

Tuckombil Quarry Rezoning

Traffic Impact Assessment



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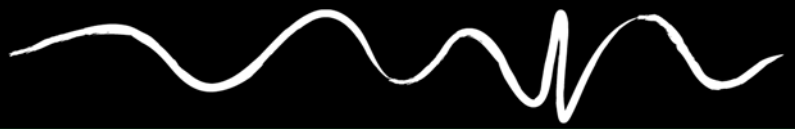
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1. Introduction

1.1 Background

GeoLINK has been engaged by Ballina Shire Council (Council) to prepare a Traffic Impact Assessment (TIA) to inform a rezoning planning proposal for the existing Tuckombil Quarry at Lot 22 DP 1243105, No. 540 Gap Road, Alstonville.

The proposal is to rezone the site to facilitate its use for a combination of high technology industrial uses, such as film studios, and community recreation. Details of the proposed future use are not fully developed. Council is currently in discussions with Byron Studios Pty Ltd regarding their proposal to undertake a staged development that would establish film production facilities at the site.

1.2 Site Description

The site is located at 540 Gap Rd, Alstonville, also known as Lot 22 DP 1243105.

The site is zoned DM (Deferred Matter) in the Ballina Local Environmental Plan (BLEP) 2012, therefore BLEP 1987 continues to apply. It is zoned *1(e) Rural (Extractive and Mineral Resources)* under the Ballina 1987 LEP.

The property has an area of 23 ha and was operated as a full-time hard rock quarry until 2016. All quarrying activities ceased at the site in mid-2020. Two tenants occupy the area surrounding the central quarry void. Bitupave Limited (Boral) occupies a leasehold lot in the south with frontage to Gap Road (Lot 21 DP 1243105) and Ron Southon Pty Ltd in the northwest (Lot 3 DP 1130300).

The site comprises a central quarry void, various structures including buildings, offices and sheds, hardstand areas, internal access roads and vegetation interspersed throughout.

The site is surrounded by large lot rural residential properties to the north, south and west, and the Gap Road Sports Field adjoining the property to the east. The village area of Alstonville is approximately 220 m to the west and 300 m to the south.

Currently, the only access to the site and the two subsidiary lots is via Gap Road, approximately 240 m east of the intersection with Teven Road. The most direct access to the site is via Teven Road, which connects to Ballina Road in Alstonville less than 200 m from the Bruxner Highway interchange. From here, traffic can easily get to Lismore, Casino etc. to the west, Ballina and the Ballina Byron Gateway Airport to the east, or onto the Pacific Highway at the West Ballina interchange allowing travel north or south. An alternative for northbound traffic is to continue on Teven Road north to Tintenbar Road, Tamarind Drive and onto the Pacific Highway at the Tintenbar interchange. This northern route is expected to be used for traffic between the site and Lennox Head (via Ross Lane), Byron Bay, and any destination further north on the Pacific Highway such as Tweed Heads, the Gold Coast and Brisbane. It may also be used to access the Ballina Byron Gateway Airport, as the travel time is the same (20 minutes) despite the travel distance being 3 km longer (20.3 km versus 17.3 km).



Figure 1.1 Site Locality [Source: WhereIs.com]

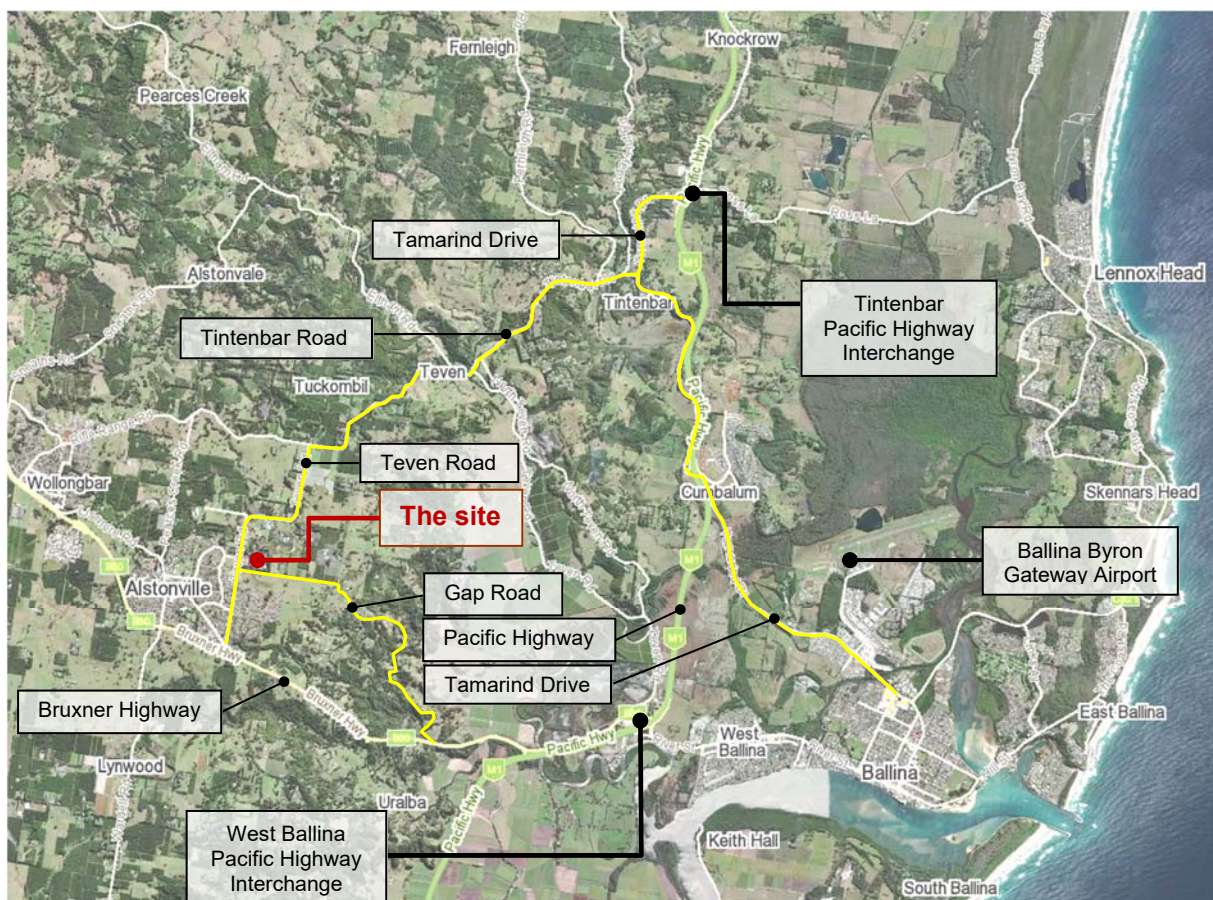


Figure 1.2 Site Context [Source: WhereIs.com]



