

MIENGINEERS

TRAFFIC IMPACT ASSESSMENT

Lot 1 DP 881927, 2926 Illawarra Highway, Tongarra, NSW

GREENVALLEYS MOUNTAIN BIKE PARK

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1. Introduction

The existing Green Valleys Mountain Bike Park has been operating on a temporary development application basis for approximately 10 years, requiring annual permission from Shellharbour City Council to continue operating. This Traffic Impact Assessment has been prepared in support of a Planning Proposal that seeks to allow for:

- The ongoing operation of the bike park under Clause 2.5 of the Shellharbour LEP 2013 and
- The operation of the bike park without conflict with the road widening order that affects this site.

This Traffic Impact Assessment reviews the following items:

- Traffic generation and impacts on the local road network
- Car parking arrangements
- Waste Collection
- Service Vehicle Access

1.1. Site & Locality

The subject site is Lot 1 DP 881927 at 2926 Illawarra Highway, Tongarra. Lot 1 has a total area of 119.1 ha with 43 ha used for mountain bike riding activities. The site is located on the Southern side of the Illawarra Highway. The primary function of the development is recreational and competitive mountain bike riding, and it is the home of the 'Greenvalleys Mountain Bike Club'.

The bike park is located on undulating land which contains both native forest and cleared farmland. The current entrance to the Park is situated adjacent the western boundary of the property. Vehicles can turn either left or right from the 'Illawarra Highway' into the entrance of the Park. Refer Figure 1.1-1 below. The surrounding area is a mix of rural residential and agriculture properties.

The existing Illawarra Highway is a two-way, bitumen sealed roadway 8m wide, with gravel shoulders, table drains and a grass verge. To the west of the site is the base of Macquarie Pass and to the east is Tullimbar and Calderwood residential areas

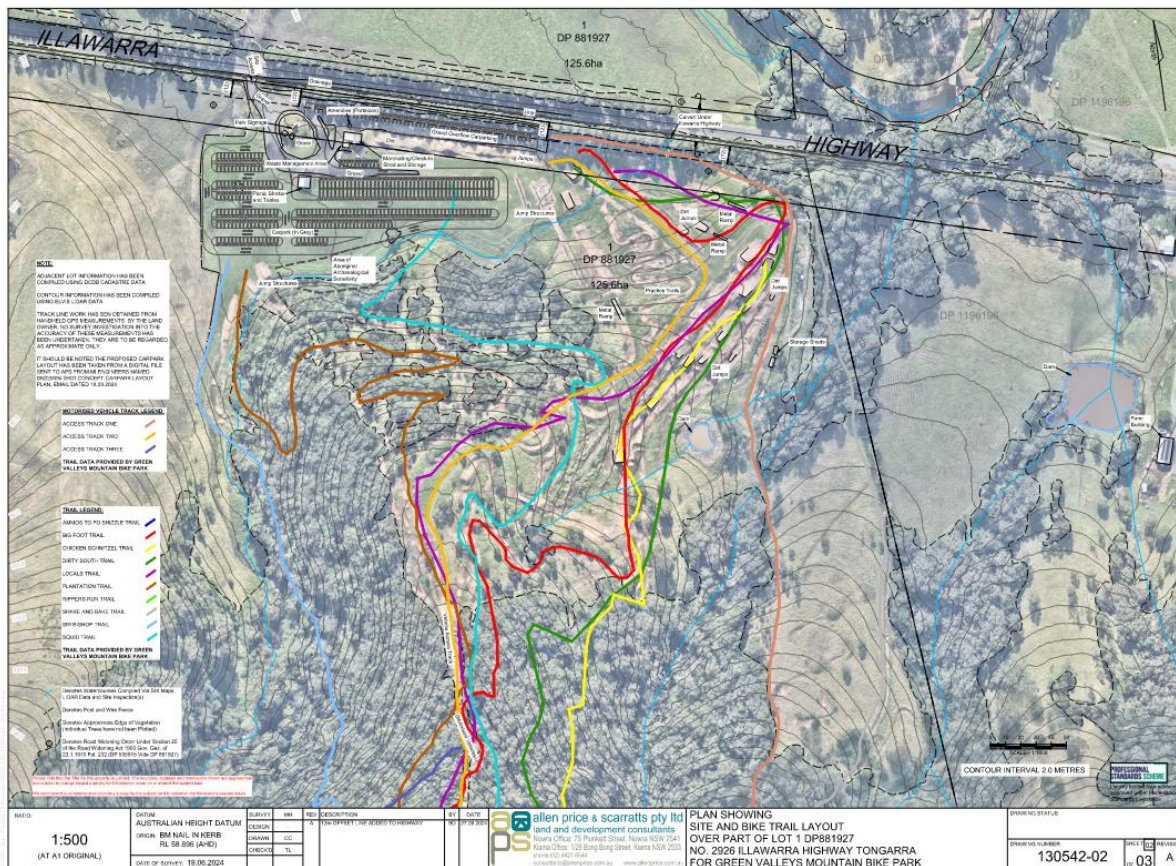


Figure 1.1-1 – Locality Plan

2. SEPP Transport and Infrastructure 2021

In accordance with SEPP Transport and Infrastructure 2021 and the TfNSW Guide to Traffic Generating Developments 2002 (GTGD), the existing mountain bike park (for which the Planning Proposal seeks more permanent operation) is deemed to be a “recreational facility”. The GTGD has been used to assess the impact of the Planning Proposal on the road network.

