

Your ref:
Our ref: 12547851

18 November 2022

Rachel Heath
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Kingscliff NSW 2487

DA2022/0107 - Bentley Quarry – Response to TIA Peer Review

Dear Rachel

The independent review of the Traffic Impact Assessment (TIA) (GHD 2021) by EMM dated 8 November 2022 identified some matters that were considered to not be adequately addressed or needed further information/clarification.

We have provided a summary of the issues identified and a response in Table 1. The TIA, concept design and Drivers Code of Conduct (DCC) have been updated where required and are attached.

In summary, while some refinements were required to the TIA, DCC and concept design to address the deficiencies identified by EMM, there is no change to the conclusion of the report.

We trust the responses and revised TIA, DCC and concept design adequately respond to the issues identified to allow Council and the Northern Regional Planning Panel to determine the application but please contact the undersigned if anything further is required.

Regards



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Attachments: Traffic Impact Assessment
Diver Code of Conduct

Table 1 Peer Review

| Item | GHD TIA Reference | Summary | Inadequacies and shortcomings | EMM recommendations | Category | Response |
|------|-------------------|--|---|--|----------|--|
| 1 | N/A | SEARs (1589) and TfNSW agency comments (letter dated 6 July 2021). | The TIA report does not include a separate chapter/section which sufficiently demonstrates whether all the traffic and transport related items raised in SEARs and TfNSW agency comments have been adequately addressed by this TIA report. | <p>The TIA report should include a separate section, preferably in a table format (e.g. TfNSW comments & GHD responses), listing the traffic and transport related items raised in SEARs and TfNSW agency comments and identifying which section in the TIA where they have been responded to.</p> <p>Not all TfNSW comments have been addressed. For example, no intersection analysis (eg SIDRA) has been undertaken as part of the study. Furthermore, no comment on decommissioning stage, no site plan is attached with the report showing the car parking etc.</p> | Moderate | <p>The report has been updated to include a table with the relevant SEARs and where they have been addressed in the TIA.</p> <p>TfNSW indicate using a SIDRA analysis, "where relevant". In this case it was considered a traffic volume growth assessment was more appropriate, to determine the number of turning vehicles and intersection upgrade warrants.</p> <p>Decommissioning will be very minor compared to the operational stage but a comment has been included in the TIA,</p> <p>The site plan in the TIA shows the car parking.</p> |

| Item | GHD TIA Reference | Summary | Inadequacies and shortcomings | EMM recommendations | Category | Response |
|------|--------------------------|-----------------|--|---|----------|---|
| 2 | Sections 2.3.1 and 2.3.2 | Traffic volumes | <p>Traffic volume data has been obtained from Richmond Valley Council for Bentley Road for 2006 and 2014, and for Naughtons Gap for 2005 and 2014. I understand that new traffic counts could not be undertaken due to Covid-19 restriction.</p> <p>However, the traffic data for Bentley Road and Naughtons Gap is eight years old.</p> <p>For Bentley Road, 2006 data is not presented from which a historical increase of volume could not be determined. Similarly, the traffic profile for Naughtons Gap Road is not provided in the TIA.</p> <p>Based on the available information, a logical traffic growth profile along Bentley Road or Naughtons Gap Road can't be derived. Estimated 3 to 4% annual baseline traffic growth is probably accurate but there is no information to back this up.</p> | <p>Two peak hour intersection counts (eg 7- 9am & 4-6pm) are required at the following two intersections:</p> <ul style="list-style-type: none"> – Bentley Road/Naughtons Gap Road; and – Bentley Road/Bungabbee Road. <p>These current traffic counts (outside the school holiday period) will result in accurate traffic data, rather than relying on the historical profile.</p> <p>Intersections should be analysed in the SIDRA model as requested by TfNSW.</p> | High | <p>There is insufficient time to obtain traffic counts at these intersections prior to the Planning Panel meeting. Also, as Naughtons Gap Road is currently closed, traffic count data would be of little value in this instance. However we believe the assumptions made in the TIA are conservative and as acknowledged by the Independent review "probably accurate". Unless the traffic counts were significantly different (which is unlikely) to the actual numbers, there would not be any change to the outcome of the assessment.</p> <p>TfNSW indicate using a SIDRA analysis, "where relevant". In this case it was considered a traffic volume growth assessment was more appropriate, to determine the number of turning vehicles and intersection upgrade warrants.</p> <p>The TIA has been reviewed by TfNSW, who supported the recommended intersection upgrade, suggesting the assessment was appropriate.</p> |

| Item | GHD TIA Reference | Summary | Inadequacies and shortcomings | EMM recommendations | Category | Response |
|------|-------------------|---------------|---|--|----------|--|
| 3 | Section 2.4 | Crash History | <p>Section 2.4 outlines the detailed crash history along the adjoining road networks (total 13 crashes with 10 casualty). There were four serious crashes at the Bentley Road/Naughtons Gap Road intersection, three of which were 'right near' type crashes.</p> <p>The report mentions the severity of these crashes may be attributed to the high speed zones and poor gap selection when making right turns.</p> <p>Bentley Road/Naughtons Gap Road is expected to carry 40% of the construction and operations phase traffic for the proposed development. The intersection appears to show a trend for 'right near' type of crashes.</p> <p>The report does not further investigate the causes or road safety hazards or put forward any safety recommendations for this intersection in its summary or conclusion.</p> <p>However, Section 4.2.3 of the report states that the crash history in the vicinity of the study area does not indicate a history of crashes at the existing intersection.</p> <p>The crash data analysis and concluding statement contradict each other.</p> <p>In addition, one of the major safety issues along east-west road is sun glare which has not been taken into consideration.</p> | <p>Crash history should be undertaken along the nominated haulage routes to Lismore, Kyogle and Casino. My understanding is the proposed route to/from Casino is via Bentley Road/Summerland Way and does not include Naughtons Gap Road. Casino will be accessed via Cedar Point.</p> <p>Further investigation to identify the cause of 'right near' type crashes at the Bentley Road/Naughton Gap Road intersection and possible road safety mitigations should be proposed.</p> <p>Also I suggest including a commentary in the TMP in regard to sun glare which is also a community concern.</p> | Moderate | <p>The crashes at the Naughtons Gap intersection are existing and should be addressed under existing road safety improvement programs. The uplift of vehicles across this intersection and wider network as a result of expansion to quarry activities do not increase the exposure to the next risk level as per Safe Systems.</p> <p>The TIA has been revised to provide some discussion about this issue.</p> <p>The DCC (the DCC was considered more applicable than the TMP) has been updated to include controls in relation to sun glare.</p> |

| Item | GHD TIA Reference | Summary | Inadequacies and shortcomings | EMM recommendations | Category | Response |
|------|-------------------|--------------------------------------|---|--|----------|--|
| 4 | Section 3 | Proposed development | <p>The proposal is to produce a maximum of 300,000 tonnes per annum or 2,000 tonnes day. Given the proposed operation of five and half days (weekdays, plus half day Saturday) or 286 active days (including public holidays) would equate to production of 1,048 tonnes per day.</p> <p>The proposal of maximum production 2,000 tonnes per day has not been adequately justified.</p> <p>Furthermore, 50,000 tonnes per annum of raw materials that would be transported to the site has not been considered in the traffic generation calculation.</p> | This mismatch between the yearly production and daily production should be corrected. | High | <p>The two maximum extraction rates are independent, so on a daily basis the quarry will not be able to extract or transport more than 2,000 tonnes and on an annual basis, it would not be able to extract or transport more than 300,000 tonnes. If the quarry operated consistently at 2,000 tonnes per day, they would only be able to operate for 150 days.</p> <p>The 50,000 tonnes are proposed to be back loads, not additional loads.</p> |
| 5 | Section 4.1.1 | Trip Generation (Construction Phase) | <p>Total 100 vehicular trips are estimated (50 inbound and 50 outbound movements) for one month construction period. These vehicles are assigned over 10 hour construction window on a typical workday.</p> <p>Light and heavy vehicle split has not been provided. The traffic report does not include the number of onsite workers and their travel mode.</p> <p>Furthermore, splitting traffic generation uniformly over the 10 hour period (eg 7 am-5 pm approved construction hours) is unlikely as typically light vehicle inbound peaks occurs in the AM peak and vice versa in the PM peak. Most of the heavy vehicular inbound and outbound movements may also occur in the same peak hours.</p> | It is likely that construction traffic would be less than the operation traffic which would negate the necessity of any traffic analysis. However, this should be clearly articulated in the report. Hence, the trip generation in Table 4.1 should be recalculated. | High | <p>Comments have been provided in the report clarifying that operational phase traffic generation is greater than the construction phase traffic generation and is therefore the critical phase in terms of traffic impacts.</p> <p>Table 4.1 has been updated to specify the directional split of traffic on Bentley Road.</p> |

| Item | GHD TIA Reference | Summary | Inadequacies and shortcomings | EMM recommendations | Category | Response |
|------|-------------------|---|--|---|----------|--|
| 6 | Section 4.1.2 | Trip Distribution (Construction Phase) | <p>The estimated baseline traffic volume increase from 2014 to 2022 is not clear. Further information is required on how the traffic growth is estimated and the reasoning behind it.</p> <p>Furthermore, the estimated 100 daily vehicular trips increase for all routes is not correct. The maximum traffic increase will occur in Bentley Road is 70 vehicle per day (vpd) to the east of the site and 30 vpd to the west of the site based on the assumed traffic. The traffic increase appears to be blanketed without any consideration of the directional split. This should be rectified.</p> <p>The last paragraph outlines that the construction impact is expected to have negative impact due to 'reduced speed zones' but no information is provided in regard to this.</p> | The estimated growth of background traffic from 2014 to 2022 should be clearly demonstrated, along with the directional split and explanation of 'reduced speed zones'. | High | <p>Estimated traffic growth between 2014 and 2022 is justified in the report as having been calculated based on growth between available 2005, 2006 and 2014 traffic volumes provided.</p> <p>Explanation of directional split is already provided in the report, and Table 4.1 has been updated to specify the directional split of traffic on Bentley Road.</p> <p>Additional explanation of the 'reduced speed zones' has been provided in the report.</p> |
| 7 | Section 4.2.1.2 | Heavy vehicle traffic (Operational phase) | <p>The report states the use of truck and dog trailers for material transport. However, there is no information on the vehicular length or if this is the only type of truck or average truck. From our experience, this type of quarry is served by trucks in various sizes.</p> <p>Furthermore, 2,000 tonnes of transport per day equates to $2,000/32 = 63$ truck deliveries (inbound or outbound). No information is provided on the proposed 50,000 tonnes per year raw material transport.</p> <p>Information would be helpful whether any backloading is proposed for this activity (to replace empty trucks arriving on site and loaded trucks travelling outbound).</p> | <p>The proposed truck movements (type of trucks) should be clarified.</p> <p>A logical explanation of the estimated truck movements per day and peak hour should be provided including the 50,000 tonnes per year raw material transport.</p> <p>It is imperative to know the maximum size of trucks that would serve this quarry, otherwise Council would not be able to appropriately condition it in due course.</p> | High | <p>The maximum size truck expected to access the site to transport material is a truck and dog combination.</p> <p>The delivery of equipment e.g. crushers, will require different vehicles a few times per year but all trucks are expected to be less than 20m in length because Bentley Road is not an approved B double route.</p> <p>As above, the 50,000 tonnes of raw material will be transported by backloads and not generate additional truck movements.</p> <p>The proposed 70 truck deliveries is based on $2,000/32$ plus 10% to be conservative.</p> |