Figure 1.3 The Site [Source: WhereIs.com]

2. Existing Conditions

2.1 Road Network

The primary impacts of the proposal will be experienced closest to the location of the land to be rezoned. As such, the assessment of existing conditions focuses on the road infrastructure in the vicinity of the site.

2.1.1 Gap Road

Gap road is a two-way two-lane rural road with a width of 7 m close to the site, narrowing to around 5 m in the southeast. It is 5.5 km in length, extending from Teven Road at the southwest corner of the site to the Bruxner Highway in Uralba, close to the Pacific Highway (refer to **Figure 1.2**).

Between the site entrance and Teven Road, Gap Road widens to 13 m to include two lanes on approach to the Teven Road intersection, separating left and right turning traffic. The western end of Gap Road includes a double barrier centreline and kerb and guttering on both sides of the road. There is a low point in the road immediately west of the access point into the site, including a large culvert with guard rail protection on both sides. This section of Gap Road is within a 60 km/h speed zone.

East of the site entrance, Gap Road narrows to 7 m and does not include kerbing or linemarking. The sign posted speed zone changes to 80 km/h about 130 m east of the site entrance.

Although the road is generally in good condition, it is unlikely that Gap Road would be used as a route from the site to the Pacific Highway, due to the many bends and travel time required to cover the short distance. Google Maps estimates the travel time from the site to the West Ballina Pacific Highway interchange is 12 minutes via Gap Road (9 km) compared to 8 minutes via Teven Road and the Bruxner Highway (9.3 km).



Figure 2.1 Gap Road at Approach to Teven Road Intersection, View to the West



Figure 2.2 Gap Road at Western End, View to the East Towards the Site Entrance



Figure 2.3 Gap Road at Existing Site Entrance, View to the East



Figure 2.4 Gap Road at Existing Site Entrance, View to the West

2.1.2 Teven Road

Teven Road is a 15 km long two-lane two-way rural road extending from Alstonville to West Ballina in a large horseshoe shape, passing through Tuckombil and Teven. The portion of Teven Road likely to be affected by the proposal is the western half of the road (7.5 km), from Alstonville via Tuckombil to the intersection of Teven Road and Tintenbar Road. The road pavement and verges within this section of Teven Road are in good condition.

South of Gap Road, Teven Road is constructed as an 11 m wide urban road, with upright kerb and gutter, centreline and edge linemarking. The speed zone is 60 km/h and there are numerous private property access driveways connecting to the road. The intersection with Panorama Drive includes an auxiliary left turn lane shared with a bus shelter and pull-over bay. Further south, there is a single lane roundabout at the intersection with Parkland Drive and Kawana Street.

North of Gap Road, Teven Road is predominantly un-kerbed and un-linemarked. This section includes several tight bends with radii between 100 and 200 m. It also includes a t-intersection with Tuckombil Road where Teven Road makes a right-angle turn to the east and Tuckombil Road continues to the west. The bends are generally well sign-posted and delineated with advance warning signs and chevron alignment markers.



Figure 2.5 Teven Road at Approach to Gap Road Intersection, View to the North



Figure 2.6 Teven Road at Approach to Gap Road Intersection, View to the South

2.1.3 Teven Road and Ballina Street Intersection

The western end of Teven Road commences at Ballina Road at the south-eastern end of Alstonville. The intersection of Ballina Road and Teven Road includes an oval-shaped roundabout retrofitted into the available space of the original t-intersection. All legs are single lane, with the exception of the entry to the roundabout from Teven Road, which includes two lanes: one for left and one for right turning traffic.



Figure 2.7 Teven / Ballina Road Intersection [Source: NearMap]



Figure 2.8 Teven / Gap Road Intersection [Source: NearMap]

2.1.4 Teven Road and Gap Road Intersection

The T-intersection of Teven Road and Gap Road includes advance warning signs on the major road (Teven Road) from both directions and a T-Intersection Ahead sign on Gap Road. Both the minor and major roads are approximately 13 m wide at the intersection. There are auxiliary left and right turn lanes from the major road onto Gap Road allowing for unimpeded through traffic to flow while turning vehicles slow to turn. Gap Road includes two lanes exiting onto Teven Road, one for left and one for right turning traffic. There is also a short, sheltered lane for vehicles turning left onto Teven Road prior to merging into the southbound lane.

The intersection is on a small crest with all three legs falling away. Sight distances from the intersection are in excess of 300 m in both directions.

There is no Give Way sign or holding line on Gap Road and no bi-directional hazard marker (sightboard) opposite Gap Road to delineate the end of the road to drivers in low light conditions.



Figure 2.9 Teven/Gap Road Intersection, View to the South



Figure 2.10 Teven/Gap Road Intersection, View to the North

2.1.5 Tintenbar Road

Teven Road is a 15 km long two-lane two-way rural road extending from Alstonville to West Ballina in a large horseshoe shape, passing through Tuckombil and Teven. The portion of Teven Road likely to be affected by the proposal is the western half of the road, between Alstonville, through Tuckombil to the intersection of Teven Road and Tintenbar Road. However, given the existing volumes on this road and the low volumes of traffic expected to be generated by the development, it is unlikely that any impacts will be experienced on Tintenbar Road or beyond.

