementing reduced speed limits, advisory speed signs, or speed-calming measures to minimise risks in areas with limited visibility
- Enhanced Road Delineation: by using high-contrast lane markings, retroreflective pavement markers, and guideposts to improve driver awareness
- Intersection & Curve Treatments: applying Chevron Alignment Markers (CAMs) to assist drivers in navigating tight corners safely.

Addressing **poor road delineation** requires a systematic approach to enhance visibility, improve lane discipline, and reduce accident risks.

Key strategies include:

- High-Contrast Line Markings – Use durable, retroreflective materials for [at least] centrelines, and lane markings to ensure visibility in all conditions.
- Retroreflective Pavement Markers (RRPMs): install raised or embedded markers to improve nighttime and wet-weather visibility.
- Guideposts & Chevron Alignment Markers (CAMs): position reflective guide posts and chevrons at curves and intersections to aid navigation.
- Advanced Warning Signs & Advisory Speed Limits: deploy signage to inform drivers of upcoming hazards, sharp bends, or reduced visibility zones.

Addressing **narrow roadways** requires a combination of infrastructure improvements, traffic management strategies, and safety measures to mitigate risks.

Here are some key approaches:

- Lane Markings & Delineation: clear lane markings, edge lines, and reflective signage help guide drivers and enhance visibility, especially in low-light conditions

- Speed Management: Implement lower speed limits, speed bumps, or traffic calming measures can reduce the likelihood of accidents.

With the implementation of the above mitigation measures, **the impact of the development on overall traffic safety** is expected to be **negligible**.

1. Introduction, site location, and appreciation of the development

Central Tablelands Mountain Bike Club has commissioned Traffic Engineering Centre to undertake a traffic impact and parking requirement study to identify potential traffic and transport impacts of the proposed Lithgow Mountain Bike Project in Lithgow, NSW (refer to Figures 1.1 to 1.3, and Photos 1.1 & 1.2).

The Development site is located within the Lithgow City Council LGA.

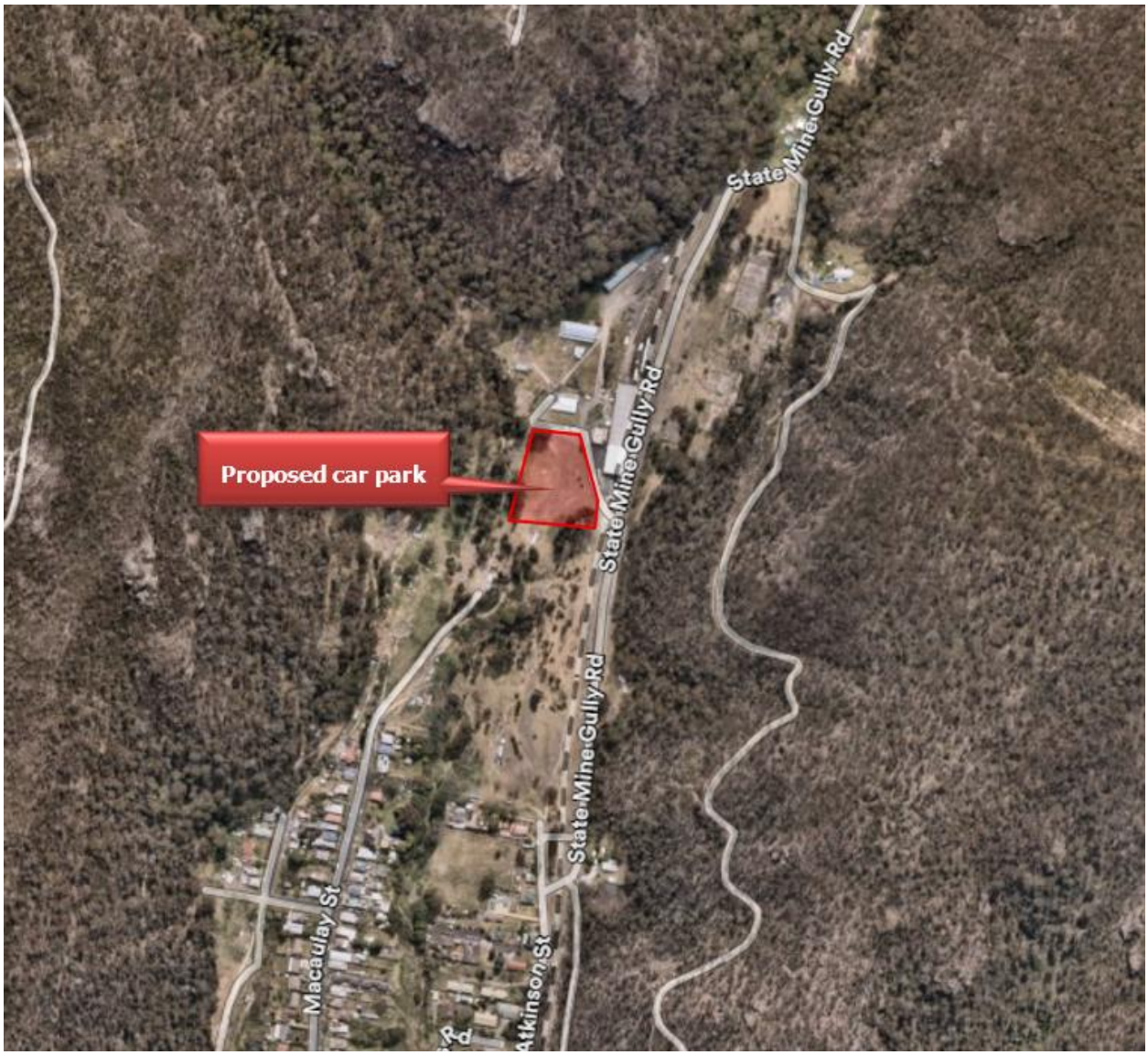


Figure 1.1: Locality map – development site
(Source: neamap)