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| 8 | Section 4.2.2 | Trip distribution (Operational phase) | Similar to Item 6, the 150 vehicle trips increase should consider the trip distribution accurately. | The operations trip generation in Table 4.2 should be recalculated also including light vehicles | High | Table 4.2 has been updated to specify the directional split of traffic on Bentley Road and does not alter the conclusions of the assessment. |
| 9 | Table 4.2 | 2032 traffic assessment | <p>It is not clear why a 2032 traffic assessment has been undertaken. A sensitivity testing for a 10 year development horizon (after commencement of operation of the quarry) is considered reasonable but it should include any cumulative traffic happening in this area for other developments (if any). Alternatively, a sensitivity testing should be undertaken for decommissioning stage eg 30 years of operation of the quarry.</p> <p>Due to the recent floods in Lismore area, it is expected that there will be reasonable traffic growth in the locality for government's incentive to buyback and relocate flood affected dwellings. This should be considered in the assessment, if needed.</p> | An explanation of the traffic calculation for a 10 year horizon and cumulative traffic impact assessment should be considered, if warranted. | Minor | <p>The 10-year horizon is consistent with TfNSW considerations, presumably because it would be difficult to predict traffic numbers beyond a 10 year horizon.</p> <p>The report has not been updated.</p> |

| Item | GHD TIA Reference | Summary | Inadequacies and shortcomings | EMM recommendations | Category | Response |
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| 10 | Section 4.2.3 | Network impact | The traffic volumes would change based on the above comments. | Rewrite this chapter with the correct vehicular numbers. Midblock capacity analysis should include overtaking/ climbing lanes on both directions (eg Level of Service). | High | As explained above, updated traffic counts are not possible prior to the Planning Panel meeting and are unlikely to be reliable due to the current closure of Naughtons Gap Road. Also, as stated by the Independent Review, the traffic numbers are considered to be accurate and unless they were significantly different to the actual numbers, there would not be any change to the outcome of the assessment. Vehicular numbers have been updated based on updates to Table 4.2 to clarify directional split on Bentley Road. |
| 11 | Section 4.3.2 | Turn Treatments | The intersection turn treatment assessment would require an update based on the comments provided above. | Update turn treatment assessment | High | As explained above, updated traffic counts are not possible prior to the Planning Panel meeting and are unlikely to be reliable due to the current closure of Naughtons Gap Road. Also, as stated by the Independent Review, the traffic numbers are considered to be accurate and unlikely to be significantly different to the actual numbers, and as such there would not be any change to the outcome of the assessment. |
| 12 | Appendix A | Site access intersection upgrade | The report states that truck and dog trailer combinations will be used to transport quarry material by the development. The proposed intersection upgrade concept plan does not show a swept path assessment of a truck and dog trailer entering and exiting the upgraded site access intersection. | The intersection upgrade concept should show a swept path assessment by the longest vehicle entering and exiting the site, total four movements to/from the east and the west (in & out). Further comments on the intersection concept plan proposed are provided in the following chapter. | High | Swept path assessment has been provided in the revised report. The design has been updated to accommodate the swept paths and this will be further refined during detailed design stage. |

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|------|-------------------|----------------|-------------------------------|---|----------|---|
| 13 | Appendix A | Concept design | | On review of the concept design dimensions, there is a concern with the storage distance. Assuming the intersection is for the use of 26 m long B-double trucks, the storage of the lane is insufficient at 20 m compared to the length of the vehicle at 26 m; | | B-doubles are not permitted on Bentley Road in the location of the site, so the longest vehicle likely to use the access would be less than 20 m. |
| 14 | Appendix A | Concept design | | The distance from the start of the taper to 2 m width is stated at 57 m on the plans. This should be 63.33 m based off the equation $E = (A/Wt) \times 2$ from the AGRD part 4A Section 7.5.2; | | The concept design has been updated as suggested. |
| 15 | Appendix A | Concept design | | As stated earlier, no swept paths are shown or considered. The design will have significant variance once swept paths are applied, as to account for the use by specific trucks. This will affect the kerb returns, positioning of the holding line, configuration of the intersection and shape of the median. Consequently, this concept design does not effectively show the true extent of works. | | The concept design has been updated as suggested. |
| 16 | Appendix A | Concept design | | The change in the positioning of the access road holding line will also have an effect on the sight distances. | | The area around the access is relatively level, so the change in the holding line is not expected to significantly alter the sight distances. |
| 17 | Appendix A | Concept design | | The road names are not clearly identifiable on the plans, these are usually shown parallel with the road | | The concept design has been updated as suggested. |
| 18 | Appendix A | Concept design | | The existing road/lane widths are not shown. The proposed lane widths are not shown by standard dimensioning, rather by a leader/arrow | | The concept design has been updated as suggested. |

| Item | GHD TIA Reference | Summary | Inadequacies and shortcomings | EMM recommendations | Category | Response |
|------|-------------------|----------------|-------------------------------|--|----------|---|
| 19 | Appendix A | Concept design | | The title block does not have the address stated and there are no discernible markings on the plan as to the location of the design such as the lot or house numbers | | The concept design has been updated as suggested. |
| 20 | Appendix A | Concept design | | There are no notes of the design criteria, including the design speeds and vehicular type on the plans, intersection treatments utilised | | The concept design has been updated as suggested. |
| 21 | Appendix A | Concept design | | The width of the verge is not shown (typically 1 m) | | The concept design has been updated as suggested. |
| 22 | Appendix A | Concept design | | The ASD and SISD are stated as achieved in the report, however, these are not shown in the plan. The crest on the left hand site for exiting vehicles from the site should be taken into consideration and shown in the plan | | The concept design has been updated as suggested. |
| 23 | Appendix A | Concept design | | There should be a note regarding the necessary removal of trees to achieve the site distances | | The concept design has been updated as suggested. |

Attachment 1

Traffic Impact Assessment



Traffic Impact Assessment

Bentley Quarry

R & S Contracting Pty Ltd

18 November 2022

→ The Power of Commitment



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1. Introduction

1.1 Background

GHD Pty Ltd (GHD) has been engaged by R & S Contracting Pty Ltd (R & S Contracting) to assess the construction impacts and operations of the proposed Bentley Quarry expansion in Bentley, New South Wales (NSW). Bentley Quarry will be a hard rock quarry and proposes to extract up to 300,000 tonnes per annum and 2,000 tonnes per day over 30 years, with a total disturbance area of approximately 6.5 hectares. Bentley Quarry will predominantly supply materials for use as fill and for road construction and maintenance.

The site is Lot 2 DP 1196757, 1465 Bentley Road, Bentley which is owned by SL McKenzie & RG McKenzie and is located approximately 14 kilometres west of Lismore. Currently the quarry operates through existing use rights with an extraction rate of 3,000 cubic metres and an extraction area of approximately one hectare.

1.2 Purpose of this report

The purpose of this report is to assess the potential traffic impacts of the proposed expansion of the Bentley Quarry on the local road network and review the most appropriate site access arrangements. This will form part of an Environmental Impact Statement (EIS) to support a development application for the proposed expansion under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.3 Scope and limitations

This report: has been prepared by GHD for R & S Contracting Pty Ltd and may only be used and relied on by R & S Contracting Pty Ltd for the purpose agreed between GHD and R & S Contracting Pty Ltd as set out in this report.

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

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

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

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

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

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1.4 Assumptions

The following assumptions have been made during the assessment of potential traffic impacts:

- Naughtons Gap Road is currently closed due to a landslide. It is assumed for the purposes of this assessment that the road will be returned to its pre-landslide conditions and that it may be used as a haulage route between the quarry and Casino.
- The construction phase is assumed to generate a maximum of 100 vehicle movements per day evenly over a 10-hour period.
- The source, destination and route of light and heavy vehicles accessing the quarry is difficult to predict, however it is assumed they would travel via various routes to projects and customers around the area via Bentley Road. R & S Contracting has indicated that approximately 60% of operation traffic will travel to and from the site via Bentley Road east of the site, approximately 30% will travel to and from the site via Naughtons Gap Road, and 10% will travel to and from the site via Bentley Road west of the site. It is assumed that these indicative proportions are representative of vehicle movements during both construction and operation phases.
- The operating speed on the site access road is assumed to be 50 km/h.
- The quarry site access road approach to the Bentley Road intersection is assumed to have a flat grade of 0%.
- The 85th percentile speed is assumed to be constant between 2014 and 2032.
- On Bentley Road it is assumed that 60% of through movements are westbound and 40% are eastbound.
- The proposed upgrade of the intersection of Bentley Road and the site access road is assumed to contain no splitter island.

2. Existing conditions

2.1 Site location

Bentley Quarry is located within the Richmond Valley local government area in NSW and is shown in Figure 2.1. The site is located within a rural area approximately 14 km west of Lismore. The surrounding land use is primarily agricultural and forestry. The study area extends to include the connecting road network.

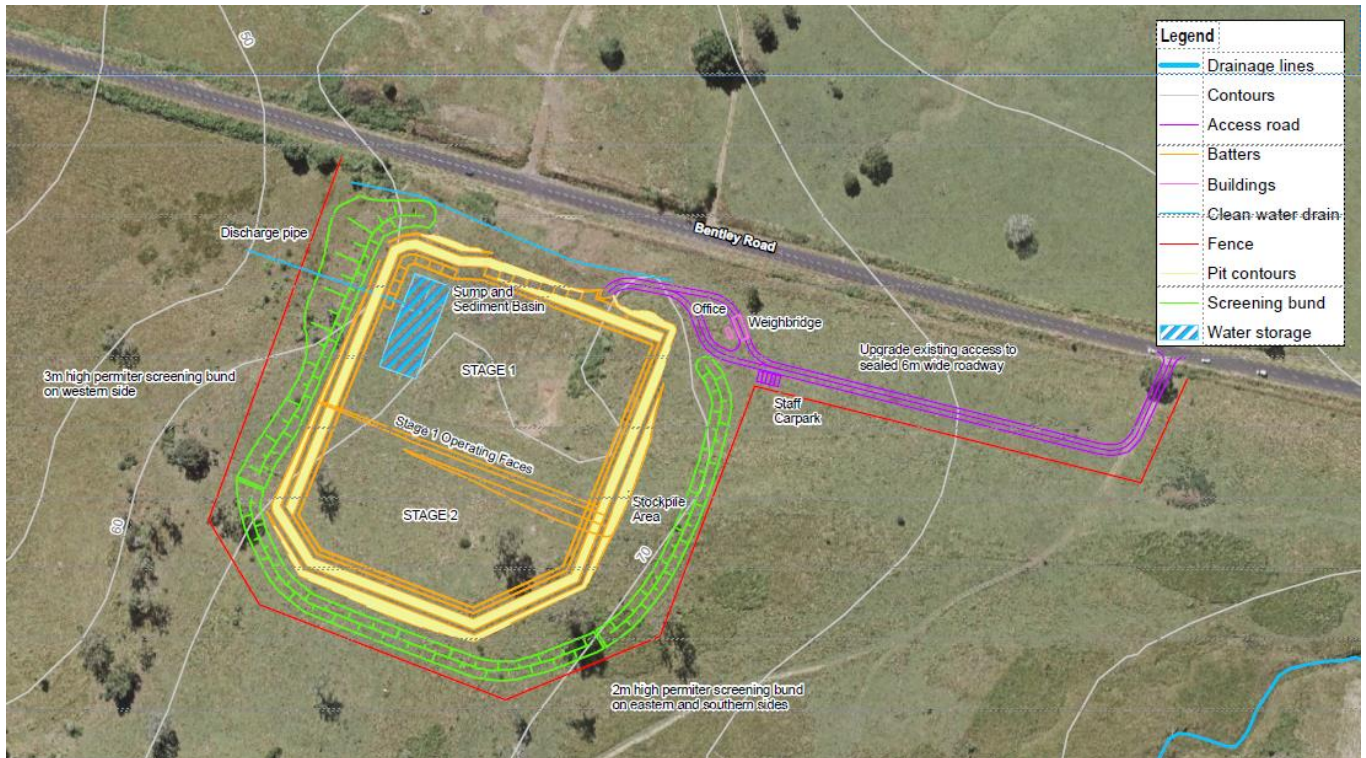


Figure 2.1 Site location of the proposed Bentley Quarry site

2.2 Site access

Currently there is one existing access point to the site via Bentley Road, as shown in Figure 2.2. This site access road is unsealed and its intersection with Bentley Road permits all movements however it does not have any turn treatments (such as a basic left-turn (BAL) or a basic right-turn (BAR) treatment).



Figure 2.2 Existing site access location via Bentley Road

Base image source: Google Maps, accessed July 2021

2.3 Road network

Key roads considered in the study area are shown in Figure 2.3. Key roads and their function within the transport network are discussed in the following sections.