2.2 Traffic Flows

Current traffic data was unavailable at the time of preparing this report. However, the following estimates have been made, based on observations and TIAs prepared for nearby developments:

- Gap Road:
 - Estimated daily traffic < 300 veh/day (< 30 veh/h during the peak hour)
- Teven Road (between Ballina Road and Tuckombil Road intersections):
 - Estimated daily traffic < 2,500 veh/day (< 250 veh/h during the peak hour)
- Teven Road (northeast of the Tuckombil Road intersection):
 - Estimated daily traffic < 5,000 veh/day (< 500 veh/h during the peak hour)

It is noted that the site operated as a full-time hard rock quarry until 2016, with quarrying activities continuing until mid-2020.

2.3 Public Transport

There are no public bus services utilising Gap Road or Teven Road in the vicinity of the site. However, some school bus routes travel along Teven Road past the Gap Road intersection. The nearest bus stop to the site is in Tanamera Drive within the Alstonville village, approximately 800 m walk from the site entrance. This stop is serviced by Ballina Buslines Route 661, Ballina to Lismore via Alstonville and Wollongbar.

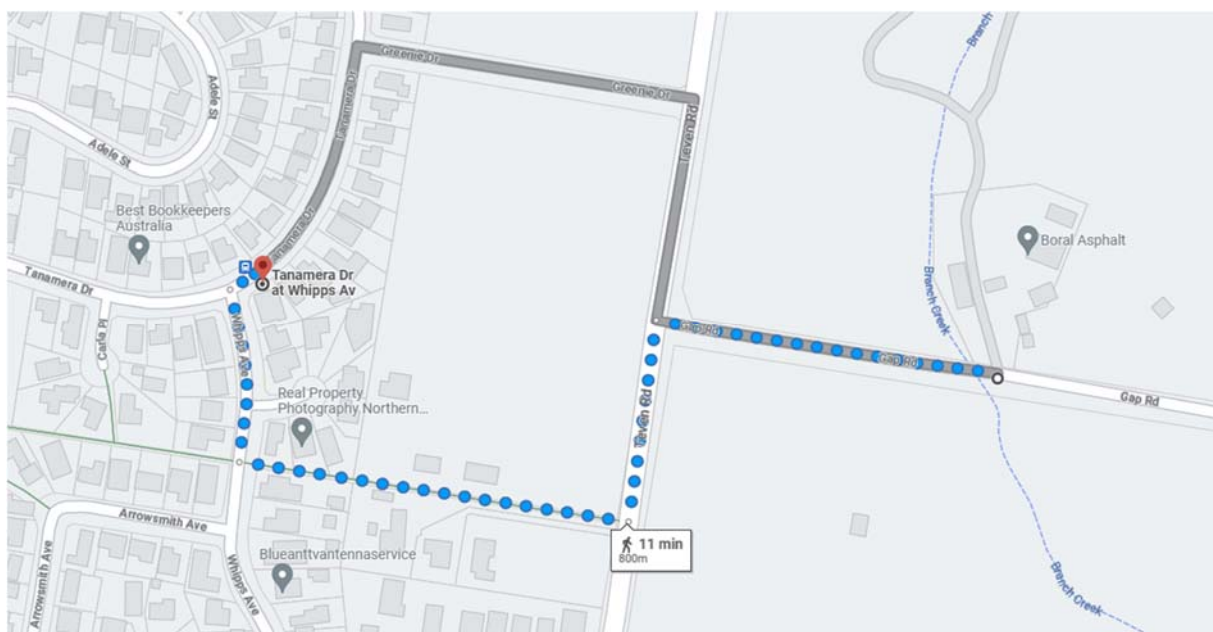


Figure 2.11 Public Bus Stop Near to the Site



2.4 Pedestrians and Cyclists

There are limited facilities for pedestrians in the vicinity of the site. The verges along much of Gap Road between the site entrance and Teven Road are not conducive to pedestrian traffic with narrow and/or steep/vegetated verges. The verges along Teven Road are similarly unsuitable for pedestrian traffic. However, approximately 150 m south of the Teven / Gap Road intersection there is a concrete path extending south on the western side of Teven Road into the residential area. Although this path isn't continuous all the way into the village centre, it extends to a point where the verges are more suitable for pedestrian traffic. At the northern end of this section of concrete path there is another pathway extending to the west through to Whipps Avenue. From here, it is a short walk north to the bus stop on Tanamera Drive (refer to **Figure 2.11**).

3. Proposal

The Proposal is to rezone the site to SP4 Enterprise, to facilitate its future use for a combination of high technology industrial uses (film studios and the like) and community recreation. A development application does not form part of this proposal as details of the proposed future use of the site are not fully developed. Council is in discussions with Byron Studios Pty Ltd regarding their proposal to undertake a staged development that would establish film production facilities at the site. The preliminary concept plan provided by Byron Studios Pty Ltd is provided below.



Figure 3.1 Preliminary Site Plan

Providing a driveway for the existing tenant (Ron Southon Pty Ltd) at Lot 3 DP 1130300 also forms part of the proposal. The proposed driveway will provide access through the site from Teven Road to the west to Lot 3 DP 1130300, as shown in the preliminary concept plan in **Figure 3.2**.

Although still in the conceptual stage, it is understood the final driveway design will provide:

- Widths of 3.5 m on straights with widening on curves.
- Widening to 5.5 m along the length of the driveway to allow for two vehicles to pass one another.

The width of Teven Road at the location of the proposed driveway will not allow for through vehicles to pass turning vehicles without crossing the double barrier centreline. Council has acknowledged that widening of Teven Road may be necessary.