2.1. Traffic Generation

To assess the impact of the Planning Proposal on the adjacent road network, the traffic generation levels and this relationship with the existing traffic volumes on the roadways needs to be determined.

It is proposed that the facility will be open for up to 52 days per year. On 40 of these days, it will be deemed as “standard operation” which is limited to 100 people (i.e. 70 registered riders and 30 spectators).

On the 12 other “competition days” it is expected to have in the order of 400 people on-site (i.e. 200 athletes, plus family/friends/spectators). It is proposed that the vehicle numbers will be capped at 287 vpd.

On the 40 standard operation days, the traffic increase on Illawarra Highway is considered negligible (i.e. a potential increase of approximately 15 vehicles per hour over a 3-4-hour period).

On the competition days (which will be weekends), vehicles primarily arrive between 7am and 11am, thereby, generating in the order of 75 vehicles per hour (i.e. 1.3 vehicles per minute) over a 4-hour period. Outside of these peak traffic hours, vehicles arrive sporadically and there is minimal impact on the Illawarra Hwy. Anecdotally a significant majority of the vehicles enter from the east via a left turn off the Illawarra Highway and exit via a right turn from the site, at the end of the competition i.e. between 2pm and 5pm.

The traffic is proposed to be managed via a TfNSW and Shellharbour Council approved Traffic Management Plan(TMP) and Road Occupancy Licence (ROL) as required. The TMP will include Variable Message Signage (VMS), trained traffic controllers and signage within the site to coordinate and direct vehicles to the allocated car parking area. This methodology has been successfully implemented in previous years under the existing Temporary DA Approval. See Figure 2.1-1 below.

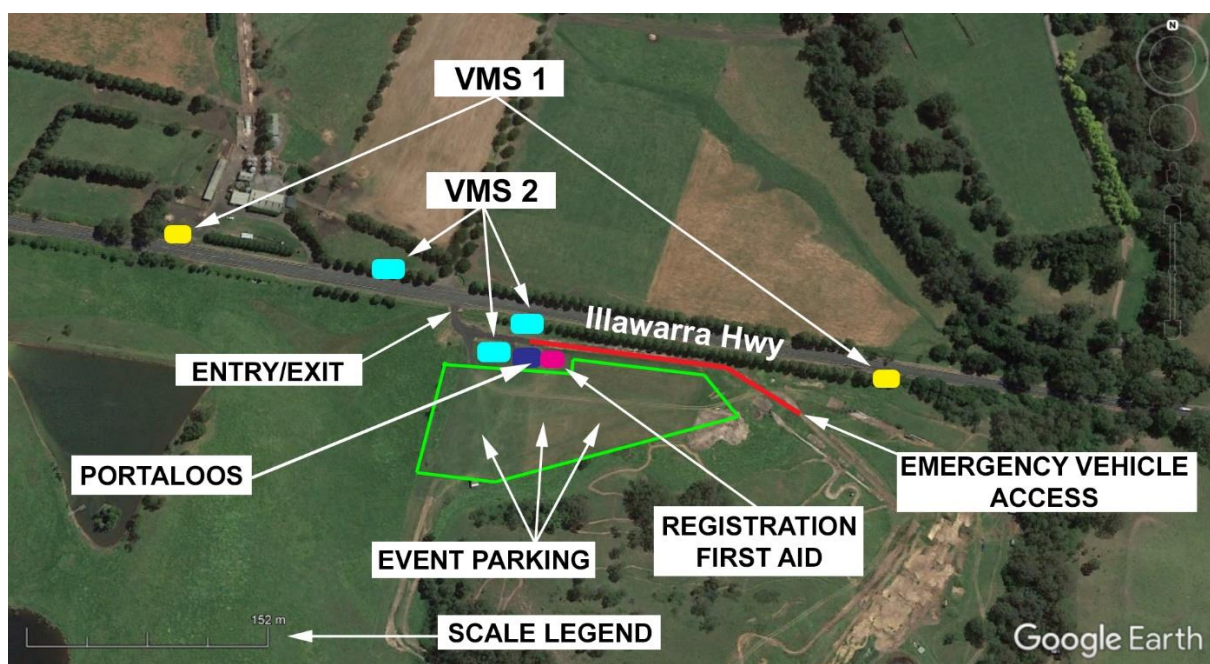


Figure 2.1-1 - Indicative Traffic Management Plan

2.1.1. Existing Illawarra Highway Traffic Summary

The Illawarra Highway traffic volumes utilised have been supplied by Transport for NSW. Station number 07094 situated approximately 1.5km Westbound along the Illawarra Highway intersection provides information up to 2020 which indicates the AADT to be:

- Eastbound = 2073 &
- Westbound = 1615

The traffic volume data was then amended to reflect the current year 2024-2025. This involved applying a 1% per annum growth rate for a period of 5 years. The result is a Cumulative Growth Factor CGF = 5.1. The updated 2025 AADT indicates:

- Eastbound = 2179 &

- Westbound = 1697

More detailed information determined using the 2020 traffic data with a CGF = 5.1 indicates that on the weekends the following volumes are experienced.