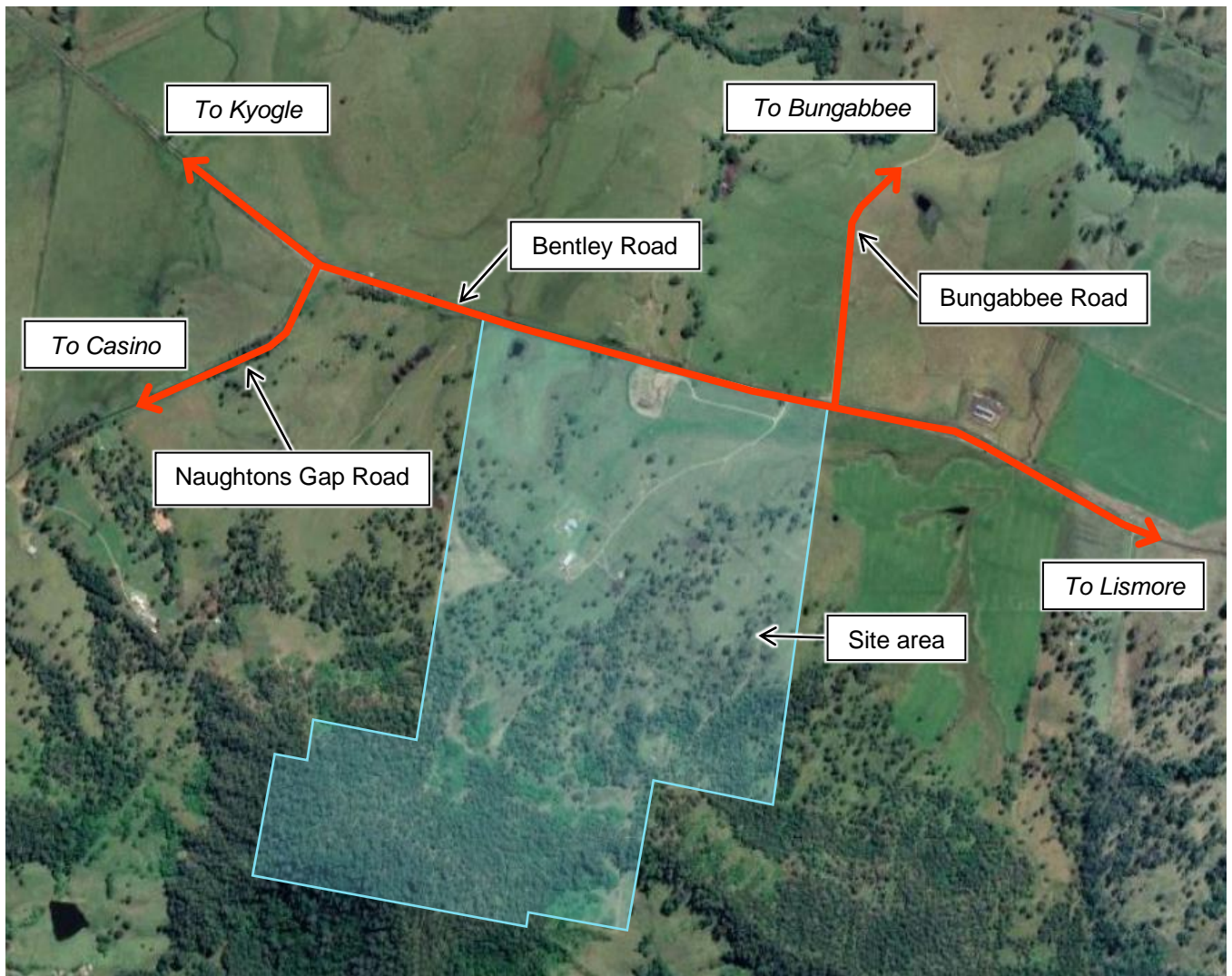


Figure 2.3 Local road network

Base image source: Google Maps, accessed July 2021

2.3.1 Bentley Road

Bentley Road is a regional arterial road managed by Richmond Valley Council and connects Summerland Way in the north-west to Kyogle Road in the south-east. Bentley Road forms part of the east-west route between Lismore and Kyogle. It is a two-way two-lane sealed line marked road with a posted speed limit of 100 km/h in the vicinity of the site. No parking, kerb and guttering, active transport infrastructure or street lighting is provided on Bentley Road in the vicinity of the site. Bentley Road is approximately 6.3 metres wide near the site area.

Traffic volume data has been obtained from Richmond Valley Council for 2006 and 2014 in the vicinity of the site. The locations of the counters used to collect this data are shown in Figure 2.4.

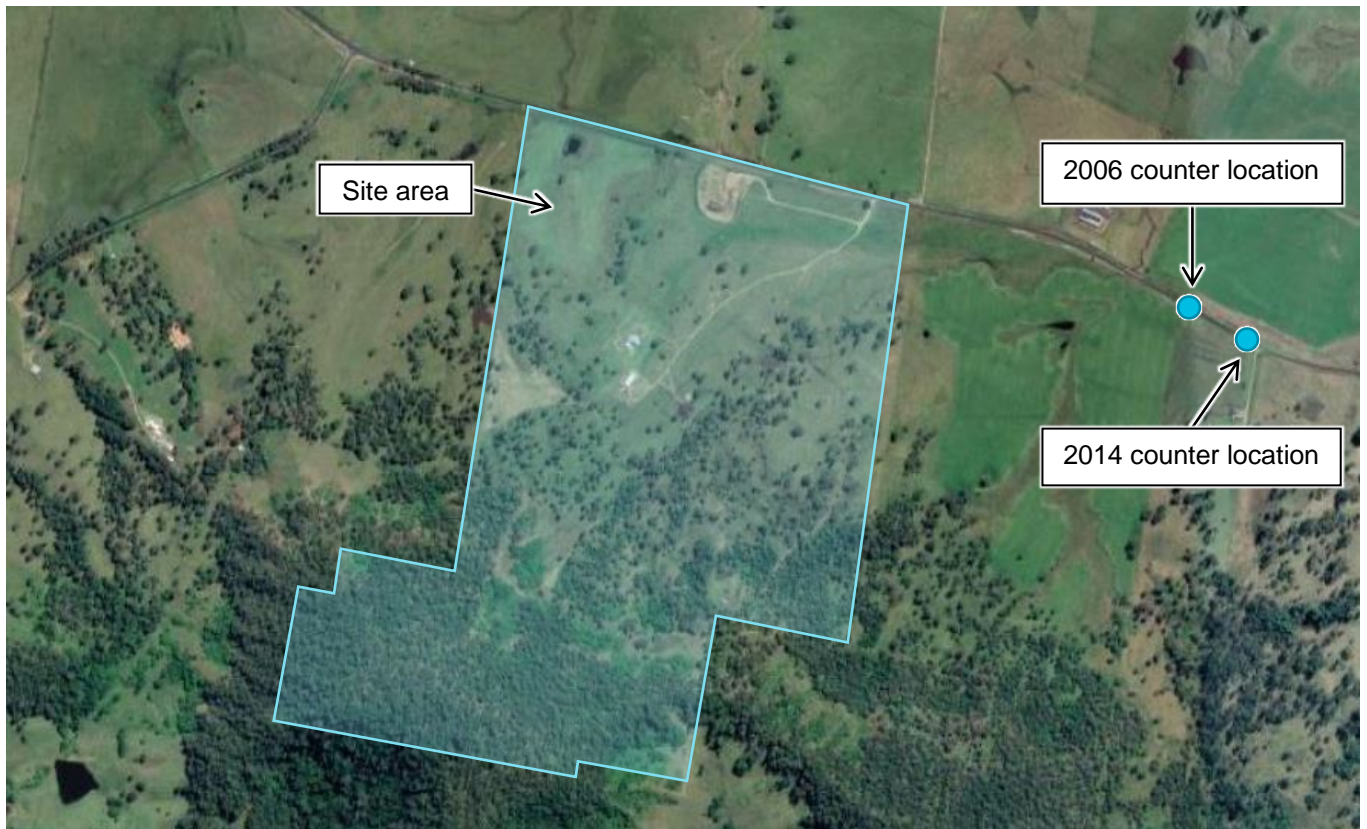


Figure 2.4 Bentley Road traffic counter locations

Base image source: Google Maps, accessed July 2021

In the vicinity of the site, Bentley Road carried approximately 3,500 vehicles per day (two-way) in 2014. The heavy vehicle component of traffic was approximately 5.7%. The 85th percentile speed on Bentley Road was approximately 97 km/h in 2014. During weekdays the average morning (AM) peak hour occurred between 8 AM and 9 AM, and the average evening (PM) peak hour occurred between 4 PM and 5 PM. The traffic profile of Bentley Road during an average weekday in 2014 is shown in Figure 2.5.

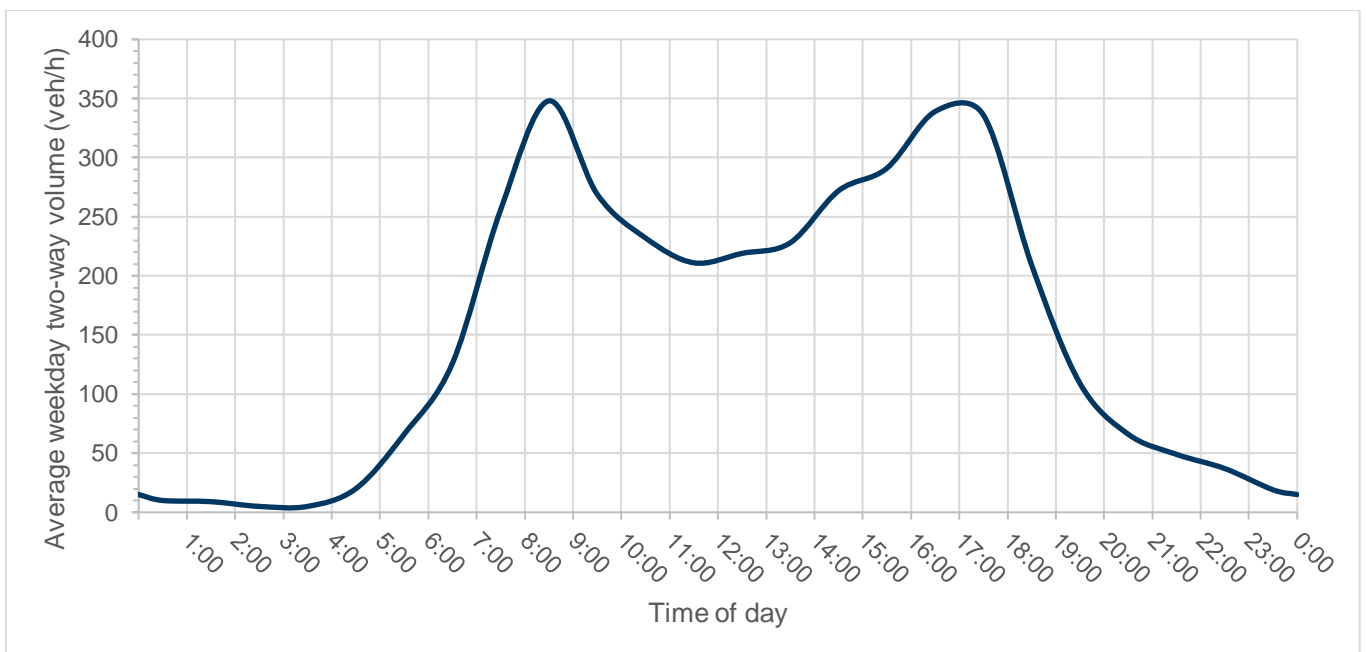


Figure 2.5 Bentley Road average weekday traffic profile 2014

Data source: Richmond Valley Council, accessed July 2021

Figure 2.6 shows photos of different views along Bentley Road captured during a site inspection on 18 March 2021.



Figure 2.6 Bentley Road (left image showing east of site access, right image showing west of site access)

2.3.2 Naughtons Gap Road

Naughtons Gap Road is a local road managed by Richmond Valley Council and connects Bentley Road in the north to Spring Grove Road, Casino in the south via Naughtons Gap and North Casino. It is a two-lane two-way road sealed road with a posted speed limit of 100 km/h in the vicinity of the site. Near the site, Naughtons Gap Road is unmarked with the exception of its intersection with Bentley Road. No parking, kerb and guttering, active transport infrastructure or street lighting is provided on Naughtons Gap Road in the vicinity of the site. Naughtons Gap Road is approximately 5.5 metres wide near the site area.

Traffic volume data has been obtained from Richmond Valley Council for 2005 and 2014 in the vicinity of the site. The locations of the counters used to collect this data are shown in Figure 2.7.