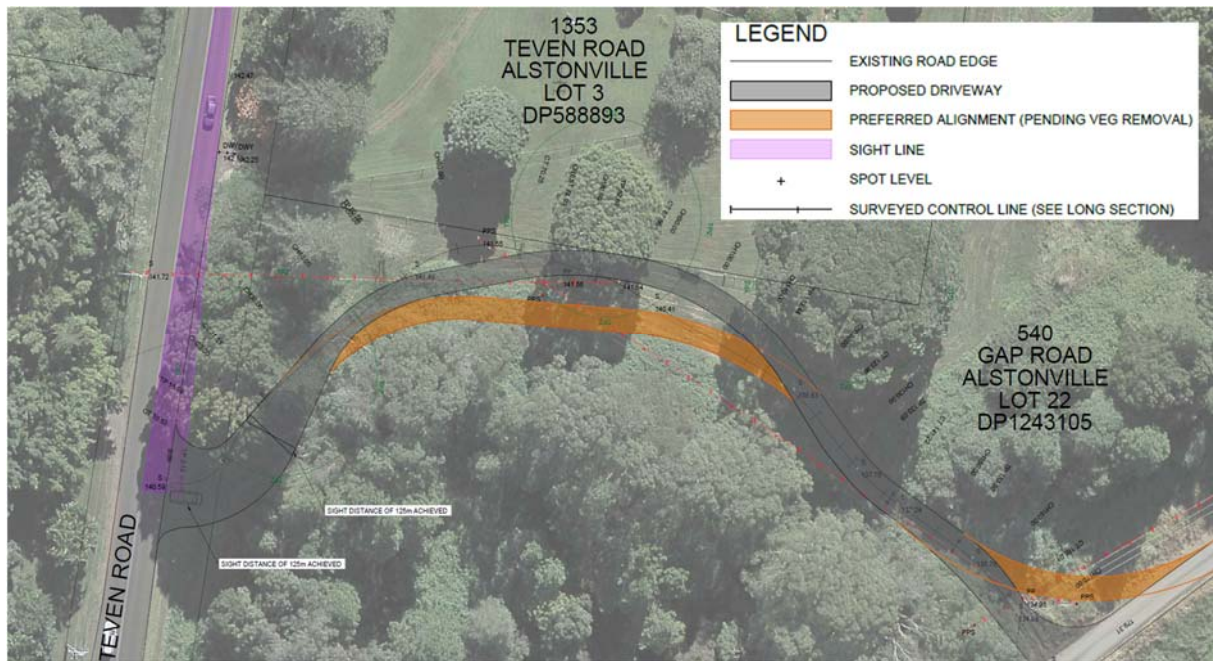


Figure 3.2 Proposed Driveway Concept Plan



4. Assessment

The following assessment has been undertaken based on the preliminary plans provided by the proponent and discussed in **Section 3**.

4.1 Traffic Generation

Traffic generation is generally calculated using rates specified in the *RMS Guide to Traffic Generating Developments* (2002), which provides generic rates for trip generation for various land uses. However, this guide does not provide rates for the intended use of the site as a film studio, nor for any other general uses which would be encompassed by the proposed 'Enterprise' zone.

In lieu of generic trip rates, Council has obtained a predicted estimate of traffic generation from Byron Studios, as the likely future user of the site. It should be noted that further assessment may be required if the site is to be used for any purpose other than the anticipated film studio.

Byron Studios has advised that during a large production, the anticipated traffic travelling to the site will be a maximum of 200 vehicles per day. For small productions, the traffic movement would be approximately 50 to 80 vehicles per day.

To account for deliveries and set construction etc. it is assumed that heavy vehicles will make up 5% of the maximum traffic arriving to the site during productions.

It is assumed that the majority of the traffic generated will be workers, including a portion living locally within the Northern Rivers area and a portion from outside the region residing in temporary accommodation near to the site in Lismore, Ballina or Byron Shire. It is therefore reasonable and conservative to assume that the majority of the traffic generated by the development will travel to the site during the morning between 7 and 9 AM and leave the site in the evening between 5 and 7 PM. For this assessment, it is assumed that 75% of the total daily trips occur during the morning peak period (7 to 9 AM) and 75% of these occur during the peak hour (e.g. 7:30 – 8:30 AM). It is also assumed that heavy vehicles will generally not access the site during the morning or afternoon peaks.

The assumed traffic generation (including all movements to and from site) is therefore as follows:

- Peak daily trips: 400 veh/day (5% heavy vehicles)
- Peak weekly trips (assuming 5-day week): 2,000 veh/week (5% heavy vehicles)
- Peak hour trips: 113 veh/hour

4.2 Directional Splits

Based on journey distance and travel times and location of likely trip destinations, the following directional splits are considered most probable:

- Exiting the site:
 - 100% to/from the west on Gap Road (towards Teven Road)
 - 0% to/from the east on Gap Road (towards Towalbyn)
- Teven / Gap Road Intersection:
 - 70% to/from the north on Teven Road (to access North Ballina, Lennox Head, Byron Bay, and Pacific Highway northbound Gold Coast, Brisbane etc.)
 - 30% to/from the south on Teven Road (to access Alstonville, Lismore, Ballina (East, West and Central) and Pacific Highway southbound)

- Teven / Ballina Road Intersection:
 - 90% to/from the southeast on Ballina Road (to access the Bruxner Highway)
 - 10% to/from the northwest on Ballina Road (to access Alstonville village centre)
- Teven / Tuckombil Road Intersection:
 - 100% to/from the east on Teven Road (towards Tintenbar, Lennox Head and Pacific Highway northbound)
 - 0% to/from the west on Tuckombil Road (towards Wollongbar)

As per the previous section, it is assumed as a worst case that all traffic generated by the development will travel to the site during the morning peak and leave the site during the late afternoon peak.