Morning: Peak AM (7am – 11am)

- Eastbound = 88 vph
- Westbound = 100 vph
- Total = 252 vph

Afternoon: Peak PM (2pm – 5pm)

- Eastbound = 267 vph
- Westbound = 129 vph
- Total = 396 vph

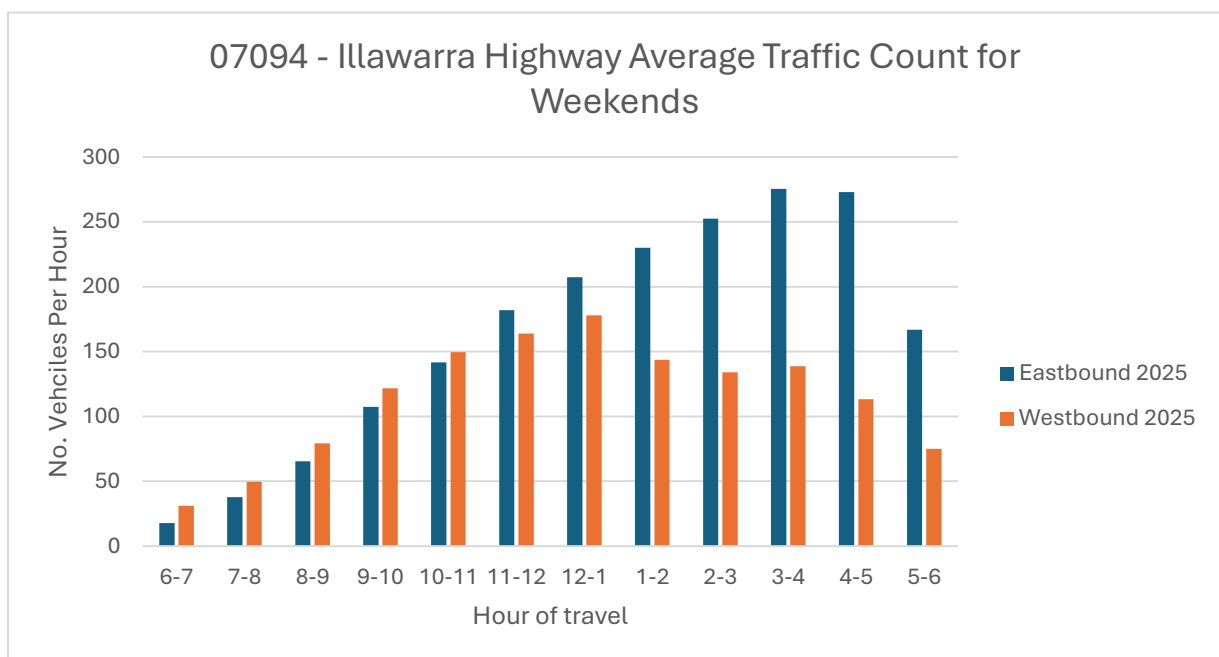


Figure 2.1-2 - Illawarra Highway Average Traffic Count for Weekends

2.1.2. Traffic Generation Summary

The approximate traffic generated by the Planning Proposal can be summarised as follows.

- 12 days x 300 vehicles = 3,600 Vehicles/year
- 40 days x 70 vehicles = 2,800 Vehicles/year
- Sum of vehicles = 5,200 Vehicles/year
- Allow for 2 trips per vehicle (i.e. enter and exit).
- Therefore, total impact of traffic on the Highway is on the order of 10,400 vehicle trips or an AADT of 28.

This represents approximately 1.37% of the total traffic using the Highway and is therefore considered to have minimal impact.

However, considering the traffic associated with the Planning Proposal, is generally clustered in the AM and PM peak periods, the impact on the current traffic flow is during the peak mornings and afternoons and can be summarised as follows.

Weekend AM peak VPH

- Highway Traffic = 149
- Development Traffic = 75

Weekend PM peak VPH

- Highway Traffic = 275
- Development Traffic = 75

This indicates that the traffic associated with the planning proposal will increase the flow volumes during these peak hours. However, the existing Highway traffic volumes are relatively low and the overall peak Highway movements equates to approximately 6.5 vehicles per minute.

Therefore, due to the relatively small scale of the Planning Proposal and the relatively low overall traffic volumes, it is considered that the Illawarra Highway has the capacity for the increased traffic volume generated from the competition day events.

3. Intersection Warrant

The Planning Proposal requires an assessment of the intersection performance to ensure that the traffic generated, during event days, can be managed safely and efficiently. While traffic impacts are minimal for most of the year, the 12 competition days create notably higher volumes.

The analysis, conducted in accordance with the Austroads Guide to Traffic Management Part 6, has identified solutions that effectively balance the park's traffic demands with the existing road network's capacity. The findings recommend targeted treatments to ensure safety and efficiency during peak periods, while avoiding excessive road upgrades that are not justified given the limited occurrence of increased traffic volumes.