Figure 1.2: Locality plan – development site & plan
(Source: nearmap & PMO 360)

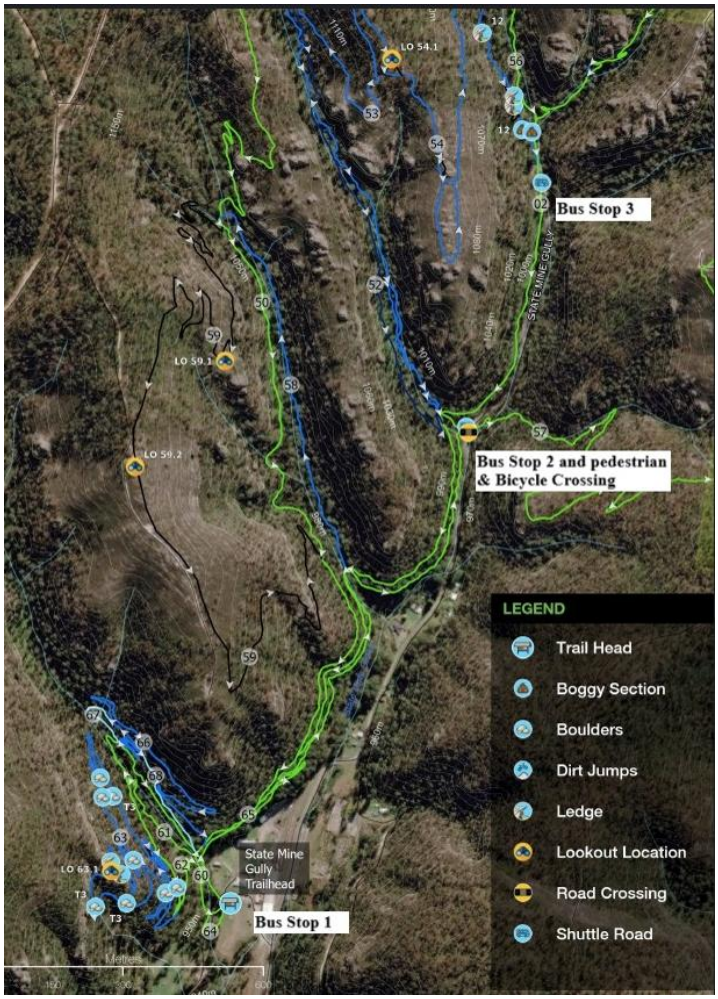


Figure 1.3: Locality plan – development plan
(Source: PMO 360)

The development site is located off State Mine Gully, a rural road with no speed limit signposted, but it is assumed to be 50km/h (refer to Photos 1.1 & 1.2).

Photo 1.1: Development site, off State Mine Gully, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 1.2: Development site, off State Mine Gully, looking southbound
(Photo: Traffic Engineering Centre Pty Ltd)

2. Study requirements

This study aims to:

- review the current traffic arrangements within the vicinity of the development site
- compare the existing traffic levels on the streets around the development site with the anticipated road usage levels once the development is complete, and likely traffic and parking generation from proposed operations during day to day activites
- assess a potential impact on the existing public transport (including the review of proposed shuttle bus (and trailer) services within the site and along State Mine Gully Road), including bus stops and turnaround points, pedestrian or cyclist' amenities, traffic safety, and residential amenities
- assess the sight distance toward the location of the newly proposed driveway crossing
- assess any potential traffic safety impact that may be created because of the proposed development
- an assessment of the adequacy of the car park capacity
- bus stops on State Mine Gully Road
- the safety of the bus stops on State Mine Gully Road
- review of the traffic safety of Mountain Bike Lane crossing State Mine Gully Road (public road)
- consider the proposed car parking arrangement and onsite manoeuvrability for the proposed development and existing land uses.
- recommendation (if any) to alleviate any traffic and parking impact arising from the change

3. Existing conditions

3.1 Site inspection

The site was inspected on 13 May 2025 in dry weather and road conditions when several photographs and video footage were taken (refer to Photos 3.1 & 3.2).

A drive and walk over the site were undertaken to investigate the possible implications of the proposed development site on the surrounding road network, traffic movements, and traffic safety.

Photo 3.1: State Mine Gully Road, looking northbound toward the development site
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.2: State Mine Gully Road, looking southbound, from the development site
[Photo: Traffic Engineering Centre Pty Ltd]

'Lithgow State Mine Railway - Workshop & Museum', which borders the development site, was closed during the site inspection (refer to Photos 3.3 & 3.4).

Photo 3.3: Lithgow State Mine Railway - Workshop & Museum, off State Mine Gully Road
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.4: Lithgow State Mine Railway - Workshop & Museum, off State Mine Gully Road
[Photo: Traffic Engineering Centre Pty Ltd]

From 'nearmap', it was recognised that the 'Lithgow State Mine Railway - Workshop & Museum' has its car park (refer to Figure 3.1)

Since the car park is located near the proposed development's car park (refer to Figure 3.2), it is highly unlikely that visitors to the Workshop & Museum will use the newly proposed [adjacent] car park in any foreseeable circumstances (refer to Figure 3.2).