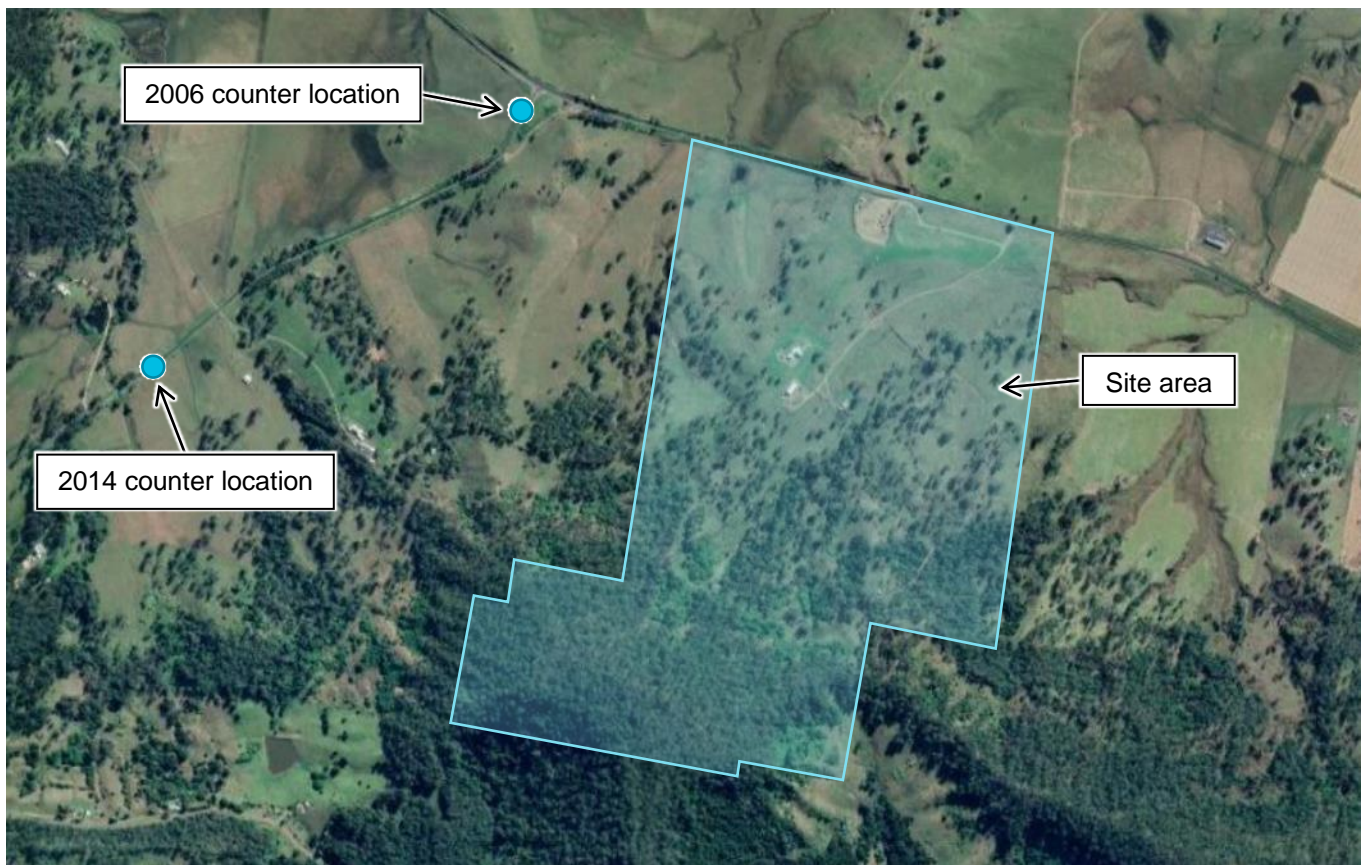


Figure 2.7 Naughtons Gap Road traffic counter locations

Base image source: Google Maps, accessed July 2021

In the vicinity of the site, Naughtons Gap Road carried approximately 660 vehicles per day two-way in 2014. The heavy vehicle component of traffic was approximately 57.4%. The 85th percentile speed on Naughtons Gap Road was approximately 119 km/h in 2014. During weekdays the average AM peak hour occurred between 8 AM and 9 AM, and the average PM peak hour occurred between 4 PM and 5 PM. The traffic profile of Naughtons Gap Road during an average weekday in 2014 is shown in Figure 2.8.

Figure 2.8 Naughtons Gap Road average weekday traffic profile 2014

Data source: Richmond Valley Council, accessed July 2021

2.3.3 Bungabbee Road

Bungabbee Road is a local road managed by Richmond Valley Council and is a gated single lane unsealed road providing access from Bentley Road to Bungabbee in the north. It does not have a posted speed, and it is likely that only low speed travel is possible on the unsealed surface. No parking, kerb and guttering, active transport infrastructure or street lighting is provided on Bungabbee Road.

2.4 Crash history

Crash data covering the five year period between 2015 to 2019 was obtained from Transport for New South Wales for the study area. Over this period there were 13 recorded crashes. Approximately 62% resulted in serious injury, 23% in non-casualty (tow-away) and 15% in moderate injury. The locations of the crashes in the study area and their severities are shown in Figure 2.9. A summary of the crash data is provided in Table 2.1.

Five crashes were recorded at the intersection of Bentley Road and Naughtons Gap Road. Four of the five crashes resulted in serious injury, three of which were 'right near' type crashes, and one was a 'cross traffic' type crash. The other crash was a 'right near' type crash that resulted in moderate injury. Four of the five crashes occurred during daylight, and the other occurred during dark conditions. The severity of these crashes may be attributed to the high speed zones on both of these roads, poor sight distance due to crest and curves in Bentley Road and poor gap selection when making right turns. This intersection is approximately 1.3km from the existing access point for the quarry and it cannot be determined that there is direct or indirect influence of the quarry activities to crashes at the intersection. The crashes at this intersection should be addressed under existing road safety improvement programs.

Three crashes were recorded on the north-western approach of Bentley Road to the Bentley Road / Naughtons Gap Road intersection. The severity of all three of these crashes was non-casualty (tow-away). Two were 'struck animal' type crashes, both of which occurred during dark conditions, and the other was an 'off road to left into object' type crash which occurred during daylight.

Three crashes were recorded on the south-eastern approach of Bentley Road to the Bentley Road / Naughtons Gap Road intersection. Two of these crashes resulted in serious injury. The one closest to the Bentley Road / Naughtons Gap Road intersection was an 'off road to left into object' type crash that occurred during dark conditions, and the other was an 'off road to right' type crash that occurred during daylight. The third crash on this approach was a 'rear end' type crash that occurred during daylight and resulted in moderate injury.

Two crashes were recorded on Naughton Gap Road, both of which occurred during daylight and resulted in serious injury. One was an overtaking 'cutting in' type crash and the other was an 'off right/left bend into object' type crash.

No crashes were recorded on Bungabbee Road, at the intersection of Bentley Road and Bungabbee Road or at the intersection of Bentley Road and the site access road during this period.



Figure 2.9 Crashes in the study area (2015 – 2019)

Image source: Interactive Crash Statistics, Transport for New South Wales, accessed July 2021

Table 2.1 Crash data summary (2015 – 2019)

| Location | Number of crashes | | Crash type(s) |
|----------------------------------|-------------------|----------|--|
| | Total | Casualty | |
| Intersection | | | |
| Bentley Road / Naughton Gap Road | 5 | 5 | Right near (4), cross traffic (1) |
| Midblock | | | |
| Bentley Road | 6 | 3 | Struck animal (2), off road to left into object (2), rear end (1), off road to right (1) |
| Naughton Gap Road | 2 | 2 | Cutting in (1), off right/left bend into object (1) |
| TOTAL | 13 | 10 | |

3. Proposed development

The proposed Bentley Quarry expansion involves a hard rock quarry with an expected annual maximum extraction rate of 300,000 tonnes per annum and a maximum daily extraction rate of 2,000 tonnes per day. The total area of disturbance would be 6.5 hectares with an extraction pit of 3.65 hectares. A maximum of 50,000 tonnes per annum of soil, topsoil and waste concrete would be imported to the site to be used for constructing landscape mounds, rehabilitation and blending with aggregate material on an ongoing basis.

The primary purpose of the quarry is to supply suitable aggregate resources for use as general fill and for the construction and maintenance of roads in the region.

The site has been used for resource extraction for many years, with obvious signs of benching from past operations. A small quarry operation continues at the site which operates under existing use rights. This limits the operation to 3,000 cubic metres (estimated to be 6,000 tonnes based on a conversion of 2 tonnes per cubic metre) and a disturbance footprint of approximately 1 hectare. No blasting or crushing occurs on-site. Due to increasing demand, it is proposed to increase the extraction rate and include blasting and crushing as part of the operation.

As part of the proposed expansion, it is proposed that the intersection of the site access road and Bentley Road be upgraded to better cater for the increased activity. The site access road would also be sealed to provide a stable surface for traffic and minimise dirt being tracked onto Bentley Road.

3.1 Construction phase

The construction phase of the Bentley Quarry expansion would be undertaken over one month. The main activity during this phase would be the construction of the site access road intersection with Bentley Road. Other activities would be as follows:

- Progressive installation of environmental controls including erosion and sediment control measures
- Vegetation clearance, soil stripping and stockpiling
- Construction of temporary drainage controls
- Importation of clean soil for landscape mounds to the east and west of the quarry
- Construction of a site office and car parking area

A dozer, excavator and haul trucks are the main items of equipment likely to be required during the construction phase. Other equipment may include the following:

- Roller
- Grader
- Water cart
- Compactor
- Light vehicles
- Hand tools

3.2 Operation phase

The quarry operations are expected to be carried out in stages and in response to demand.

Topsoil stripping would occur in stages prior to excavation. Generally, areas would be stripped immediately prior to quarrying. Overburden would either be stockpiled for future rehabilitation works or placed in final location as voids are created.

The main activities during operation of the quarry would include the following:

- Drilling and blasting
- Crushing and screening
- Blending
- Stockpiling

The main items of equipment likely to be required during the operation phase include the following:

- Dozer
- Excavators
- Jaw, cone and impact crusher
- Screen
- Front-end loader
- Grader
- Haul trucks
- Water cart
- Water pump
- Light vehicles
- Hand tools

3.3 Decommissioning

Decommissioning would involve the removal of the infrastructure, battering the top bench of the quarry, topsoiling and revegetating. Limited traffic movements are expected during decommissioning.

4. Traffic impacts

4.1 Construction phase

4.1.1 Trip generation

During the construction phase the traffic generated would primarily consist of heavy vehicle movements, mostly relating to the construction of the intersection of Bentley Road and the site access road. A few light vehicles would also access the site daily during the construction works. The traffic generated during construction is anticipated to be less than that generated during operation of the quarry. For the purposes of this assessment, it is assumed that the construction period will generate a peak rate of 100 vehicle trips per day that would occur evenly over a 10-hour period each weekday.

It is noted that the assumed traffic generated during the construction phase is less than that of the operation phase (see Section 4.2), and therefore the operation phase is considered the critical phase in terms of traffic impact.

4.1.2 Trip distribution

The source, destination and route of light and heavy vehicles accessing Bentley Quarry is difficult to predict, however it is assumed that vehicles would travel via various routes around the area via Bentley Road. R & S Contracting has indicated that approximately 60% of operation traffic will travel to and from the site via Bentley Road east of the site, approximately 30% will travel to and from the site via Naughtons Gap Road, and 10% will travel to and from the site via Bentley Road west of Naughtons Gap Road. The construction phase trip distribution has been estimated assuming these indicative proportions are also representative of construction vehicle movements and is summarised in Table 4.1.

The traffic volumes on Bentley Road and Naughtons Gap Road were extrapolated for the opening year of 2022 using annual linear growth rates calculated between the traffic survey years of 2006 to 2014 for Bentley Road and 2005 to 2014 for Naughtons Gap Road. The proportions of construction traffic movements were then added to the 2022 volumes to estimate the future volumes on each road.