3.1. Existing Intersection Assessment

The posted speed limit on the major approach road, the Illawarra Highway, is 90 km/h. However, a design speed of 100 km/h has been adopted in accordance with the TfNSW response (STH24/00150/001).

The Safe Intersection Sight Distance (SISD) has been determined to be 250m in accordance with AGRD Part 4A. The SISD at the existing driveway access has been determined to be >300m to the West and >450m to the East. The SISD requirements are satisfied in both directions of the existing intersection refer to Figure 3.1-1 & Figure 3.1-2



Figure 3.1-1 - Existing Driveway On Left (Looking West)



Figure 3.1-2 - Existing Driveway on Right (Looking East)

3.2. Major Road to Minor Road - Intersection Treatment

In accordance with Austroads Guide to Traffic Management Part 6 the method adopted to determine the required intersection treatment is as follows:

1. Determine the minor road turn volumes.
2. Determine the major road traffic volume data.
3. Utilise Figure 3.2-2 AGTM P6 to graphically determine the required treatment.

3.2.1. Minor Road Turn Volumes

The peak minor road turn volumes have been established to be approximately 75 vehicles per hour (VPH).

For Arriving Traffic:

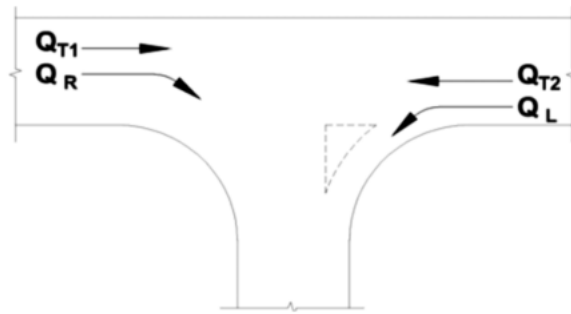
- The peak period for eastbound & westbound traffic is between (10-11am).
- It is anticipated that in the order of 65% of the traffic will attend in a Westbound direction and that 35% will attend in an Eastbound direction.

For Exiting Traffic:

- The peak period for eastbound & westbound traffic is between (3-4pm).
- It is anticipated that 65% of the traffic will exit in a Eastbound direction and 35% exit in a Westbound direction.

3.2.2. Illawarra Highway (Major Road) Traffic Volumes

Figure 3.2-1 below has been adopted for naming conventions and the numerical methodology. The Illawarra Highway, at the Bike Park entrance, has a total of two lanes, one in each direction.



Road type	Turn type	Splitter island	Q_M (veh/h)
Two-lane two-way	Right	No	$= Q_{T1} + Q_{T2} + Q_L$
		Yes	$= Q_{T1} + Q_{T2}$
	Left	Yes or no	$= Q_{T2}$
Four-lane two-way	Right	No	$= 50\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 50\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 50\% \times Q_{T2}$
Six-lane two-way	Right	No	$= 33\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 33\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 33\% \times Q_{T2}$

Figure 3.2-1 - Calculation of the Major Road Traffic Volume (TMR, 2016a)

Traffic volumes - right turn off the Highway

$$Q_M = Q_{T1} + Q_{T2} + Q_L = 142 + 149 + (75 \times 0.35) = 317 \text{ VPH}$$

Traffic volumes -left turn off the Highway:

$$Q_M = Q_{T2} = 149 \text{ VPH}$$

3.2.3. Required Intersection Treatment.**Right turn off the Highway:**

$$Q_M = 317 \text{ VPH}$$

Therefore, the minimum requirement is a Channelised Right Short (CHR(s), designed in accordance with Figure 3.2-4.

Left turn off the Highway:

$$Q_M = 149 \text{ VPH} \text{ \& } Q_L = 49 \text{ VPH}$$

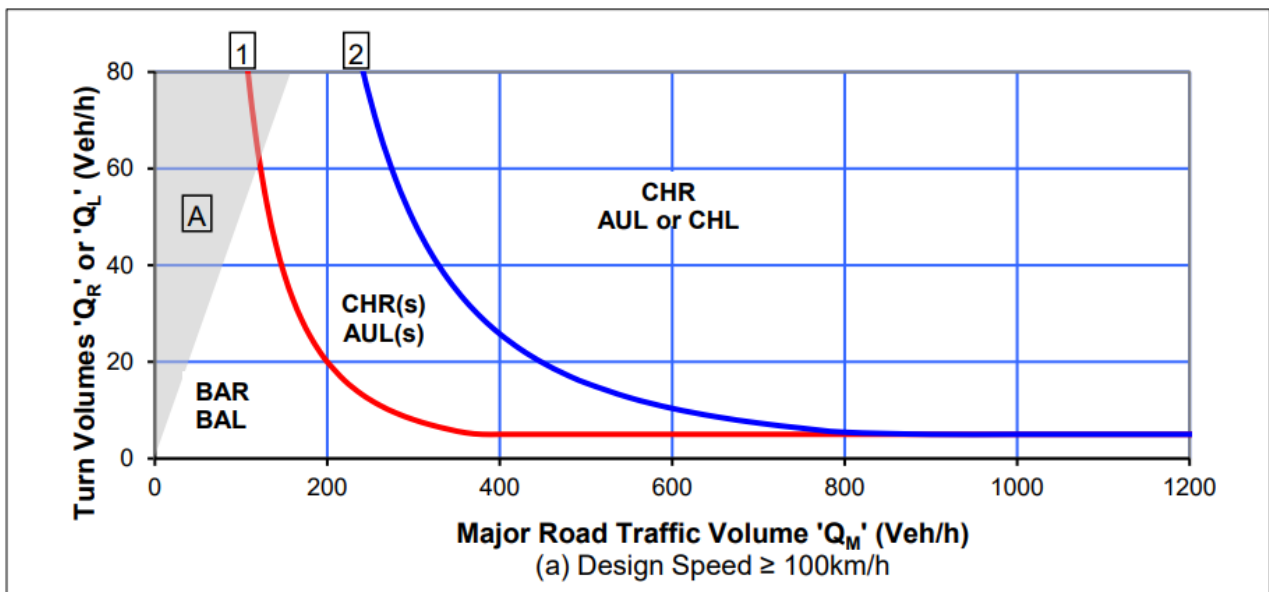


Figure 3.2-2 - Warrants for Turn Treatments on Major Roads at Unsignalised Intersections (AGTM Part 6)

Figure 8.2: Rural basic left-turn treatment (BAL)

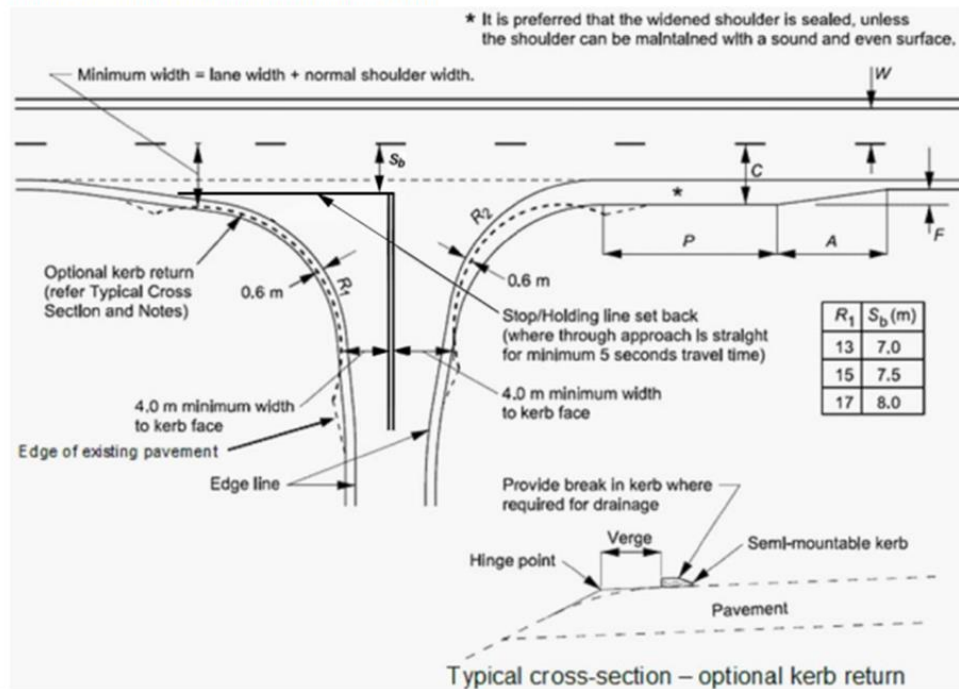


Figure 3.2-3 - Rural BAL Treatment (AGRD Part 4A)

Figure 7.2: Channelised right-turn treatment with a short turn slot [CHR(S)] two-lane rural road