The following diagram represents traffic volumes associated with the development at key intersections. It can be seen that the majority of the traffic is expected to arrive at the site from the north/east via Teven Road through Tintenbar and Teven, turn left to stay on Teven Road at the Tuckombil intersection, then turn left again onto Gap Road. The afternoon peak will be the reverse of this: turn right onto Gap Road, right onto Teven Road, right again to stay on Teven Road at the Tuckmobil Road intersection, then through to the Pacific Highway interchange. Due to the significant volumes of existing traffic beyond this point and the low volumes of generated traffic, no assessment has been undertaken beyond those intersections shown below. Similarly, no assessment has been undertaken of the intersection of Ballina Road and the Bruxner Highway

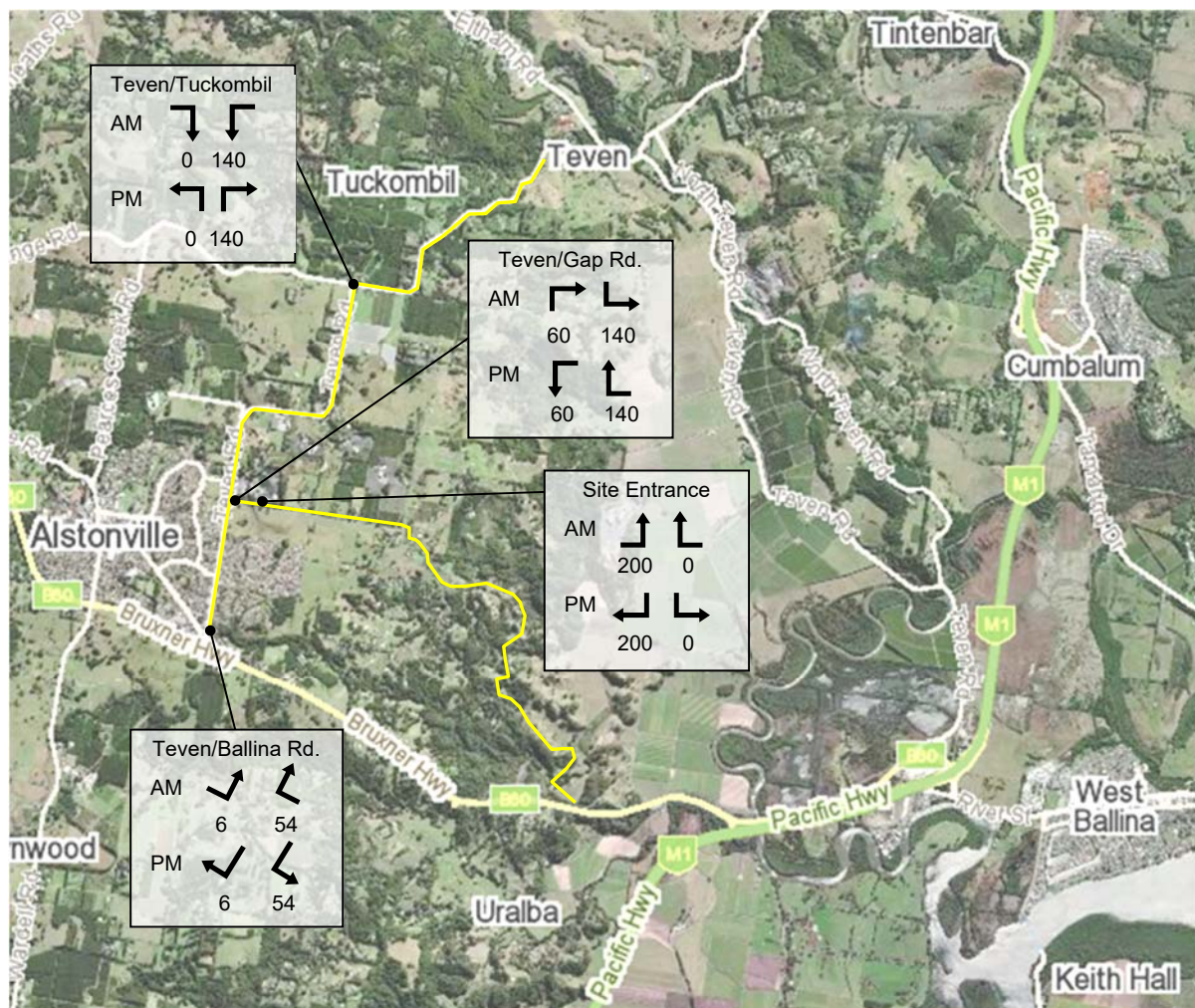


Figure 4.1 Peak Daily Traffic Generation and Directional Splits

4.3 Intersections

4.3.1 Turn Treatments

For unsignalised intersections, the warrants for different turning treatments for the major road of an are provided in the Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (2020) (AGTM06). Figures 3.25(a) and (b) from AGTM06 is reproduced below, for a design speed less than 70 km/h (applicable to the intersections at the site entrance, Teven/Gap Road and Teven/Ballina Road) and for a design speed between 70 and 100 km/h (applicable to the intersection of Teven and Tuckombil Road).

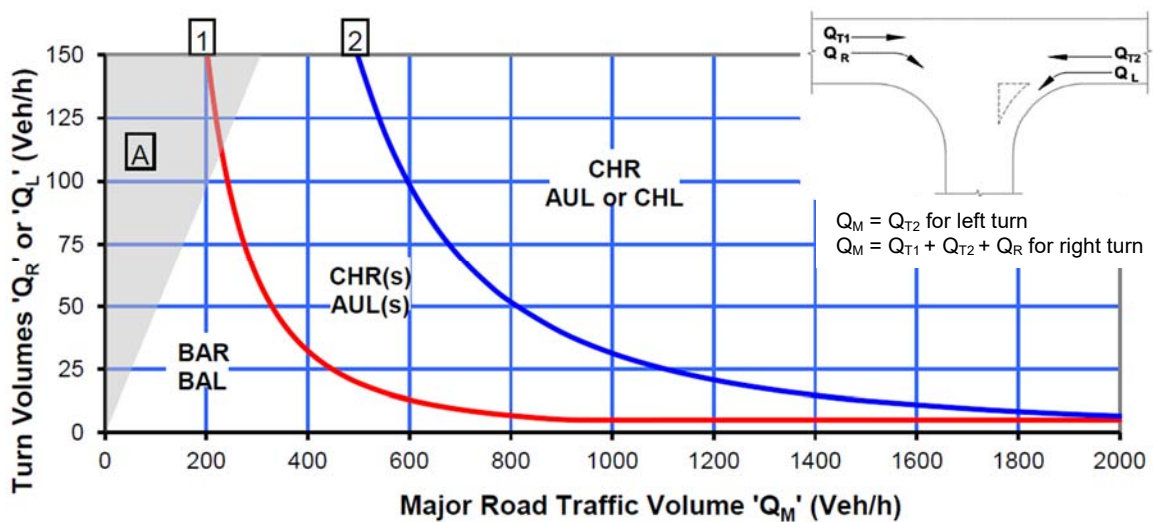


Figure 4.2 Warrants for major road turn treatments at unsignalised intersections (<70 km/h)