Figure 3.1: Workshop & Museum's car park
(Source: nearmap)

Figure 3.2: Workshop & Museum's car park, adjacent to the proposed development's car park
(Source: nearmap & PMO 360)

State Mine Gully Road is a less than 6.0m wide road between Atkinson Street and the development site (refer to Figures 3.3 to 3.6).

Figure 3.3: Section of State Mine Gully Road between Atkinson Street and the development site
(Source: nearmap)

Figure 3.4 Carriageway width of State Mine Gully Road, measured at a random location between Atkinson Street and the development site
(Source & measurement: nearmap)

Figure 3.5 Carriageway width of State Mine Gully Road, measured at a random location between Atkinson Street and the development site
(Source & measurement: nearmap)

Figure 3.6 Carriageway width of State Mine Gully Road, measured at a random location between Atkinson Street and the development site
(Source & measurement: nearmap)

The remaining section of State Mine Gully Road (refer to Figure 3.7, and Photos 3.5 & 3.6), to be used by shuttle buses, is also narrower than 6.00m (refer to Figures 3.8 & 3.9) with a signposted narrow road section (refer to Photo 3.7) and a signposted one-way bridge (refer to Photo 3.8).

Figure 3.7: Section of State Mine Gully Road between the development site and the northern end of the study area
(Source: nearmap)

Figure 3.8 Carriageway width of State Mine Gully Road, measured at a random location between the development site and the northern end of the study area
(Source & measurement: nearmap)

Figure 3.9 Carriageway width of State Mine Gully Road, measured at a random location between the development site and the northern end of the study area
(Source & measurement: nearmap)

Photo 3.5: State Mine Gully Road, at a random location, to the north of the development site (looking southbound)
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.6: State Mine Gully Road, at a random location, to the north of the development site (looking southbound)
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.7: State Mine Gully Road, at signposted narrow road section (looking southbound)
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.8: State Mine Gully Road, at one-way bridge (looking southbound)
[Photo: Traffic Engineering Centre Pty Ltd]

There are a lot of potholes, and the overall of the road surface is in a very bad condition, along the entire section of State Mine Gully Road, between Atkinson Street and the northern end of the studies section (Photos 3.10 & 3.11 show the poor road conditions at only a couple of random locations).

While these sections are in very poor condition, they should not affect the construction of the proposed Mountain Bike Park.

Photo 3.9: Typical condition of the road surface of State Mine Gully Road, between the development site and the northern end of the studied road section
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.10: Typical condition of the road surface of State Mine Gully Road, between Atkinson Street and the development site
[Photo: Traffic Engineering Centre Pty Ltd]

The observed poor condition of the railway tracks indicate that the section of the railway network is no longer in regular use or has even been decommissioned.

Signs of neglect include (refer to Photos 3.11 to 3.14):

- Rust and Corrosion: seemingly, the tracks were not used for long periods, as rust developed, weakening their structural integrity
- Overgrown Vegetation: grass and weeds growing between and around the tracks suggest a lack of maintenance.
- Sediments, gravel, and loose material between tracks
- Lack of Recent Repairs: no signs of fresh ballast, welding, or track realignment indicate abandonment.

Photo 3.10: The poor condition of the railway tracks indicates that the section of the railway network is no longer in regular use or has even been decommissioned
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.11: The poor condition of the railway tracks indicates that the section of the railway network is no longer in regular use or has even been decommissioned
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.12: The poor condition of the railway tracks indicates that the section of the railway network is no longer in regular use or has even been decommissioned
[Photo: Traffic Engineering Centre Pty Ltd]

Photo 3.13: The poor condition of the railway tracks indicates that the section of the railway network is no longer in regular use or has even been decommissioned
[Photo: Traffic Engineering Centre Pty Ltd]

3.2 Access to the Development site

The proposed access driveway to the car park is off the access driveway to the museum, which is located off State Mine Gully Road (refer to Figure 3.10).

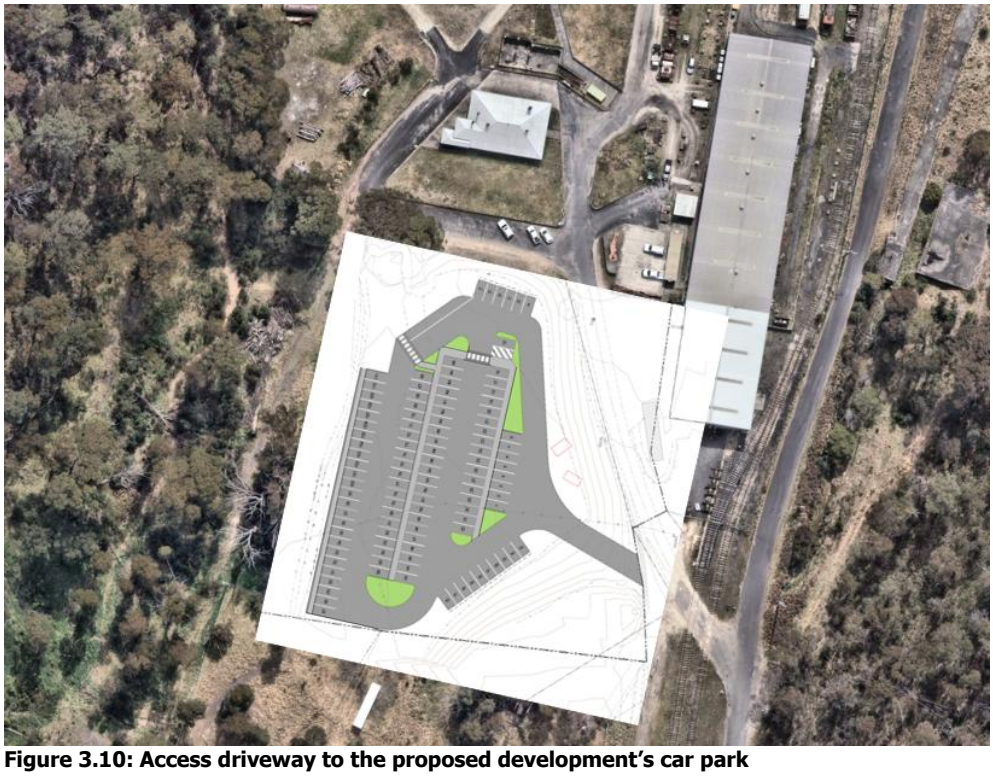


Figure 3.10: Access driveway to the proposed development's car park
(Source: nearmap)