Table 4.1 Construction phase trip distribution (vehicles per hour)

| Road section | Time period | 2014 volume | Estimated 2022 volume | 2022 volume with construction traffic | |
|--|-------------|-------------|-----------------------|---------------------------------------|-------|
| Bentley Road (east of the site access) | Daily | 3,731 | 5,025 | 5,085 | (+60) |
| | AM peak | 348 | 433 | 439 | (+6) |
| | PM peak | 339 | 440 | 446 | (+6) |
| Bentley Road (west of the site access) | Daily | 3,731 | 5,025 | 5,065 | (+40) |
| | AM peak | 348 | 433 | 437 | (+4) |
| | PM peak | 339 | 440 | 444 | (+4) |
| Naughtons Gap Road | Daily | 714 | 944 | 974 | (+30) |
| | AM peak | 85 | 157 | 160 | (+3) |
| | PM peak | 65 | 74 | 77 | (+3) |

4.1.3 Network impact

According to the Transportation Research Board's *Highway Capacity Manual* (2016), the typical lane capacity of two-lane two-way rural roads and highways is 1,700 passenger cars per hour per direction of travel. This is nearly independent of the directional distribution of traffic. That is, the capacity of two-lane two-way rural roads and highways per direction is almost unaffected by the proportion of vehicles travelling in each direction.

As shown in Table 4.1, the peak traffic volumes on Bentley Road during the construction phase are expected to be a maximum of 446 vehicles per hour (occurring east of the site access during the PM peak in 2022), which is well within the typical capacity per direction, regardless of the directional distribution of traffic. Similarly, the peak traffic volumes on Naughtons Gap Road during the construction phase are expected to be a maximum of 160 vehicles per hour (occurring during the AM peak in 2022), which is also well within the typical capacity per direction, regardless of the directional distribution of traffic. The construction is expected to have no noticeable impact on Bungabbee Road. Therefore, the proposed expansion works of the quarry and the access road intersection are expected to have minimal impact on the mid-block capacity, condition and efficiency of the local network during the construction phase.

The safety of the local network during the construction phase is not expected to be negatively affected, provided that the works are carried out with appropriate and compliant temporary traffic management. Construction works are expected to have some negative impact on travel times on Bentley Road due to reduced speed zones implemented as part of temporary traffic management for the works, however construction would be carried out over a brief period, following which it is expected the existing speed limits would be reinstated, and therefore the effect on local traffic is not expected to be significant.

4.2 Operation phase

4.2.1 Trip generation

4.2.1.1 Workforce traffic

During operation of the Bentley Quarry, it is assumed there would be a maximum of five workers or plant operators on the site at any one time. This would yield a daily workforce traffic generation in the order of 10 vehicle trips per day. It is assumed that five entry trips will occur during the AM peak hour and five exit trips will occur during the PM peak hour. Operating hours of the quarry have been assumed as follows:

- Monday to Friday: 7:00 AM to 6 00 PM
- Saturday: 7:00 AM to 2 00 PM
- Sunday or Public Holiday: Closed

It is anticipated the majority of the workforce would arrive between 6:30 AM and 7:30 AM and depart generally between 3:00 PM and 6:30 PM on weekdays.

It is noted that the assumed traffic generated during the operation phase is less than that of the construction phase (see Section 4.1), and therefore the operation phase is considered the critical phase in terms of traffic impact.

4.2.1.2 Heavy vehicle traffic

Truck and dog trailer combinations are expected to be used to transport the majority of incoming and outgoing material from the site and are the maximum size truck expected to access the site for this purpose. They have a capacity of about 32 tonnes. At maximum daily production (i.e. 2,000 tonnes), the quarry is conservatively expected to generate about 70 truck and dog loads or 140 truck movements per day. The truck movements are anticipated to start at 7 AM and continue evenly throughout the day until 5 PM on weekdays (i.e. 14 trips per hour). This rate of maximum truck movements is expected to be infrequent and for short durations. The average number of movements is expected to be significantly less and there would be times when no trucks would access the site.

The maximum of 50,000 tonnes per annum of soil, topsoil and waste concrete imported to the site for use in ongoing landscaping, rehabilitation and blending with aggregate material are proposed to be back loads, rather than additional loads. Therefore, for the purposes of this assessment no additional heavy vehicles movements beyond the assumed 140 truck per day are considered.

The delivery of equipment, such as crushers, will require different heavy vehicles a few times per year, but all heavy vehicles are expected to be less than 20 m in length as Bentley Road is not an approved B-double route.

4.2.2 Trip distribution

The source, destination and route of vehicles accessing Bentley Quarry is difficult to predict, however it is assumed they would travel via various routes to projects and customers around the area via Bentley Road. As discussed in Section 4.1.2, the construction phase trip distribution was calculated using the same proportions assumed for the operation phase. The traffic volumes for the opening of the quarry expansion and a 10-year horizon have been extrapolated and summarised in Table 4.2.

Table 4.2 Operation phase trip distribution (vehicles per hour)

| Road section | Time period | 2014 volume | Estimated 2022 volume | 2022 volume with operation traffic | | Estimated 2032 volume | 2032 volume with operation traffic | |
|---|-------------|-------------|-----------------------|------------------------------------|-------|-----------------------|------------------------------------|-------|
| Bentley Road (east of site access) | Daily | 3,731 | 5,025 | 5,115 | (+90) | 7,946 | 8,036 | (+90) |
| | AM peak | 348 | 433 | 445 | (+12) | 625 | 637 | (+12) |
| | PM peak | 339 | 440 | 452 | (+12) | 674 | 686 | (+12) |
| Bentley Road (west of site access) | Daily | 3,731 | 5,025 | 5,085 | (+60) | 7,946 | 8,006 | (+60) |
| | AM peak | 348 | 433 | 441 | (+8) | 625 | 633 | (+8) |
| | PM peak | 339 | 440 | 448 | (+8) | 674 | 682 | (+8) |
| Naughtons Gap Road | Daily | 714 | 944 | 989 | (+45) | 1,216 | 1,261 | (+45) |
| | AM peak | 85 | 157 | 163 | (+6) | 301 | 307 | (+6) |
| | PM peak | 65 | 74 | 80 | (+6) | 86 | 92 | (+6) |

4.2.3 Network impact

As shown in Table 4.2, the peak traffic volumes on Bentley Road during the operation phase are expected to be a maximum of 686 vehicles per hour (occurring east of the site access during the PM peak in 2032), which is well within the typical capacity for a two-lane two-way rural road or highway. Similarly, the peak traffic volumes on Naughtons Gap Road during the operation phase are expected to be a maximum of 307 vehicles per hour (occurring during the AM peak in 2032), which is also well within the typical capacity. The operation of Bentley Quarry is expected to have no noticeable impact on Bungabbee Road. Therefore, the proposed operations of the quarry are expected to have minimal impact on the mid-block capacity, condition, and efficiency of the local network during the operation phase.

As discussed in Section 2.4, the crash history in the vicinity of the study area does not indicate a history of crashes at the existing intersection. Increased vehicle movements turning in and out of the site may increase the potential for 'cross traffic' type crashes, particularly as Bentley Road is a high-speed road. However, provided the appropriate sight distances and turn treatments are met (see Section 4.3), the safety of traffic on the local network is not expected to be significantly impacted by the operation phase. The increase in vehicles at the intersection of Bentley Road and Naughtons Gap Road and the wider network as a result of the operation phase does not increase the exposure to the next risk level as per Safe Systems.

The increase in traffic on the local network during the operation phase is approximately 3% and is considered relatively low and within the typical hourly capacity of such roads, therefore the impact on local traffic is expected to be minimal. The classification of roads within the road hierarchy in NSW is based on their function, that is the role of the road in the regional network context. The function of roads in the local network is not expected to be altered by the small increase in traffic during the operation phase. The truck and dog trailer combinations with a capacity of approximately 32 tonnes that will be used during the operation phase comply with the General Mass Limit provided in Roads and Maritime Services' *Heavy vehicles chart*, and therefore have unrestricted access to the NSW road network. Therefore, the proposed access routes to and from the site are considered suitable to accommodate the specified type of haulage vehicles.

4.3 Access arrangements

As part of the Bentley Quarry expansion, it is proposed that the intersection of the site access road with Bentley Road be upgraded to facilitate safe passage of the expected vehicle trips.

4.3.1 Sight distance requirements

4.3.1.1 Approach Sight Distance

Approach Sight Distance (ASD) for cars is the minimum sight distance that must be available on minor road approaches to all intersections. This distance is measured from the driver's eye height (1.1 metres) to the pavement level at the holding line. ASD for trucks is the distance required for trucks approaching the intersection at 85th percentile operating speed to stop safely. It is measured from the driver's eye height (2.4 metres) to the pavement level at the holding line and is numerically equal to truck stopping sight distance. Trucks require a longer distance to stop than light vehicles, therefore the minimum requirements are assessed for trucks.

The required ASD for trucks for the site access road intersection with Bentley Road was calculated in accordance with Table 5.6 in the Austroads *Guide to Road Design Part 3: Geometric Design* (AGRD03-16, 2021). The operating speed on the site access road was conservatively assumed to be 50 km/h, the reaction time was taken as the desirable value of 2.5 seconds in accordance with AGRD03-16, and a flat grade of 0% was assumed. Therefore, the required ASD was determined to be 69 metres on approach to Bentley Road.

In constructing the intersection and any upgrade to the existing site access road it is recommended that the alignment of the site access road be such that this ASD is achieved.

4.3.1.2 Safe Intersection Sight Distance

Safe Intersection Sight Distance (SISD) is the minimum sight distance that should be provided on major road approaches to all intersections. This distance is measured along the carriageway from the conflict point to the approaching vehicle. It is measured from the driver's eye height (1.1 metres) to a point 1.25 metres above the road (representing the driver seeing the upper part of a car), assuming the driver on the minor approach is 7 metres from the conflict point, as per the Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (AGRD04A-17, 2021).

The SISD for the Bentley Road and site access road intersection was calculated in accordance with Equation 2 in the AGRD04A-17. The operating speed (V) on Bentley Road was assumed to be 97.2 km/h based on 2014 traffic data obtained from Richmond Valley Council. The reaction time was taken as the desirable value of 2.5 seconds in accordance with AGRD03-16, which was combined with an observation time of 3 seconds to produce a decision time (D_T) of 5.5 seconds. The coefficient of deceleration (d) for trucks was taken as 0.29 in accordance with AGRD03-16. On the eastbound approach, a downhill grade of 3.44% was calculated based on measurements taken onsite. Therefore, the required SISD on the eastbound approach of Bentley Road was calculated to be 294 metres.

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)} = \frac{5.5 \times 97.2}{3.6} + \frac{97.2^2}{254 \times (0.29 + 0.01 \times -3.44)} = 294.0 \text{ metres}$$

On the westbound approach of Bentley Road, an uphill grade of 3.44% was taken. Therefore, the required SISD on the westbound approach was calculated to be 263.2 metres.

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)} = \frac{5.5 \times 97.2}{3.6} + \frac{97.2^2}{254 \times (0.29 + 0.01 \times 3.44)} = 263.2 \text{ metres}$$

Sight distances measured on site determined that the eastbound sight distance is approximately 312.65 metres, and the westbound sight distance is approximately 467.28 metres with the intersection in its current location. These sight distances are in excess of the calculated SISD requirements, and therefore the intersection location is considered appropriate in this respect.

4.3.2 Turn treatments

The Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management* (AGTM06-20, 2020) includes guidance on the selection of turn treatments on a major road at unsignalised intersections. The major road volume parameter, Q_M , is calculated according to Figure 4.1.

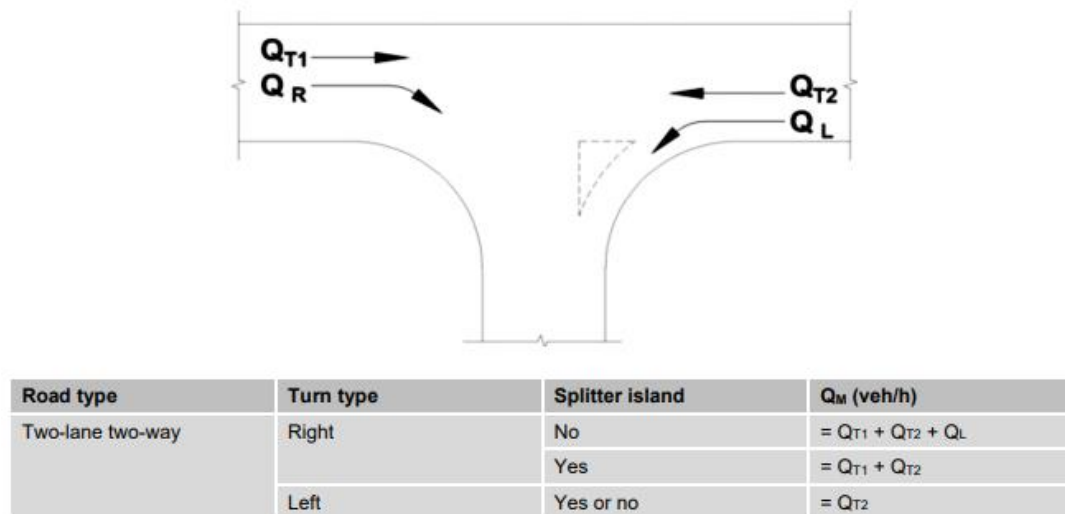


Figure 4.1 Calculation of the major road traffic volume parameter

Source: Figure 3.26, Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management* 2020, accessed August 2021

The maximum peak hour access movements to the site are anticipated to occur during the AM peak, according to data provided by R & S Contracting in relation to vehicles entering the site. Therefore, turning and through movements at the intersection of the site access road and Bentley Road were estimated based on traffic data obtained from Richmond Valley Council and trip generation and distribution data for the AM peak (see Section 4.2). These AM peak turning and through movements were applied in the determination of required turn treatments.