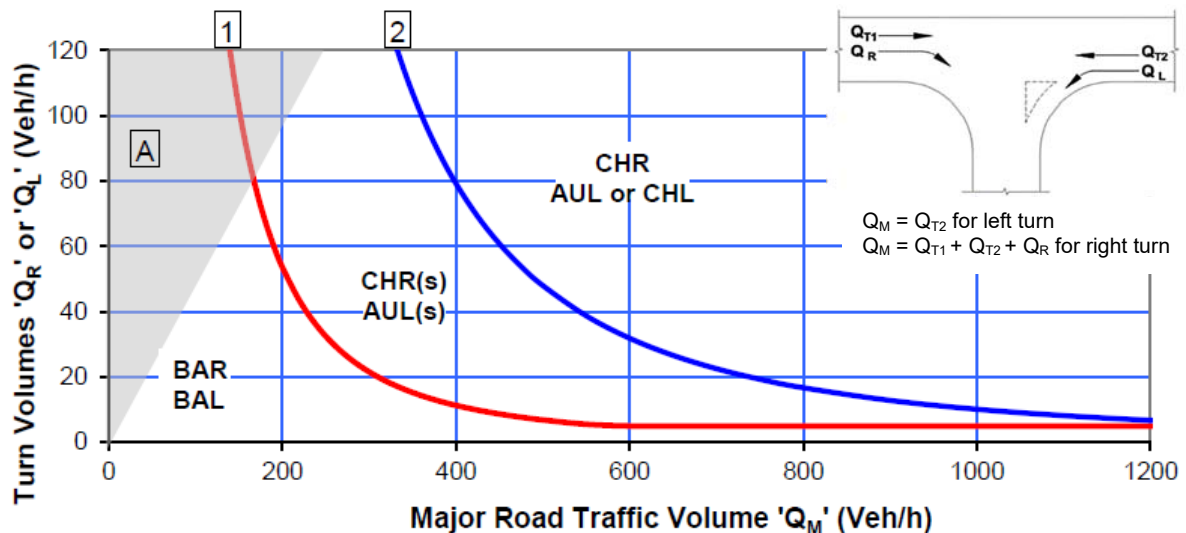


Figure 4.3 Warrants for major road turn treatments at unsignalised intersections (70-100 km/h)

The figures above and the volumes estimated in **Sections 2.2** and **4.1** have been used to produce the results below, indicating which turn treatment is appropriate at each intersection assuming the development proceeds.

Table 4.1 Intersection Turn Treatments

Intersection	Existing Intersection	Recommended Turn Treatment
Site entrance on Gap Road	Left turn: BAL	Left turn: BAL
	Right turn: BAR	Right turn: BAR
Site entrance on Teven Road (to service Lot 3 DP 1130300)	Left turn: Nil	Left turn: BAL
	Right turn: Nil	Right turn: BAR
Teven Road / Gap Road	Left turn: AUL	Left turn: AUL
	Right turn: AUR	Right turn: CHR
Teven Road / Ballina Road	Roundabout	Left turn: AUL
		Right turn: CHR
Teven Road / Tuckombil Road	Left turn: BAL	Left turn: BAL
	Right turn: BAR	Right turn: BAR

BAL = Basic left turn, CHL/CHR = Channelised left/right turn, CHR(s) = Short CHR, AUL = Auxiliary left turn

Thus in all cases the existing intersections are acceptable, with two exceptions.


Firstly, the right turn treatment from Teven Road onto Gap Road does not meet the recommended standard. The Austroads Guide would recommend this intersection include a channelised right turn in lieu of the existing auxiliary right turn lane. Although auxiliary lanes provide space for through vehicles to pass vehicles slowing/stopping to turn, they are not considered as safe as channelised right turn lanes, as they are associated with a greater number of rear-end collisions compared to the channelised turn treatment.

Given the intersection provides advance warning signs on the approach to the AUR and this stretch of Teven Road is straight and clear, it is unlikely the existing auxiliary right turn treatment will be a contributing factor in any crashes resulting in serious injuries. However, the ARRB (Australian Road Research Board) interactive Road Crash Map includes one record of a rear-end crash type occurring at this intersection in March 2014. As is typically the case for rear-end collisions, the result was a minor injury (no hospitalisation). According to the Transport for NSW Centre for Road Safety, there have been no crashes recorded at this intersection within the five-year period from 2017 to 2021.

It appears possible to convert the existing auxiliary right turn lane to a channelised right turn lane with pavement markings only and without any road widening. It is recommended that Council gives due consideration to improving the safety at the Teven/Gap Road intersection as shown in the figure below.



Figure 4.4 Possible Future Conversion of AUR to CHR



The second non-conformance with respect to existing and recommended turn treatments is in relation to the proposed driveway access point on Teven Road to service Lot 3 DP 1130300. At present, there is no driveway in this location. Regardless of the final design, it is recommended that Teven Road be widened to provide the minimum requirements of a BAR and BAL, in accordance with the Austroads Guide to Road Design Part 4A (2021) (AGRD04A). Although this treatment is generally not required for a rural driveway, it is considered that the heavy vehicles and traffic movements associated with the activities on site warrant an allowance for vehicles travelling on Teven Road to safely pass turning vehicles.