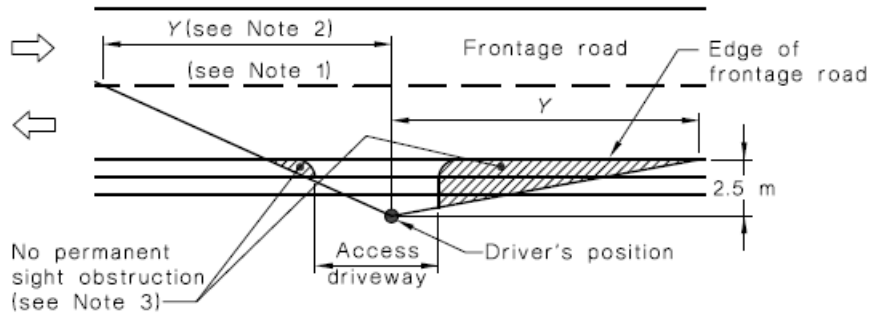
3.2.1 Sight distances

It is fundamental to the safety of the access driveway that drivers can:

- recognise the presence of the access driveway in time to slow down or stop in a controlled manner
- see vehicles approaching in conflicting traffic streams and give way where required by law or avoid a crash in the event of a potential conflict

Therefore, the safety performance of the proposed access driveway mainly depends upon adequate sight distance about horizontal and vertical geometry for all drivers approaching and entering the access driveway.

The **sight distance** associated with an **access driveway** is estimated based on the minimum requirements of the AS2890.1:2004. Table 3.1 determines the sight distance for vehicles entering the public roadway from an access driveway.



Frontage road speed (Note 4) km/h	Distance (Y) along frontage road m		
	Access driveways other than domestic (Note 5)		Domestic property access (Note 6)
	Desirable 5 s gap	Minimum SSD	
40	55	35	30
50	69	45	40
60	83	65	55
70	97	85	70
80	111	105	95
90	125	130	Use values from 2nd and 3rd columns
100	139	160	
110	153	190	

Table 3.1: Sight Distance Requirement at Access Driveways
(Source: AS2890.1: 2004, Section 3.2.4)

Photos 3.14 & 3.15, and Figure 3.11 show the view and sight distance of ≈ 100m looking southbound along State Mine Gully Road, on the northern approach to the proposed access driveway.

Photo 3.14: State Mine Gully Road, looking southbound, on the northern approach to the proposed access driveway - sight distance ≈ 100m
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.15: State Mine Gully Road, looking northbound, from the proposed access driveway - sight distance ≈ 100m
(Photo: Traffic Engineering Centre Pty Ltd)

Figure 3.11: State Mine Gully Road, the southbound sight distance measured toward the proposed access driveway ≈ 100m
(Source: nearmap)

Photos 3.16 & 3.17, and Figure 3.12 show the view and sight distance of ≈ 190m looking northbound along State Mine Gully Road, on the southern approach to the proposed access driveway.

Photo 3.16: State Mine Gully Road, looking southbound, on the southern approach to the proposed access driveway - sight distance ≈ 190m
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.17: State Mine Gully Road, looking southbound, from the proposed access driveway - sight distance ≈ 190m
(Photo: Traffic Engineering Centre Pty Ltd)

Figure 3.12: State Mine Gully Road, the northbound sight distance measured toward the proposed access driveway ≈ 190m
(Source: nearmap)

Based on the observations from the site and measurements on the 'near map', the **minimum site distance** [in both directions] **exceeds the minimum standard requirements** of 69m for the frontage [speed limit] road speed of 50km/h (refer to Table 3.1), when looking along State Mine Gully Road from/toward the proposed future access driveway.

3.3 Provision for pedestrians

No pedestrian footpaths border the development site or approach to the development site. However, there is no need for such facilities as no pedestrians were observed walking along State Mine Gully Road.

3.4 Provision for cyclists

There are no cycling facilities near the development site, and such facilities are not proposed as part of this development.

However, the favourable geometry of the road section adjoining the development site, seemingly very low traffic volumes, and relatively lower speed of vehicular traffic on State Mine Gully Road provide a reasonably safe and convenient environment for cycling.

Therefore, from the cyclists' viewpoint, the site is reasonably well connected with the adjoining residential and retail areas.

3.5 Public transport

Currently, there is no public transport in the vicinity of the development site.

3.6 Current traffic safety issues

3.6.1 Poor condition of the road surface

The surface of State Mine Gully Road is in poor condition with a significant number of potholes and other pavement damage (Photos 3.18 to 3.20 show only a few random locations).