On Bentley Road the estimated 2032 two-way through movement volume during the AM peak is 625 vehicles per hour (refer to Table 4.2) with an anticipated volume of 12 vehicles per hour entering the site (i.e. five light vehicles and seven heavy vehicles). The directional split of the through traffic on Bentley Road is unknown. For the purposes of this assessment, it has been assumed that 60% of these through movements are westbound (Q_{T2}), and 40% are eastbound (Q_{T1}) to obtain a conservative value of Q_M for the left turn. To obtain a conservative value of Q_M for the right turn, it has been assumed that there will be no splitter island at the intersection. The turning volumes and major road traffic volume parameters for each turn movement are summarised Table 4.3.

Table 4.3 Bentley Road and site access road intersection volume parameters

| | Q_{T1} | Q_{T2} | Q_L | Q_R | Q_M |
|------------|----------|----------|-------|-------|-------|
| Left turn | 250 | 375 | 8 | - | 375 |
| Right turn | 250 | 375 | - | 5 | 633 |

Figure 4.2 provides guidance for turn treatments for design speeds greater than or equal to 100 km/h. As the speed limit on Bentley Road is 100 km/h, this guidance has been applied. The estimated turn movements have been used to determine the appropriate turn treatments as per Figure 4.2.

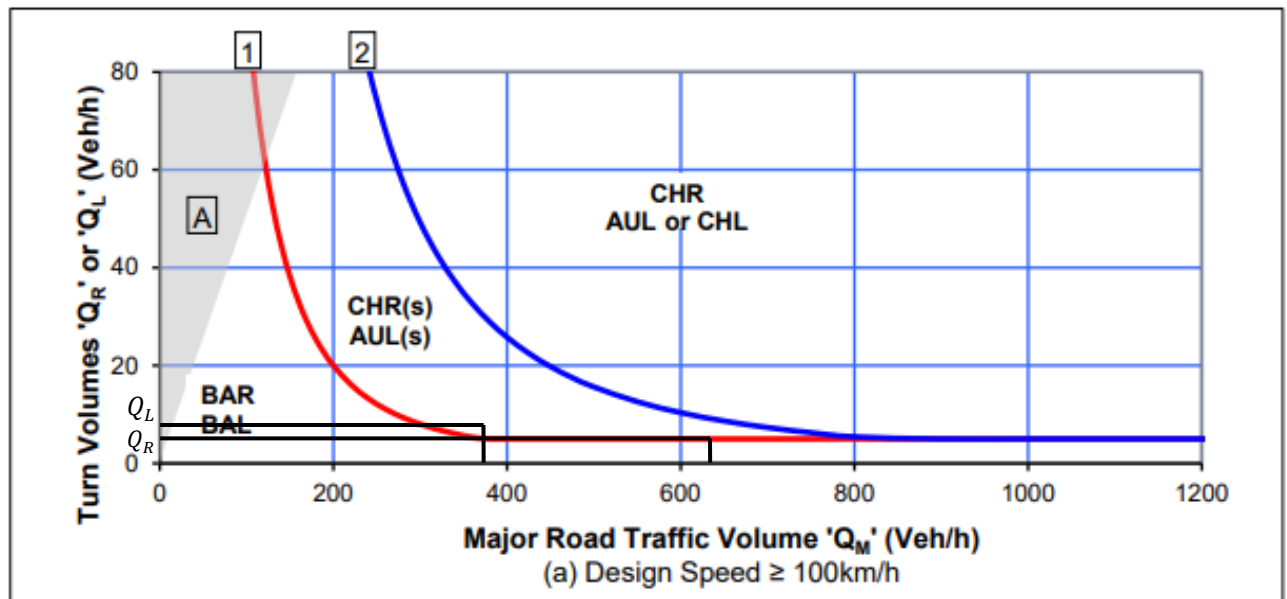


Figure 4.2 Warrants for turn treatments on the major road at unsignalised intersections for design speeds ≥ 100 km/h

Source: Figure 3.25, Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management, 2020, accessed August 2021

As shown in Figure 4.2, the traffic volumes warrant turn treatments for the right turn from Bentley Road to the site access road as a channelised right-turn (CHR(S)), and for the left turn as an auxiliary left-turn (short lane) (AUL(S)). An example of a CHR(S) turn treatment for a rural road is shown in Figure 4.3, and an example of an AUL(S) turn treatment for a rural road is shown in Figure 4.4.

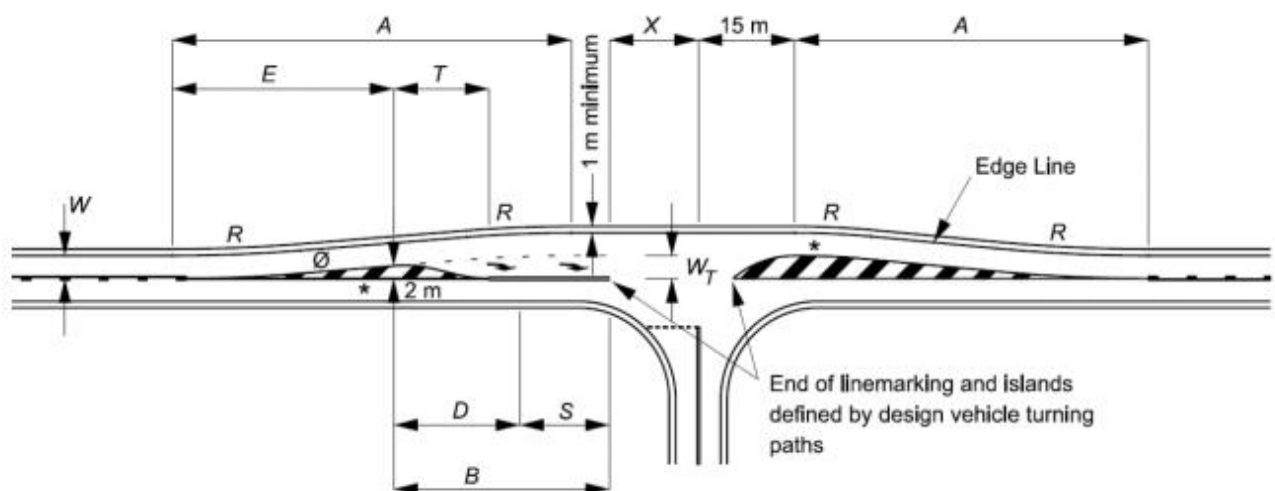


Figure 4.3 Channelised right-turn short lane (CHR(S)) treatment on a two-lane rural road

Image source: Figure A7, Austroads Guide to Road Design Part 4: Intersections and Crossings - General 2021, accessed August 2021

In Figure 4.3, A represents the lateral movement length, D represents the diverge/deceleration length, R represents the desirable radius and T represents the taper length. The Austroads *Guide to Road Design Part 4: Intersections and Crossing – General* (AGRD04-17, 2021) Table A4 provides dimensions of CHR(S) treatments for various design speeds. As the posted speed limit of Bentley Road is 100 km/h, the design speed is considered to be 110 km/h as per Table 3.2 in AGRD03-16. Therefore, according to AGRD04-17 Table A4, A is 95 m, D is 102 m (where a grade correction of - 4% has been applied as per AGRD04A-17 Table 5.3), R is 500 m and T is 30 m. These values are based on a turn lane width of 3.0 m, a diverge rate of 1 m/s, a 20% reduction in through road speed at the start of the taper to a stopped condition and deceleration of 3.5 m/s^2 , as per AGRD04-17. These values would be confirmed, or adjusted where necessary, during the design stages of the intersection.

Also in Figure 4.3, W represents the nominal lane width, E represents the distance from start of taper to 2.0 m width, B represents the total length of the auxiliary lane including taper, diverge/deceleration and storage, S represents the storage length to cater for one design turning vehicle, X represents the distance based on design vehicle turning path, and W_T represents the nominal width of turn lane, including widening for curves based on the design turning vehicle. The values of these dimensions would be determined in the design stages of the intersection.

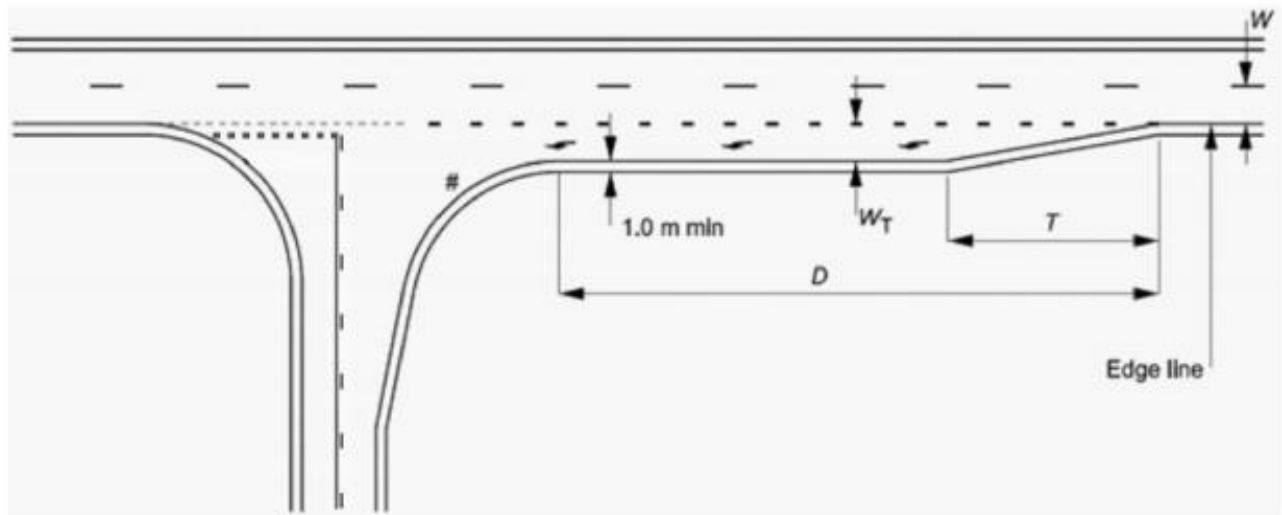


Figure 4.4 Auxiliary left-turn short lane AUL(S) treatment on a two-lane rural road

Image source: Figure 8.3, Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, 2021, accessed August 2021

In Figure 4.4, D represents the diverge/deceleration length and T represents the taper length. AGRD04A-17 Table 8.2 provides dimensions of AUL(S) treatments for various design speeds. As the posted speed limit of Bentley Road is 100 km/h, the design speed is considered to be 110 km/h. Therefore, according to AGRD04A-17 Table 8.2, D is 76.5 m (where a grade correction of +4% has been applied as per AGRD04A-17 Table 5.3) and T is 30 m. These values are based on a turn lane width of 3.0 m, a 20% reduction in through road speed at the start of the taper and deceleration of 3.5 m/s², as per AGRD04A-17. These values would be confirmed, or adjusted where necessary, during the design stages of the intersection.

Also in Figure 4.4, W represents the nominal lane width and W_T represents the nominal width of turn lane, including widening for curves based on the design turning vehicle. The values of these dimensions would be determined in the design stages of the intersection.

The CHR(S) and AUL(S) turn treatment dimensions have been adopted in the intersection upgrade concept design provided in Appendix A. A swept path assessment has been undertaken on the concept design. These concept designs will need to be refined during the detailed design phase.

Additionally, as the site access road is required to accommodate the turning movements of truck and dog trailer combinations, the swept paths of these vehicles will need to be considered in the design of both treatments.