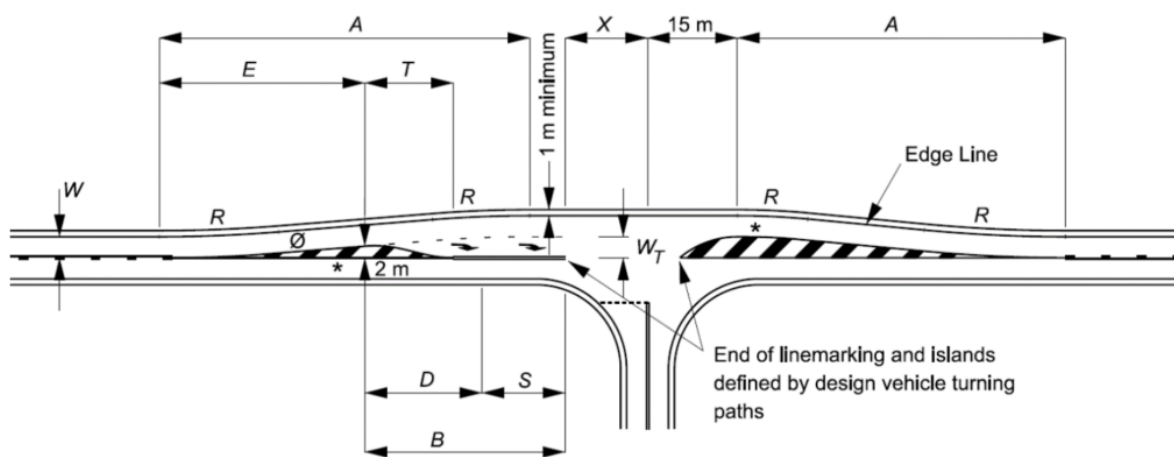


Figure 3.2-4 - Rural CHR (S) for Two Lane Road

3.3. Minor Road to Major Road Intersection Treatment

Provision for traffic exiting the Bike Park must also be considered. For vehicles leaving the park the peak period for traffic on the Illawarra highway is between 3-4pm.

Between 3-4pm the traffic count on the Highway indicates:

- 276 VPH in the Eastbound direction
- 139 VPH in the Westbound direction

Traffic counts expected to exit the existing mountain bike park:

- 49 VPH in the Eastbound direction
- 26 VPH in the Westbound direction

a) Left turn onto the Highway

Traffic exiting the facility Westbound must merge into a single lane on the Illawarra Highway. Section 3.1 indicated that the SISD is adequate for the site. The critical acceptance gap theory was used to determine if it is viable for vehicles to turn left without an acceleration lane.

During the afternoon, the peak number of vehicles exiting the facility Westbound on the Illawarra Highway is 139 VPH, which equates to a peak of 1 vehicle every 26 seconds. Table 3.5 of AGRD Part 6 specifies that the minimum critical acceptance gap for a left-hand turn such that it does not interfere with traffic flow, is 14 seconds. Findings indicate that no treatment is required.

b) Right Turn onto the Highway

Traffic exiting the facility Eastbound, must cross a single lane of traffic before joining Eastbound vehicles. The critical acceptance gap theory was used to determine if it is viable for vehicles to turn right without an acceleration lane.

Based on the available traffic data and the anticipated traffic generated by the Planning Proposal, it was determined that during the afternoon, the peak number of vehicles exiting the facility Eastbound on the Illawarra Highway is 276, which equates to a peak of 1 vehicle every 13 seconds. Table 3.5 of AGRD

Movement	Diagram	Description	$t_a^{(1)}$ (sec)	$t_l^{(2)}$ (sec)
Left turn		Not interfering with A Requiring A to slow	14 - 5	2-3 2-3
Right turn from minor road		Not interfering with A One way Two lane/two way Four lane/two way Six lane/two way	14 - 3 5 8 8	3 3 3 5 5
Merge		Acceleration lane	3	2

Figure 3.3-1 - Critical Acceptance Gaps (AGRD Part 4A)

Part 6 specifies that the minimum critical acceptance gap for a left-hand turn is 14 seconds to not interfere with traffic flow refer Figure 3.3-1. Based on the findings above, the inclusion of an acceleration lane should be considered.

However, the potential for the gap to be less than 14 seconds, only occurs on the specific days and times as outlined above. It could be considered that the inclusion of an acceleration lane, would not be warranted providing an appropriate Traffic management Plan was implemented.

A review of the site indicates that inclusion of a CHR(s) intersection, with an acceleration lane would require major road & stormwater drainage construction works, including the removal of numerous trees and reconstruction of a private property driveway on the Northern side of the roadway.

To more accurately assess the need for intersection treatments, it may be necessary to obtain further field data, especially during a competition day event. This data will provide a clearer understanding of actual peak traffic conditions and ensure that any proposed treatments are appropriately justified.

4. Lakeview Road

4.1. Site & Location

Lakeview Road is situated approximately 1km East of the primary access into the Bike Park. It adjoins the eastern boundary of the Bike Park site and provides access to properties South of the Illawarra Highway.

4.2. Traffic Generation

This road is utilised by the Bike Park to allow for event rider transportation and emergency service vehicle access. On standard operation days a 12 seat van, with trailer for 12 bikes, is used to transport riders, to and from the Lakeview Rd entrance every 20 minutes. On competition days, 4 x 20-seat buses are utilised in lieu of the 12 seat van.

These traffic movements involve vehicles exiting the Bike Park, then travelling East along the Highway to Lakeview Road, turning right (south) into Lakeview Road and travelling further South to a dedicated vehicle turning/set down area.

Once unloaded, the buses or van, return to the Bike Park via Lakeview Road and The Illawarra Highway.

These vehicle movements occur every 20 minutes between 9am and 4pm on both standard operation and competition days. This equates to around 40 travel movements on standard days and 80 movements on competition days.

4.3. Intersection Warrant

It is fundamental to the safety of intersections that drivers can recognise the presence of an intersection in time to slow down or stop in a controlled and comfortable manner. Intersection safety performance is largely dependent upon adequate sight distance.

The vehicle movement which requires primary sight distance assessment is the right turn from the Highway into Lakeview Road as it must cross a lane of oncoming traffic. The available Safe Intersection Sight Distance (SISD) for this movement is approximately 70m, however, the required minimum SISD for a design speed of 100kmh is approximately 250m (NB. from AGRD Part 4A). See figure below.