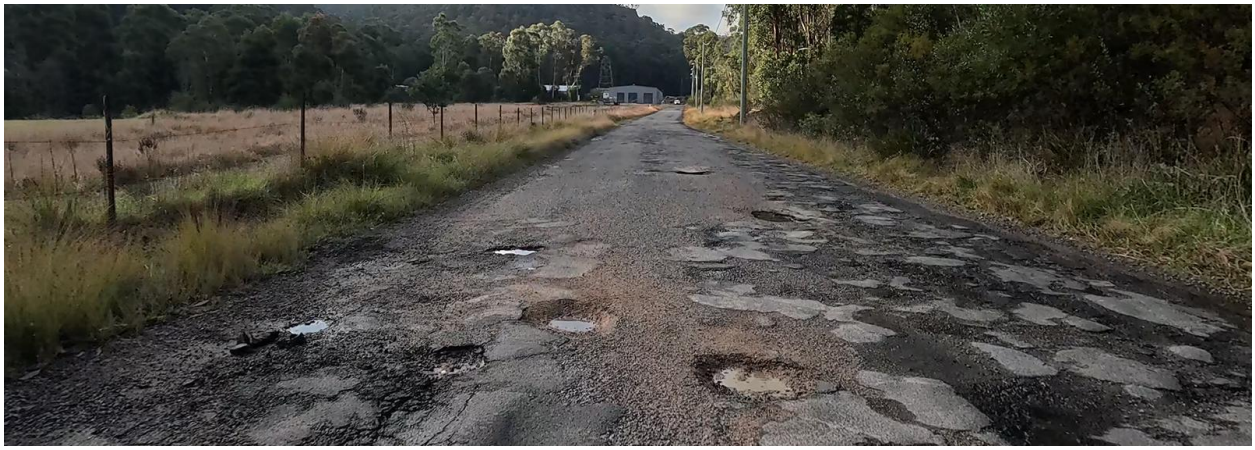


Photo 3.17: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.18: State Mine Gully Road, looking southbound
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.19: State Mine Gully Road, looking southbound
(Photo: Traffic Engineering Centre Pty Ltd)

Potholes and other identified pavement damage are more than just an inconvenience - they pose serious risks to traffic safety, because:

- Vehicle damage & Loss of control: hitting a deep pothole can damage tires, suspension, and steering systems, leading to sudden loss of control.
- Increased incident/collision risk: drivers may swerve unexpectedly to avoid potholes, potentially colliding with other vehicles or pedestrians.
- Reduced Braking Efficiency: Potholes can interfere with braking systems, especially in wet conditions, making sudden stops more difficult.
- Danger to Cyclists and Motorcyclists: A pothole can cause immediate instability for two-wheeled vehicles, leading to crashes.
- Traffic Congestion: drivers slowing down or taking evasive manoeuvres can disrupt traffic flow, increasing congestion and frustration.

3.6.2 Lack of delineation

Road **delineation** is poor along State Mine Gully Road (Photos 3.20 to 3.23 show only a few poorly delineated road sections).

Photo 3.18: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.19: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.20: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.21: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

There are not enough **delineation devices** to provide drivers with visual information, helping them plan and control the placement, speed, or direction of their vehicles.

The lack of delineation devices results in a poor **delineation system** over the subject section of the roadway, which is likely to fail to regulate, warn, and provide tracking information and guidance to drivers so that they can carry out their driving tasks safely and efficiently.

Poor road delineation can significantly impact traffic safety by reducing visibility and increasing the likelihood of accidents. Here's how:

- Driver confusion: faded or missing lane markings make it harder for drivers to stay in their lanes, especially at night or in bad weather.
- Late braking & sudden manoeuvres: unclear road boundaries can lead to last-minute braking or swerving, increasing collision risks.
- Reduced nighttime visibility: without clear reflective markings, drivers struggle to navigate safely in low-light conditions

3.6.3 Narrow roadway

The roadway is narrower than 6.0m and, at some locations, even narrower than 5.0m (refer to Chapter 3.1 of this report).

Narrow roadway poses significant safety risks for drivers, cyclists, and pedestrians for the following reasons:

- Higher incident risk: drivers may misjudge distances, leading to crashes, especially in areas with sharp turns or blind spots.

- Limited manoeuvrability: reduced space makes it harder for vehicles to pass safely, increasing the risk of sideswipe collisions. This was observed during the site inspection when both opposing vehicles had to drive beyond the respective edge of the roadway to pass each other safely and conveniently (refer to Photo 3.22).

Photo 3.21: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

3.6.4 Short forward visibility/sight distance and tight corners

Short forward visibility/sight distance and tight corners were observed along State Mine Gully Road, between the development site and northern end of the study section (refer to Photos 3.32 & 3.33).

Photo 3.22: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

Photo 3.23: State Mine Gully Road, looking northbound
(Photo: Traffic Engineering Centre Pty Ltd)

Short forward visibility/sight distance and tight corners pose significant safety risks for drivers, cyclists, and pedestrians for the following reasons:

- Reduced Reaction Time: limited visibility means drivers have less time to react to obstacles, pedestrians, or sudden changes in traffic
- Increased Collision Risk: tight corners and poor sight distance can lead to sideswipe accidents, rear-end crashes, and misjudged turns.
- Higher Risk in Bad Weather: fog, rain, or darkness further compound the visibility issues, making roads even more treacherous.
- Unsafe Overtaking: With substandard sight distance, overtaking becomes risky, increasing the chance of head-on collisions

4. Proposed development and its potential impact on traffic and parking requirements

4.1 Traffic

4.1.1 Calculated estimate of the traffic generation

Section 3.8 of the RTA Guide to Traffic Generating Development (2002) indicates that the daily vehicle trips for recreational facilities is largely dependent on, site location, type of use, and seasonal variations.

It recommends analysis of proposed developments be based on survey data of similar developments.