5. SEARs

The Planning Secretary's Environmental Assessment Requirements (SEARs) for the proposed expansion of Bentley Quarry (EAR 1589) includes requirements for the Environmental Impact Statement (EIS) to address specific issues in relation to traffic and transport. The specific traffic and transport issues raised in EAR 1589 and the responses to each are shown in Table 5.1.

Table 5.1 SEARs requirements and responses

| Requirement | | Response |
|-------------|--|---|
| 1 | Accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products. | Predictions of the road traffic generated by the construction and operation phases of the proposed expansion of Bentley Quarry have been provided in Sections 4.1.1 and 4.2.1 respectively. Description of the types of vehicles likely to be used for transportation of quarry products is provided in Section 4.2.1.2. |
| 2 | An assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads. | An assessment of the potential traffic impacts has been provided in Section 4. |
| 3 | A description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development. | Assessment of the proposed development in accordance with the assumptions and limitations set out in this report indicate that the capacity, efficiency and safety of the road network will not be significantly impacted by the proposed expansion of Bentley Quarry over the period assessed. As such, no measures to maintain and/or improve the capacity, efficiency and safety of the road network have been considered, beyond the proposed upgrade to the intersection of Bentley Road and the site access provided in Section 4.3. |
| 4 | Evidence of any consultation with relevant roads authorities, regarding the establishment of agreed contributions towards road upgrades or maintenance. | At the initial pre-lodgement meeting with Council they advised Section 7.11 contributions would need to be paid, which was acknowledged. Lismore City Council (LCC) also made contact during the preparation of the EIS in regards to contributions, which we responded to by indicating the Applicant is willing to pay contributions to LCC but would not pay contributions to both Councils. Council were advised of LCC request and our response. |
| 5 | A description of access roads, specifically in relation to nearby Crown roads and fire trails. | Description of the site access road is provided in Section 2.2. Description of the nearby road network is provided in Section 2.3. Requirements for the intersection of the site access road with Bentley Road are provided in Section 4.3. |

6. Summary

This TIA has assessed the potential traffic impacts of the proposed expansion of Bentley Quarry on the local road network and reviewed the most appropriate site access arrangements. The conclusions and recommendations of the assessment are summarised as follows:

- The proposed construction phase is anticipated to have minimal impact on the mid-block capacity, safety and traffic on the local network.
- The proposed operation phase is anticipated to have minimal impact on mid-block capacity, safety, functionality of the road hierarchy and traffic on the local network.
- The proposed access routes to and from the site are considered suitable to accommodate the specified type of haulage vehicles.
- In constructing the intersection and any upgrade to the existing site access road it is recommended that the alignment of the site access road be such that an ASD of 69 metres is achieved on approach to Bentley Road.
- Sight distances on Bentley Road are in excess of SISD requirements.
- The traffic volumes warrant a turn treatment for the right turn from Bentley Road to the site access road with a CHR(S) treatment.
- The traffic volumes warrant a turn treatment for the left turn from Bentley Road to the site access road with an AUL(S) treatment.
- The swept paths of the proposed haulage vehicles have been undertaken on the concept design and will need to be considered in the detailed design of the intersection.

Based on the findings of this report, and subject to the recommendations outlined above, the proposed expansion of Bentley Quarry is supported on traffic grounds.

Appendix A

**Proposed Bentley Road Site Access
Intersection Upgrade Design**



NOTE
INTERSECTION DESIGN CRITERIA:
• DESIGN SPEED = 110km/hr.
• DESIGN VEHICLE = TRUCK AND DOG (20m)
• INTERSECTION TREATMENT = CHR(S) AND AUL(S)

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| | | | |
| A | ISSUED FOR COUNCIL DA | BL | 17.11.22 |
| Rev | Description | App'd | Date |



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Scale
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Project No.
12547851

R & S CONTRACTING Pty Ltd
BENTLEY QUARRY
Lot 2 DP 1196757, No. 1465 Bentley Road
BENTLEY ROAD SITE ACCESS
INTERSECTION PLAN

Sketch no.
12547851-SKT-0002

Size
A3
Rev no.
A



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Status code
S3

Scale
1:2500 for A3
Project No.
12547851

R & S CONTRACTING Pty Ltd
BENTLEY QUARRY
Lot 2 DP 1196757, No. 1465 Bentley Road
BENTLEY ROAD SITE ACCESS
INTERSECTION SITE DISTANCE PLAN

Sketch no.
12547851-SKT-0003

Size
A3
Rev no.
A



RIGHT TURN INTO SITE



LEFT TURN INTO SITE

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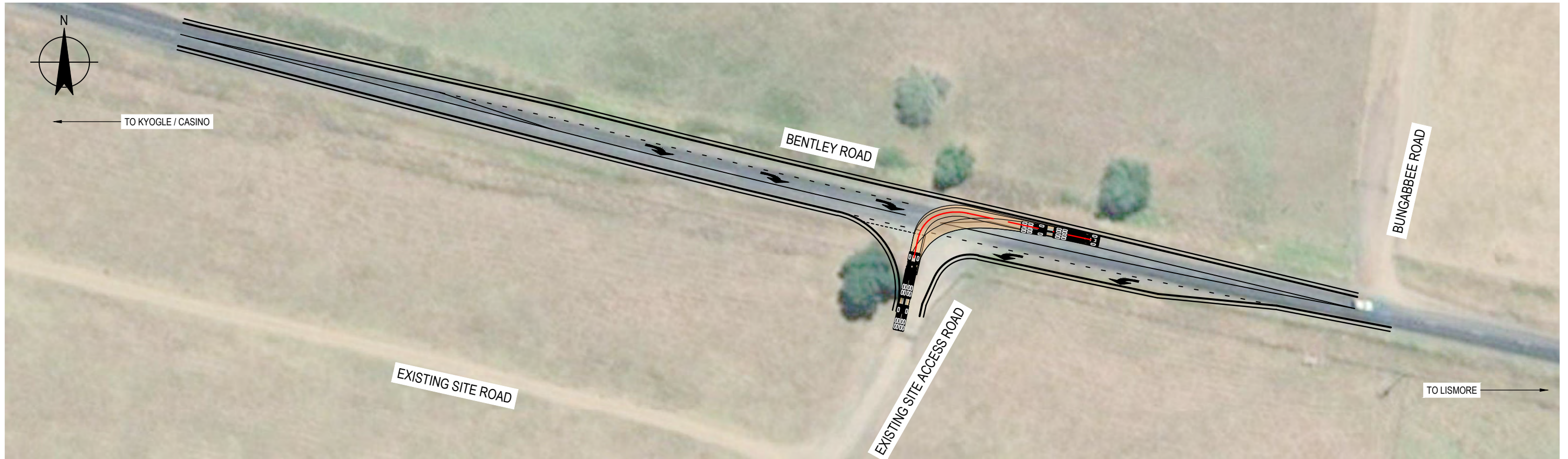
Status code
S3

Scale
1:1000 for A3
Project No.
12547851

R & S CONTRACTING Pty Ltd
BENTLEY QUARRY
Lot 2 DP 1196757, No. 1465 Bentley Road
BENTLEY ROAD SITE ACCESS
TURN PATHS - SHEET 1 OF 2

Sketch no.
12547851-SKT-0011

Size
A3
Rev no.
A

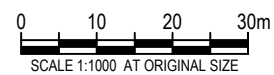


RIGHT TURN OUT FROM SITE



LEFT TURN OUT FROM SITE

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R & S CONTRACTING Pty Ltd
BENTLEY QUARRY
Lot 2 DP 1196757, No. 1465 Bentley Road
BENTLEY ROAD SITE ACCESS
TURN PATHS - SHEET 2 OF 2

Sketch no.
12547851-SKT-0012

Size
A3
Rev no.
A



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Attachment 2

Driver Code of Conduct



Drivers Code of Conduct

Bentley Quarry

R&S Contracting

18 November 2022

→ The Power of Commitment



| Project name | | Drivers Code of Conduct | | | | | |
|-----------------------|----------|---|----------|-----------|--------------------|-----------|----------|
| Document title | | Drivers Code of Conduct Bentley Quarry | | | | | |
| Project number | | 12547851 | | | | | |
| File name | | 12547851_RPT_Bentley Drivers Code of Conduct.docx | | | | | |
| Status Code | Revision | Author | Reviewer | | Approved for issue | | |
| | | | Name | Signature | Name | Signature | Date |
| S3 | A | B Luffman | S Lawer | | S Lawer | | 06/10/22 |
| S3 | B | B Luffman | S Lawer | | S Lawer | | 18/11/22 |
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Appendices

Appendix A Bus company consultation

DRAFT

1. Introduction

This Drivers Code of Conduct applies to trucks servicing Bentley Quarry, located at Lot 2 DP 1196757, 1465 Bentley Road, Bentley. It has been developed to outline the expectations of drivers hauling material from the quarry because:

- The quarry is operated near residences.
- The route used by heavy vehicles servicing the quarry is also used by local buses, including school buses.
- There is a need for the drivers of heavy vehicles to understand the limitations and conditions associated with quarry operations.

The Drivers Code of Conduct has been prepared to achieve, at a minimum, the requirements of the draft condition 59(b) of DA2022/0107, which is:

- b) Include a Driver Code of Conduct, including but not limited to:*
- *A map of the vehicle movement plan highlighting critical locations.*
 - *An induction process for vehicle operators and regular toolbox meetings.*
 - *Procedures for travel through residential areas, school zones and/or bus route/s.*
 - *Evidence of consultation with relevant bus service providers where applicable.*
 - *A complaint resolution and disciplinary procedure.*
 - *Community consultation measures proposed for peak extraction periods.*
 - *Work, health and safety requirements under the Work Health and Safety Regulation 2017*

1.1 Scope and limitations

This report: has been prepared by GHD for R&S Contracting and may only be used and relied on by R&S Contracting for the purpose agreed between GHD and R&S Contracting as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than R&S Contracting arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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

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

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

2. Operating hours

Heavy vehicles are not to arrive or leave the quarry outside of the approved operating hours of:

- Weekdays - 7.00 am - 6.00 pm
- Saturdays - 8.00 am - 1.00 pm

No heavy vehicles are to enter or leave the quarry on a Sunday or a public holiday.

3. Truck movements

Truck movements, inclusive of all incoming and outgoing trucks, shall not exceed 70 truck movements in any one day or seven truck movements in any hour.

4. Designated routes

Heavy vehicles travelling to and from the quarry must use the following routes (see Figure 6.1), unless there is no other way to access the delivery location:

East – Lismore

- Bentley Road/Kyogle Road

South – Casino

- Bentley Road/Naughtons Gap Road. If Naughtons Gap Road is not open, Manifold Road is to be used in the interim

West – Kyogle

- Bentley Road

North

- Bentley Road/Kyogle Road and then Rosehill Road

5. Speed limits

- All speed limits on the designated routes are to be observed.
- Heavy vehicles are to abide by the site speed limit on the access track to the quarry, which is 10 km/hr.
- Drivers will use two way radios in order to establish the position of heavy vehicles entering or leaving the quarry on the access road to ensure the safety of all heavy vehicle drivers and reduce queuing along the access road or designated route.
- Drivers of heavy vehicles will comply with any instructions given by quarry staff in relation to speed, position, entry and exiting of the quarry.
- Drivers of heavy vehicles should drive at a speed appropriate to the conditions and always observe speed restrictions relevant to the vehicle configuration.
- Vehicles may be fitted with speed limiters so that the manager can monitor truck speed and ensure vehicles do not exceed the maximum permitted speed limit.

6. No convoying

- Heavy vehicles are to leave at least 200 metres between the rear of each heavy vehicle and the front of each other heavy vehicle, whilst on the designated route.
- If on the designated route a heavy vehicle is placed in a situation where the distance between heavy vehicles is less than 200 metres, the heavy vehicle at the rear will slow down, or pull off the road at a safe place to allow the vehicle in front to proceed without convoying taking place.