Figure 4.3.1 Illawarra Highway at Lakeview Rd intersection (Looking East)

Due to the existing horizontal road alignments, the improvement of sight distance to achieve the numbers determined by Austroads, would likely require significant engineering, significant construction costs and land acquisition. Therefore, in lieu of the major road works, the management of traffic at the Lakeview Road/Illawarra Highway intersection during the competition and standard operation days, would require the implementation and TfNSW approval of a TMP which supported the TMP for the main entrance to the Bike Park.

5. Carparking

The car parking layout is shown in Figure 3.3-1 below, which also incorporates a concept layout plan for a CHR intersection. A substantial area is available for car-parking and as shown in the Figure below, there is sufficient space available for the proposed maximum of 287 vehicles. The carparking layout has considered and achieved compliance to AS2890.1.2004 Off-Street Car Parking. Car parking spaces are primarily 2.6m wide x 5.5m long and gradients do not exceed 5%.

Additional “over-flow” car parking is provided within an area adjacent to the Highway (as shown on the Figure below).

5.1. Road Widening Order

Under the provisions of the Shellharbour Local Environmental Plan 2013, part of the site where the mountain bike park is located is currently zoned SP2 Infrastructure (Classified Road) and has an associated Road Widening Order (RWO) under Section 25 of The Roads Act, 1993. – see Figure 1.1.1.

Transport for New South Wales (TfNSW) have advised (via consultation undertaken by Council during the scoping stage of the Planning Proposal) that the RWO must be free from permanent infrastructure with the exception of overflow car parking. The current layout of the mountain bike park is not consistent with this requirement as there are various permanent structures located within the land affected by the RWO.

The TIA acknowledges that one of the objectives of the PP is:

- *To amend the Shellharbour LEP 2013 in order to remove conflict between the existing use of the site (part of the site only) as a mountain bike park and the SP2 Infrastructure zone (and the underlying RWO) that affects the bike park.*

The above objective is proposed to be achieved via the following provision:

- *Amend the Shellharbour LEP 2013 Land Zoning Map by rezoning part of the land occupied by the mountain bike park from SP2 Infrastructure to RU1 Primary Production, which is consistent with adjacent land to the south.*
- The proposed rezoning requires that the width of the underlying RWO is reduced. It is understood that TfNSW support reduction of the RWO and are currently in the process of amending the RWO extents.
- Further details regarding this matter are provided in the main Planning Proposal document prepared by Cowman Stoddart.