By following that advice form TfNSW, Traffic Engineering Centre has considered the traffic generation and parking rates in Traffic Impact Assessment report (2019) for 'Warburton Mountain Bike Destination Project' (VIC).

According to that study, most cyclists are expected to be day trippers who drive to the site. A proportion may arrive from Sydney or Bathurst or other nearby cities or cycle from their place of accommodation if staying overnight in the region (e.g., interstate or overseas visitors).

According to that study and based on information provided by the local Council on users' likely travel habits, it was expected that there would typically be 2 - 4 cyclists per vehicle and an average occupancy rate of 2.8 cyclists per vehicle. This equates to a visitor parking generation rate of 0.35 vehicles per user.

Information has been sourced from the developer to determine the number of trips likely to be generated by this development.

Table 4.1 show the additional number of visitors per annum, respectively.

Table 3-9 Additional spend by visitors

	Proposed Reference project 25 km annual figures yr 1	Expenditure per trip TRA [15]	Total additional spend per annum
Domestic Day Trippers	7,000	$90	$630,000
Domestic overnight	32,000	$159 - 1 night	$5,088,000
International visitors	1,000	$67 - 2 nights	$134,000
TOTAL	40,000	-	$5,852,000

Table 4.1: Additional number of visitors per annum
(Source: PMO 360)

Domestic and **International day trippers**

The total projected annual number of domestic and international day trippers is 8,000.

If this number is divided by 365 days, it means that, on average, there will be **22** domestic and international day trippers.

If it is fairly assumed that this number would triple on weekends, it means that on any given day, the number of day-trippers is unlikely to exceed 66.

If reasonably assumed that 80% of day trippers will arrive with vehicle (while the remining 20% would cycle from their place of accommodation if staying overnight in the region) and the occupancy rate of 2.8 cyclists per vehicles, it means that no more of **19 vehicles per day** would be generated by the proposed development on any given day.

4.1.2 Traffic impact

The projected increase in traffic activity of on average 19 vehicles per day generated by domestic and international day trippers would have an insignificant impact on the traffic volumes, operation, and safety on State Mine Gully Road [currently with extremely low traffic volume] and the adjoining intersections and road network of Lithgow.

4.2 Parking demand and supply

The proposed parking demand would likely be equal to the number of vehicles generated by the development.

As a result, for most of the year, the parking demand would be around 20 long-term low-turnover parking spaces required on any given day.

Parking provision includes:

- 111 parking spaces are provided in the proposed car park (refer to Figure 4.1)

The proposed 111 car parking spaces in supply would meet and even exceed the parking demand generated by the development.

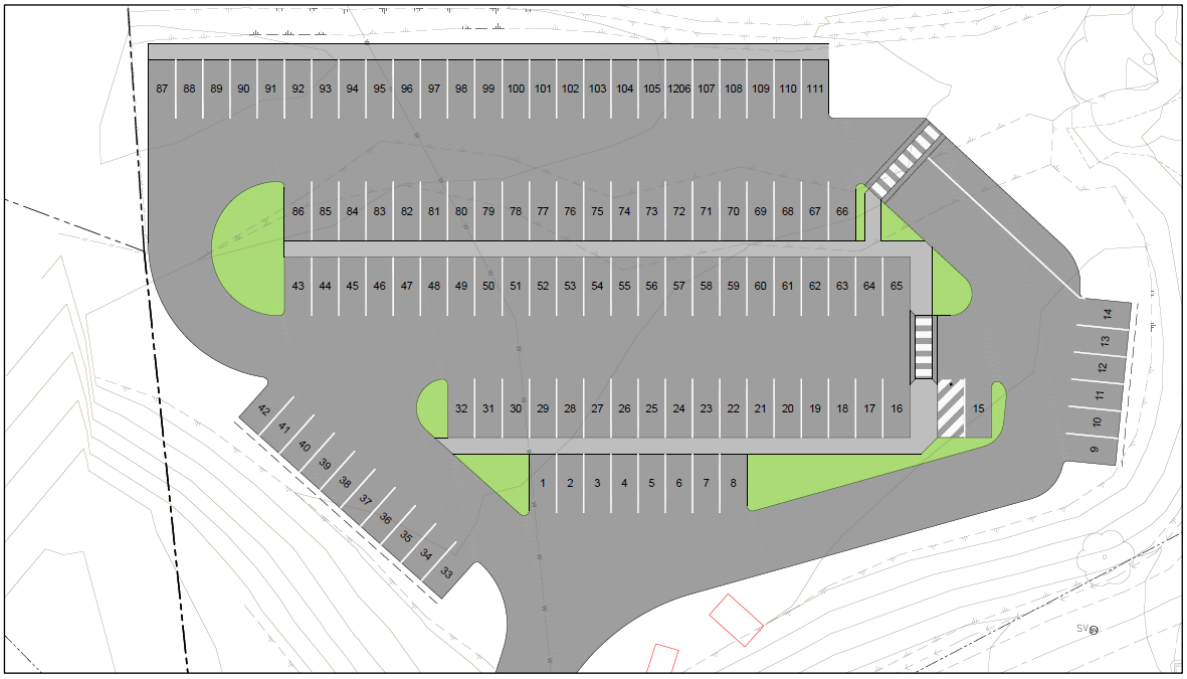


Figure 4.1: Proposed car park with 111 car parking spaces
(Source: PMO 360)

4.3 Impact on public transport

Shuttle buses are proposed to operate along the study section of State Mine Gully Road, with 3 (three) bus stops (refer to Figure 4.3).