4.3.2 Sight Distances

According to AGRD04A Table 3.2, for a design speed of 60 km/h, the minimum safe intersection sight distance (SISD) is 123 m. For a design speed of 100 km/h, the SISD is 248 km/h.

The available sight distance in both directions at the Teven/Gap (60 km/h) and Teven/Tuckombil (100 km/h) intersections is in excess of 300 m. At the site entrance on Gap Road, where the design speed is 60 km/h, the available sight distance is approximately 150 m in both directions.

The estimated available site distance at the proposed driveway to service Lot 3 DP 1130300 on Teven Road is 240 m to the south and at around 200 m to the north. The speed zone to the south is 60 km/h, but the speed zone changed to 100 km/h approximately 100 m north of the proposed driveway. It is not unreasonable to assume the design speed for vehicles approaching the intersection from the north is between 80 km/h (requiring a SISD of 181) and 100 km/h (requiring a SISD of 248 km/h). The proposed driveway here does not constitute an intersection and therefore does not strictly require that SISD requirements be met. There is an acceptance of road users that exiting a driveway requires a higher level of vigilance than exiting a minor road of an intersection. However, as the sight distance to the north cannot be achieved, and given the development at Lot 3 DP 1130300 generates heavy vehicle traffic, it is recommended that signage be installed on the northern approach to the proposed driveway on Teven Road, such as *W5-22 Trucks Entering*

Sight distances do not apply to intersections controlled by a roundabout, thus the available sight distance at the Teven/Ballina Road intersection has not been considered.

4.4 Roadway Capacity

According to the Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (2020) (AGTM03), the level of service (LOS) is a qualitative stratification of the performance measure or measures representing quality of service. The performance measures include speed, travel time, delays, density, freedom to manoeuvre, traffic interruptions, comfort, convenience, and safety. LOS ranges from A to F, with LOS A representing the best operating conditions and service quality from the users' perspective (i.e. free flow) and LOS F the worst.

Roadway conditions that affect capacity and LOS include the type of road, lane widths, design speed, composition of traffic, and the horizontal and vertical alignment.

According to AGTM03, the capacity of a single traffic lane, C, measured in vehicles per hour (veh/h), is a function of the lane width and lateral clearances, and the percentage of heavy vehicles. As the main impact of the development will be experienced on Gap Road (between the site entrance and Teven Road) and Teven Road (between Ballina Road and Teven), the capacity per traffic lane for these two roads has been calculated.

$$C = 1800 f_w F_{HV}$$

Where: f_w = As per Table 5.1 of AGTM03

= 0.9 for Teven Road (3.2 m wide lanes with 2 m lateral clearance)

= 1.0 for Gap Road (3.7 m wide lanes with 2 m lateral clearance)

$$F_{HV} = 1 / [1 + P_{HV} (E_{HV} - 1)]$$

P_{HV} = Proportion of heavy vehicles in traffic stream

= 0.10 for Teven Road (conservative assumption)

= 0.20 for Gap Road (conservative assumption)

E_{HV} = Average passenger car equivalents for heavy vehicles (Table 5.2 of AGTM03)

= 4.0 for Teven Road

= 8.0 for Gap Road

Thus C = **1,246 veh/h for Teven Road**, and

= **750 veh/h for Gap Road**

Existing traffic volumes on Teven and Gap Roads in the vicinity of the site are expected to be no more than 2,500 veh/day and 300 veh/day respectively. The widely accepted estimate of peak hourly traffic flow is 10% of the daily flow, being no more than 250 veh/h for Teven Road and 30 veh/h on Gap Road. This is for two-way traffic flow. Assuming a worst-case peak hour split of 75/25, we can assume that the existing peak hourly traffic on Teven Road in one lane is no more than 188 veh/h and 23 veh/h on Gap Road.

Allowing for future traffic growth (estimated conservatively to be 3.5%) and adding the predicted traffic generated by the likely future use of the site (113 veh/h), it is clear that traffic volumes do not come close to exceeding the calculated capacity of the existing infrastructure.

5. Traffic Impacts of Proposal

5.1 Efficiency

The proposal has potential to impact the efficiency of the existing road network by resulting in a new traffic-generating activity taking place at the subject site. The traffic associated with the likely future use as a film studio is considered to be relatively low, and limited to times when productions are occurring on site. There will be times when the site generates no traffic, and during peak times, the traffic generation has been estimated to be as high as 113 veh/h.

Given the very low existing traffic volumes on Gap Road and the high standard of Gap Road west of the site entrance to Teven Road, including left and right turn lanes onto Teven Road and some facilities for acceleration of turning vehicles before entering the main traffic stream, there is not expected to be any noticeable drop in efficiency on Gap Road.

The RMS Guide provides indicative expected LOS for two-lane rural roads with rolling terrain, such as Teven and Gap Roads, as follows.

Table 5.1 Two-way peak hour flows on two lane rural roads

Terrain	Level of Service (LOS)	Peak hour flow			
		10% heavy vehicles		15% heavy vehicles	
		(v/h) 100 km/h	(v/h) 80 km/h*	(v/h) 100 km/h	(v/h) 80 km/h*
Rolling	B	360	324	310	279
	C	650	585	570	513
	D	970	873	700	630
	E	1,720	1,548	1510	1,359

* Note that capacities for 80km/h design speed are assumed to be 90% of the equivalent for 100km/h

The RMS Guide suggests that acceptable peak hour LOS on major and minor rural roads is LOS C. As per the table above, it is expected that Teven Road, which has a variable speed limit between 60 km/h and 100 km/h, limited opportunity for overtaking and a composition of heavy vehicles between 10% and 15%, currently functions at around a LOS C.

Estimated future traffic volumes on Teven Road may decrease the efficiency to a LOS D, however more information would be required regarding the existing traffic volumes at various locations along Teven Road and the estimated traffic growth rate based on predicted growth areas etc.