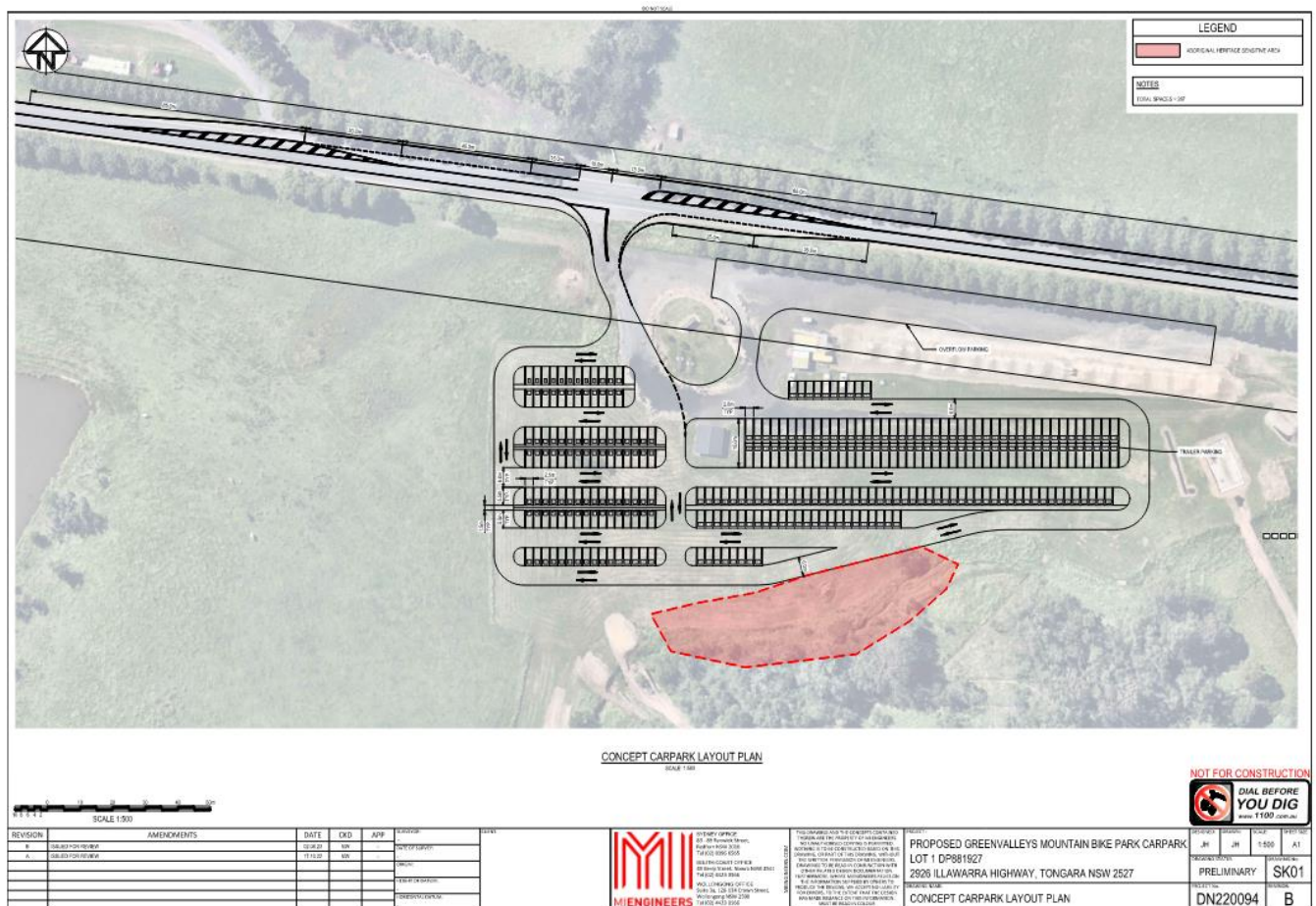


Figure 5.1-1 - Car Parking Layout and conceptual CHR Intersection Layout

6. Waste Collection

It is proposed to use a single 4m³ bin for general waste and 660 litre general waste/co-mingled bins provided and collected by Remondis. Based on feedback from Remondis, a domestic side lift truck could be used for the collection of waste materials, with the frequency of collection varying based on utilisation, however, collection is historically undertaken monthly. Collection of the waste bins will occur wholly within the property. Porta-loos are provided for the users of the site and are serviced regularly by South Coast Liquid Treatment.

7. Service Vehicle Access

The Greenvalleys Mountain Bike Park has suitable access & manoeuvrability for service vehicles, including waste collection trucks and emergency vehicles. Facilities will be provided in accordance with AS2890.2 – Off-street Commercial Vehicle Facilities. A designated service area within the site provides ample space for vehicles to load and unload without interfering with the park's normal operations.

Emergency vehicle access, including ambulance services, is also able to be accommodated, with clear routes and access points throughout the site. This ensures that emergency vehicles can reach all areas quickly and safely, in line with NSW Ambulance Service Guidelines.

8. Conclusion

The existing Green Valleys Mountain Bike Park has been operating on a temporary development application basis for approximately 10 years, requiring annual permission from Shellharbour City Council to continue operating. This Traffic Impact Assessment has been prepared in support of a Planning Proposal that seeks to allow for:

- The ongoing operation of the bike park under Clause 2.5 of the Shellharbour LEP 2013
- The operation of the bike park without conflict with the road widening order that affects the site.

This Traffic Impact Assessment reviews the following items:

- Traffic generation and impacts on the local road network
- Car parking arrangements
- Waste Collection
- Service Vehicle Access

Traffic generation and access impacts have been assessed using Austroads Guide to Traffic Management Part 6. The outcome from the assessment indicates that, in order to safely enter and exit the site, some road access improvements may be required:

- **Illawarra Highway to Bike Park entrance:** Based on the above assessment, a Channelised Right Turn **CHR(s)** and a Basic Auxiliary Left **BAL** treatment are required to accommodate right and left-turn movements from the Illawarra Highway into the site, to ensure minimal disruption to highway traffic and safe vehicle access during event days.
- **Bike Park Entrance to Illawarra Highway:** No additional treatments are required for westbound traffic exiting the site as the available acceptance gaps are sufficient for safe merging. However, for eastbound traffic, the critical acceptance gap (13 sec) is less than the recommended threshold (14 sec) and therefore, technically, a CHR(s) intersection is required.

Although the traffic volumes and short acceptance gap, indicate a major intersection upgrade is technically required, the infrequency and short time frames of the peak event periods should also be considered. It may be more appropriately addressed by further development of the temporary traffic management plan (TMP) along with BAL/BAR treatments.

In order to determine more accurate vehicle numbers and direction of travel, it may be considered necessary to undertake a live traffic study during a major event.

Lakeview Road

The use of Lakeview Road for transportation of competitors and emergency vehicle access, generates in the order of 80 daily traffic movements for competition days and 40 for standard days, over a period of 7 hours.

The sight distance at the intersection is significantly less than that required by Austroads. Therefore, in lieu of undertaking major road works, the management of traffic at the Lakeview Road/Illawarra Highway intersection (during both standard and competition days), would require the implementation and TfNSW approval, of a TMP which also supported the required TMP for the main entrance to the Bike Park.

Car parking

The available car parking can accommodate 287 vehicles and a significant additional area for overflow parking, in accordance with AS2890.1. Car parking spaces are primarily 2.6m wide x 5.5m long and gradients do not exceed 5%.

Road Widening Order – Refer 5.0 above and the main Planning Proposal document prepared by Cowman Stoddart.

Waste Collection - Refer 6 above

Service Vehicle Access - Refer 7 above