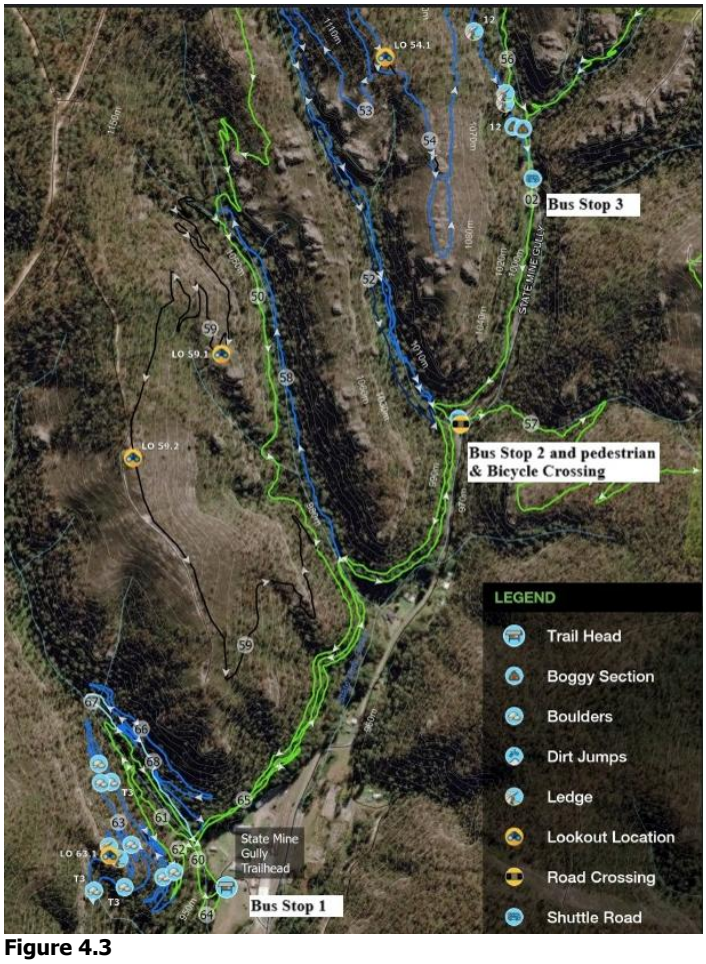


Figure 4.3
(Source: PMO 360)

The proposed locations for all three bus stops (refer to Figures 4.3 to 4.6) have been assessed to ensure adequate lateral clearance for shuttle bus accommodation without introducing operational or safety risks (refer to Photos 4.1 to 4.3 for spatial analysis and site validation). Each site provides sufficient roadside space to facilitate safe passenger boarding and alighting, minimising potential conflicts with vehicular traffic. The 'Bus Stop 1' will be located off State Mine Gully Road, with the turnaround route utilising the museum's internal access road. The proposed development will not have any adverse impact on public transport.

Figure 4.4: Proposed location of 'Bus Stop 1'
(Source: PMO 360)

Photo 4.1: State Mine Gully Road, at the proposed location of the 'Bus Stop 1' – ample adequate lateral clearance for shuttle bus accommodation without introducing operational or safety risks
(Photo: Traffic Engineering Centre Pty Ltd)

Figure 4.5: Proposed location of 'Bus Stop 2'
(Source: PMO 360)

Photo 4.2: State Mine Gully Road, at the proposed location of the 'Bus Stop 2' – ample adequate lateral clearance for shuttle bus accommodation without introducing operational or safety risks
(Photo: Traffic Engineering Centre Pty Ltd)

Figure 4.6: Proposed location of Bus Stop 3
(Source: PMO 360)

Photo 4.3: State Mine Gully Road, at the proposed location of the 'Bus Stop 3' – ample adequate lateral clearance for shuttle bus accommodation without introducing operational or safety risks
(Photo: Traffic Engineering Centre Pty Ltd)

4.4 Pedestrian and Bicycle crossing over the road

Pedestrian and Bicycle crossing over the road is proposed at the location marked in Figure 4.7 and shown in Photo 4.4.

Figure 4.7: Proposed location of pedestrian & bicycle crossing
(Source: PMO 360)

Photo 4.2: State Mine Gully Road, at the proposed location of pedestrian & bicycle crossing
(Photo: Traffic Engineering Centre Pty Ltd)

Managing safety at mountain bike track crossings on public roads is crucial to prevent accidents and ensure smooth interaction between cyclists and motorists. The crossing will be designed in accordance with AusCycling recommendations and relative standards.

Here are some key strategies:

- Clear Signage & Warnings: install visible signs for both cyclists and drivers, indicating upcoming crossings and potential hazards

- Dedicated Crossing Points: designate specific crossing areas with road markings, signals, or even bike-friendly traffic lights
- Speed Control Measures: Implement speed bumps, reduced speed zones, or warning lights to alert drivers approaching the crossing
- Good Sight Lines: ensure clear visibility for both cyclists and motorists by removing obstructions like vegetation or poorly placed structures
- Education & Awareness: promote safe crossing practices among cyclists and educate drivers on yielding to bike traffic

Proper planning and infrastructure can significantly reduce risks at these intersections.

4.5 Impact on cyclists

The development would not have a negligible impact on cycling and cyclists.

4.6 Impact on pedestrian safety

The development would not have a negligible impact on pedestrian safety and amenity.

4.7 Impact on traffic safety

The anticipated increase in vehicle trips relative to the existing conditions may elevate the risk of incidents if roadway infrastructure and delineation remain unchanged.