Adding traffic generated by the development is unlikely to noticeably affect the LOS on Teven Road in addition to the background traffic growth. Efficiency may be affected at the Teven / Gap Road intersection, however, impacts are expected to be low. It has previously been recommended to convert the existing auxiliary right turn lane to a channelised right turn lane, and although the benefits of this are predominantly relating to safety, there will likely be improvements to efficiency as well, as the through traffic will not need to change lanes if there is a vehicle turning right into Gap Road.



5.2 Safety

Although capacity is commonly linked to efficiency, providing sufficient roadway capacity assists to provide road safety, as motorists are able to drive comfortably without needing to choose tight gaps in traffic streams to turn or overtake etc. As per **Section 4.4**, the existing road infrastructure is expected to have sufficient capacity to accept the traffic generated by the likely future use of the site if rezoned as per the proposal.

In most cases, the existing road infrastructure, specifically at intersections, is adequate to accept the expected increase in traffic. To improve safety and to address the warrants of the Austroads Guides for intersection turn treatments, it is recommended that the existing auxiliary right turn lane at the Teven / Gap Road intersection is converted to a channelised right turn lane. As shown in **Figure 4.4**, it is anticipated this can be achieved with minimal work and no widening, with the use of painted pavement markings.

It was noted during the site inspections that the intersection of Teven and Gap Roads included advance warning signs (W2-4, *Side Road Intersection*) on the northern and southern approaches to the intersection, and a *T-intersection* (W2-3) sign on Gap Road. However, the site did not include a Give Way sign or holding line on Gap Road, and there was no bi-directional hazard marker (sightboard) opposite Gap Road to delineate the end of the road to drivers in low light conditions.

Given the relatively low cost associated with these items, it is recommended they be provided to improve safety at the site.

It is also recommended that the proposed new driveway intersection servicing Lot 3 DP 1130300 on Teven Road be constructed to include minor widening of Teven Road to accommodate basic left and right turn treatments, in accordance with the AGRD04A. As it is unlikely that sufficient SISD can be provided from the north, it is also recommended that signage be installed on the northern approach to the proposed driveway, such as W5-22 *Trucks Entering*.

SISD can be achieved at all other key intersections and no further upgrades are recommended.

5.3 Amenity

The amenity on parts of Gap and Teven Road will be marginally affected by the increase in traffic. However, given the area is predominantly rural and most dwellings are set back from the road frontage, it is not anticipated that residents in the locality will notice a decline in the amenity.

The additional traffic volumes are not expected to cause any unreasonable delays for existing residents of the local area.

It is noted that until mid-2020, the site was generating traffic associated with the previous quarry activities. Although peak volumes of the previous use are assumed to be lower than the expected peak volumes associated with the film studio, the composition of heavy vehicles would have been significantly higher. Heavy vehicle traffic has a greater impact on amenity compared to passenger vehicle traffic due to the higher levels of noise and propensity to generate dust.

5.4 Public Transport

Public transport is limited in the Northern Rivers region, particularly outside the major centres of Lismore, Ballina and Byron Bay. The change in use is not expected to generate any additional demand for public transport usage, and no change to the existing network is proposed.



5.5 Pedestrians and Cyclists

Facilities for pedestrians and cyclists are limited in the vicinity of the site. The change in use is not expected to generate any pedestrian or cycle traffic, and no change to the existing network is proposed.

5.6 During Construction

Following rezoning and the likely subsequent leasing of the subject land, it is expected that there will be a period of construction activities to convert the land for the new activities. Construction traffic will introduce heavy vehicles to the area for the duration of the construction which is expected to be no more than 6-12 months.

It is recommended that a Construction Management Plan (CMP) including a Traffic Management Plan (TMP) be prepared and implemented prior to, and for the duration of any substantial (6 months +) construction on site. This will assist to reduce risks and impacts associated with construction traffic accessing the site.



6. Summary and Recommendations

Having become familiar with the area, undertaken desktop review of relevant documentation, calculated predicted traffic generation and trip distribution, assessed the key intersections and the expected impacts of the proposed development, the following conclusions have been made:

- The development will increase the volume of traffic on Gap Road and Teven Road. Volumes will also be increased beyond the intersections of Teven/Ballina Road and Teven/Tuckombil Road, however, existing volumes are higher here and impacts are expected to be imperceptible. The impacted roads are generally in suitable condition and geometry to accept the additional traffic and have the capacity to do so. The proposal is not expected to noticeably reduce the efficiency within the existing road network.
Recommendation: *Further assessment may be required if the site is to be developed with a use generating traffic in excess of the estimated peak 200 veh/h.*
- It is likely that 100% of the generated traffic will travel through the Teven / Gap Road intersection. Assessment of this intersection against the Austroads Guideline using predicted future traffic volumes reveals that some upgrades are warranted to improve safety and maintain efficiency.
Recommendation: *Upgrade the existing auxiliary right turn (AUR) to a channelised right turn (CHR), using painted linemarking. No widening of the existing carriageway is anticipated.*
Recommendation: *Provide Give Way signage, hold lines and a bi-directional hazard marker (sight board) to improve delineation of the intersection for traffic approaching from Gap Road.*
- The proposed driveway to service Lot 3 DP 1130300 on Teven Road may not achieve adequate safe intersection sight distance for vehicles approaching from the north.
Recommendation: *Construct the driveway to include minor widening of Teven Road to accommodate basic left and right turn treatments, in accordance with the AGRD04A.*
Recommendation: *Install signage on the northern approach to the proposed driveway to highlight its presence and the likelihood that trucks may be entering or exiting e.g. W5-22 Trucks Entering.*
- Construction associated with a new use of the site will likely take 6-12 months. Construction traffic will have a negative impact on the amenity of the locality and may impact on traffic safety and efficiency on Teven Road.
Recommendation: *A Construction Management Plan (CMP) including a Traffic Management Plan (TMP) should be prepared and implemented prior to, and for the duration of the construction on site to reduce risks and impacts associated with construction traffic accessing the site.*



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