The study identified the following main traffic safety issues:

- Poor condition of the road surface
- A lack of proper delineation
- A narrow roadway
- A short forward visibility/sight distance and tight corners

Mitigating **short forward visibility, limited sight distance, and tight corners** will include a combination of engineering solutions and traffic management strategies to enhance safety and operational efficiency.

Key measures include:

- Sight Distance Improvements: remove obstructions such as vegetation to improve visibility along curves
- Advance Warning Systems: install signage, or road markings to alert drivers of upcoming visibility restrictions

- Speed Management: implementing reduced speed limits, advisory speed signs, or speed-calming measures to minimise risks in areas with limited visibility. Due to the condition on State Mine Gully Road, reducing the speed limit to 40km/h is recommended. The 40km/h shared zone will be a designated road area where vehicles, cyclists, and sometimes pedestrians coexist, with a reduced speed limit to enhance safety. It will include traffic calming measures like raised thresholds on each end of the section of State Mine Gully Road between Atkinson Street and the development site. Legal Framework: In Australia, shared zones are governed by Rule 24 of the Road Safety Road Rules (RSRR), which mandates integrated road engineering with the surrounding environment

- Enhanced Road Delineation: by using high-contrast lane markings, retroreflective pavement markers, and guideposts to improve driver awareness

- Intersection & Curve Treatments: applying Chevron Alignment Markers (CAMs) to assist drivers in navigating tight corners safely.

Safety concerns warrant lower speeds due to limited visibility, narrow roads, or mixed traffic types.

Addressing **poor road delineation** requires a systematic approach to enhance visibility, improve lane discipline, and reduce accident risks.

Key longer-term strategies include:

- High-Contrast Line Markings – Use durable, retroreflective materials for [at least] centrelines, and lane markings to ensure visibility in all conditions.

- Guideposts & Chevron Alignment Markers (CAMs): position reflective guideposts and chevrons at curves and intersections to aid navigation.

- Advanced Warning Signs & Advisory Speed Limits: deploy signage to inform drivers of upcoming hazards, sharp bends, or reduced visibility zones.

Addressing **narrow roadways** requires a combination of infrastructure improvements, traffic management strategies, and safety measures to mitigate risks. However, this will not impede the construction of the proposed development, provided the short-term mitigation listed in Section 4.7 is implemented.

Here are some key approaches:

- Lane Markings & Delineation: clear lane markings, edge lines, and reflective signage help guide drivers and enhance visibility, especially in low-light conditions

- Speed Management: Implementing lower speed limits, speed bumps, or traffic calming measures can reduce the likelihood of accidents. Due to the condition on State Mine Gully Road, reducing the speed limit to 40km/h is recommended.

With the implementation of the above mitigation measures, **the impact of the development on overall traffic safety** is expected to be **negligible**.

4.8 Impact on residential amenity

The proposed development would not impact the residents' amenities near the development site.

This is due to:

- insignificant increase in traffic generated by the proposed development
- ample road capacity and intersection capacity available at these times
- not creating additional parking demand in any of the local, but quite away, residential streets
- no impact on the vehicular access to the residential properties
- no impact on the pedestrian access to any of the residential properties

5. Conclusions

This assessment has concluded that the proposed Lithgow Mountain Bike Transformation Project ('State Mine Gully Mountain Bike Park') in Lithgow, NSW, will not adversely impact the adjacent road network, provided that the recommended mitigation measures are effectively implemented.

The proposed development would not have unacceptable traffic implications for the adjacent road network in terms of road capacity or traffic safety.

The development would not have an unacceptable impact on public transport, pedestrian or cyclist amenities, or safety.

Required mitigation measures:

The study identified the following main traffic safety issues:

- poor condition of the road surface
- lack of proper delineation
- narrow roadway
- short forward visibility/sight distance and tight corners

Mitigating **short forward visibility, limited sight distance, and tight corners** will include a combination of engineering solutions and traffic management strategies to enhance safety and operational efficiency.

Key measures include:

- Sight Distance Improvements: remove obstructions such as vegetation to improve visibility along curves
- Advance Warning Systems: install signage, or road markings to alert drivers of upcoming visibility restrictions
- Speed Management: implementing reduced speed limits, advisory speed signs, or speed-calming measures to minimise risks in areas with limited visibility
- Enhanced Road Delineation: by using high-contrast lane markings, retroreflective pavement markers, and guideposts to improve driver awareness
- Intersection & Curve Treatments: applying Chevron Alignment Markers (CAMs) to assist drivers in navigating tight corners safely.

Addressing **poor road delineation** requires a systematic approach to enhance visibility, improve lane discipline, and reduce accident risks.

Key strategies include:

- High-Contrast Line Markings – Use durable, retroreflective materials for [at least] centrelines, and lane markings to ensure visibility in all conditions.
- Retroreflective Pavement Markers (RRPMs): install raised or embedded markers to improve nighttime and wet-weather visibility.
- Guideposts & Chevron Alignment Markers (CAMs): position reflective guide posts and chevrons at curves and intersections to aid navigation.
- Advanced Warning Signs & Advisory Speed Limits: deploy signage to inform drivers of upcoming hazards, sharp bends, or reduced visibility zones.

Addressing **narrow roadways** requires a combination of infrastructure improvements, traffic management strategies, and safety measures to mitigate risks.

Here are some key approaches:

- Lane Markings & Delineation: clear lane markings, edge lines, and reflective signage help guide drivers and enhance visibility, especially in low-light conditions
- Speed Management: Implement lower speed limits, speed bumps, or traffic calming measures can reduce the likelihood of accidents.

With the implementation of the above mitigation measures, **the impact of the development on overall traffic safety** is expected to be **negligible**.