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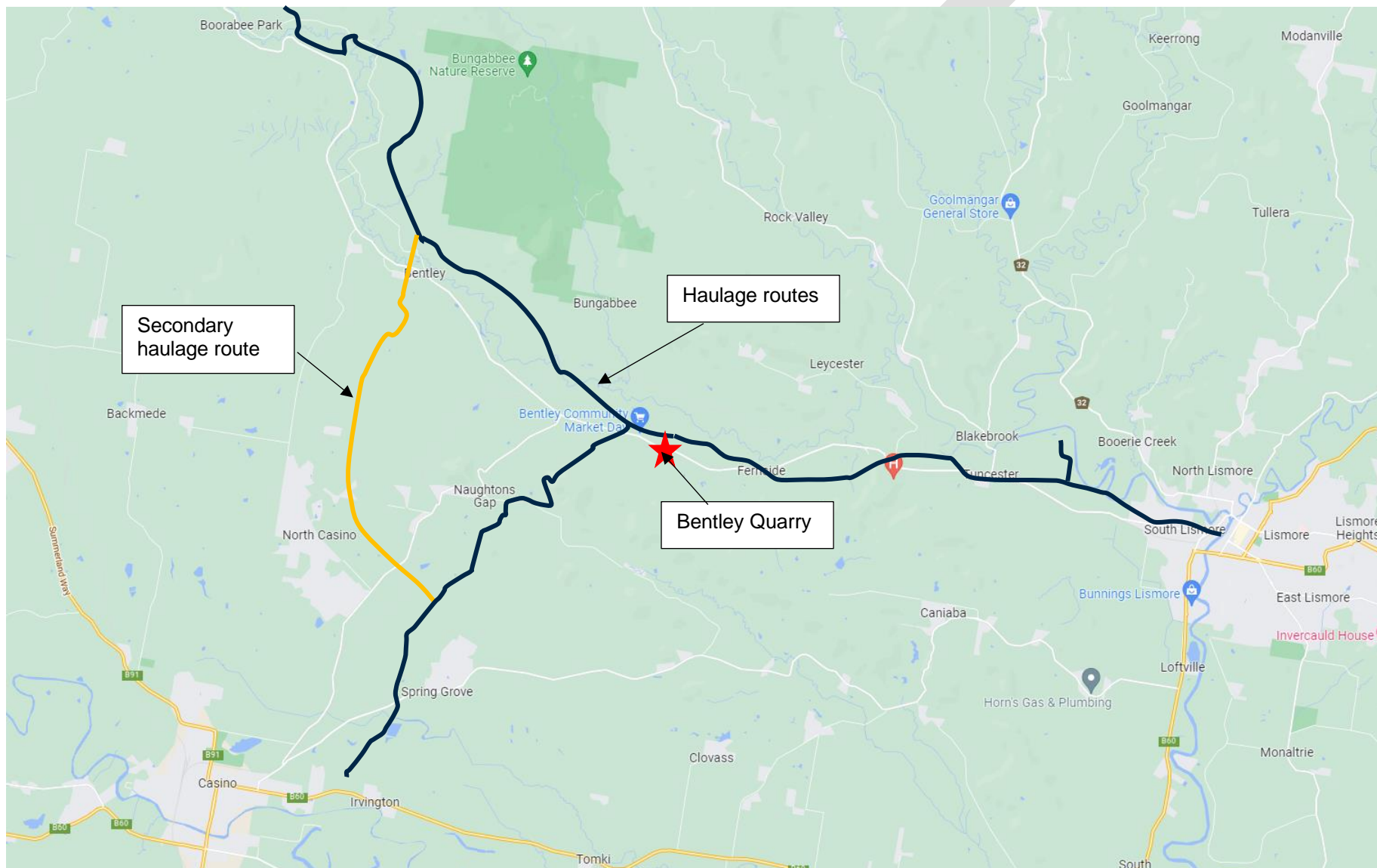


Figure 6.1 Designated routes for heavy vehicles associated with Bentley Quarry

7. Loads to be covered

- All loads are to be covered appropriately and properly so that material/ dust is not lost from the load.
- Drivers are to avoid any action that may cause pollution of the environment, over and above that created by works under normal circumstances.

DRAFT

8. The use of exhaust brakes

While heavy vehicles are on the designated routes, exhaust brakes are not to be used at any time.

DRAFT

9. Heavy vehicles and the public

Drivers of heavy vehicles must be:

- Conscious of the safety of others on the designated route
- Obedient to road rules
- Courteous towards other road users and pedestrians
- Consider the level of noise being made by their vehicles and keep noise to a minimum
- Conscious of actions that may cause pollution and avoid such actions

DRAFT

10. School bus requirements

Table 10.1 provides the school bus timetables, as advised by the bus companies (see Appendix A). In summary the peak periods for buses to operate on the designated route during the morning and afternoon are between:

- 7:15 am – 8:45 am
- 2.30 pm – 4.00 pm

Table 10.1 *Bus timetables*

| Company | Route | Morning | Afternoon |
|-------------------------|--|--------------------|--------------------|
| Casino Bus Service | Manifold Road, Naughtons Gap Road and Bentley Road | 7.15 am to 9.15 am | 2.30 pm to 4.30 pm |
| Sodhi Bus Services | Bentley Road | 8.00 am to 8.15 am | 3.35 pm to 4:00 pm |
| Casino Christian School | Bentley Road and Manifolds Road | 8.33 am to 8.40 am | - |
| | Manifolds Road and then west to Kyogle on Bentley Road | 8.45 am | 3.10 pm |

While it is not feasible to cease operations for the 3 hours school buses are operating on the haulage routes, the following measures will be enforced:

- Haulage during the above times will be minimised.
- Truck drivers are to be particularly cautious during the above times.
- The Quarry Manager will notify all truck drivers by UHF when buses are operating on the haulage routes and instruct heavy vehicle operators to be cautious.
- Heavy vehicles are to remain 500 m behind school buses and if the bus stops, slow to 40km before overtaking the bus.
- Be vigilant for school kids waiting by the side of the road and slow to 40km before passing them.

11. Rest stops

- Where it is reasonably practicable, sleep and breaks shall be taken where there is access to amenities such as toilets, showers and facilities for meals.
- Rests shall be taken in accordance with Table 11.1.

Table 11.1 Rest stops

| In any period of... | A driver must not work for more than a total of | And must have at least... |
|---------------------|---|--|
| 5 hrs 30 mins | 5 hrs 15 mins | 15 continuous mins rest |
| 8 hrs | 7 hrs 30 mins | 30 mins rest, in blocks of 15 continuous mins |
| 11 hrs | 10 hrs | 60 mins rest, in blocks of 15 continuous mins |
| 24 hrs | 12 hrs | 7 continuous hrs stationary rest |
| 7 days (168 hrs) | 72 hrs | 24 continuous hrs stationary rest |
| 14 days (336 hrs) | 144 hrs | 4 nights rest (includes 2 consecutive nights rest) |

Notes: Stationary rest is rest time that the driver spends out of the heavy vehicle or in an approved sleeper berth of a stationary regulated heavy vehicle.

A nights rest is 7 hours continuous rest taken between 10pm and 8am or 24 hours continuous stationary rest.

12. Glare

- Do not exit the quarry or enter from the west when there is a vehicle approaching from the east (Lismore) within 500 m because their visibility may be affected by the glare from the afternoon sun.

DRAFT

13. Emergency response

- In the event of an emergency:
 - Stop your vehicle immediately and secure it.
 - Ensure the safety of those around you and yourself.
 - Dial 000 and seek support from Police, Ambulance or Fire Brigade as required.
 - Contact the Quarry Manager and advise of the emergency.
 - Await further instructions from the Emergency Services, Quarry Manager or your supervisor.
- If a heavy vehicle driver becomes aware of a hazard or a circumstance that the driver considers dangerous the driver must immediately inform the Quarry Manager and if necessary, must deal with the hazard.
- Report all hazards and incidents to the Quarry Manager, Council and TfNSW.

14. Driver responsibilities and safety

The safety of heavy vehicle drivers, people employed and working with those drivers and people affected by the work of those drivers is to be a priority. As a result, drivers of heavy vehicles must be responsible for the following:

- Ensuring that they are fit, not suffering from fatigue, nor under the influence of drugs or alcohol and will cooperate in the undertaking of random drug and alcohol testing if required.
- That they are rested and alert prior to and during the time they are driving heavy vehicles.
- Monitor their own performance and take regular breaks and rest times as required by road safety legislation and requirements.
- Inspect their vehicle prior to start up and report any issues before proceeding with work.
- Use the designated routes when servicing the quarry.
- Inform the Quarry Manager of any matter that may affect the ability of the driver to undertake the tasks of driving a heavy vehicle.
- Stop driving the heavy vehicle and inform the Quarry Manager should the driver become aware of any issue that might endanger himself/herself or a member of the public.
- Ensure the load is appropriately covered.
- Ensure the heavy vehicle is appropriate for the load to be carried in it.
- Ensure that all safety equipment fitted to the vehicle works properly.
- Do not operate the vehicle unless the two way radio attached to the vehicle is working properly.
- Listen carefully and abide by instructions on the two way radio, particularly advice from the Quarry Manager.
- Use good road manners and operate the heavy vehicle safely and responsibly while considering the safety of himself/herself and the general public, in particular school children on the designated route.
- Complete all work diaries and timesheets properly and accurately and supply all necessary and appropriate paper work to the Quarry Manager if required.
- Ensure they are wearing the appropriate personal and protective equipment, including steel capped safety boots, high visibility clothing/vests and hearing protection.
- Understand and abide by all road rules, including speed limits, road signs, use of seatbelts, avoiding taking unnecessary risks, avoiding overhead obstructions, not driving in a convoy and always parking well off the road.

15. Complaint resolution and discipline procedure

The following outlines the procedure for when a traffic related complaint is received.

The Quarry Manager will deal with all complaints in a fair, timely and transparent manner and all complaints will be treated seriously. In the event that the allegation(s) is/are of an illegal nature, the Quarry Manager reserves the right to refer the matter(s) to the relevant authority.

The Quarry Manager will maintain confidentiality as far as possible and ensure that no one is disadvantaged for making, supporting or providing information about a complaint.

15.1 Complaints register

The Quarry Manager will keep a register of all complaints received, the register will record, where provided:

- Date of the complaint
- Time of the complaint
- Name of the complainant (if provided)
- How the complaint was made
- Detailed description of the complaint, including:
 - Location of incident
 - Time of incident
 - Vehicle registration or description of vehicle
 - Nature of the complaint
- What and when actions were taken to resolve the issue
- Details of when the complainant was informed of the response

15.2 Investigation

Once the Quarry Manager is satisfied that the complaint is substantiated, an investigation of the location and causes of the complaint will be undertaken.

To ensure fairness for everyone involved and to comply with natural justice processes, the Quarry Manager may provide the full details of the complaint to the person or people against whom the complaint has been made and ask for their response.

15.3 Response and disciplinary action

If after the investigation the Quarry Manager confirms the complaint is justified, an appropriate response will be implemented. The nature of the response will depend on the nature of the complaint, some typical complaints and responses are outlined in Table 15.1. This list of complaints and responses is not exhaustive, with even the responses outlined potentially being different to the actual response depending on the details of the complaint.

Table 15.1 Complaint responses

| Complaint | Response |
|--|---|
| Dangerous driving | Disciplinary action (refer to Table 15.2) |
| Tracking of material onto Bentley Road | Assess the effectiveness of cleaning practices and consider installing a rumble grid or other form of control. |
| Driving too fast | Disciplinary action (refer to Table 15.2) |
| Rocks on the road | Review vehicle cleaning practices and toolbox drivers on covering loads and cleaning vehicles before exiting the site |
| Noisy or smoky truck | Have truck inspected and serviced (if required) |
| Road damage | Report issue to Council |

If the complaint relates to driver behaviour the disciplinary action process will be enforced, as detailed in Table 15.2.

Table 15.2 Disciplinary action

| Warning | Details |
|---------|--|
| 1 | Driver will be warned for the breach and re-inducted. |
| 2 | Driver will be warned for the breach, re-inducted and the company of the driver will be notified that a second breach of the site rules has occurred by the offending driver. The result of this second breach will result in the driver being banned from the site for a period to be determined by management, depending on the severity of their actions. |
| 3 | The driver will be banned from hauling material to or from the quarry and the company of the driver will be notified of the ban. |

Following investigation of the issue, the Quarry Manager will provide feedback to the complainant that details the investigations undertaken, the result of the investigation and measures implemented to ensure that operations remain compliant. A description of any follow-up investigations and the response provided to the complainant will be recorded in the Complaints Register upon satisfactory closure of the issue.

16. Drivers Acknowledgement

I hereby acknowledge receipt of the Bentley Quarry Drivers Code of Conduct and I understand I need to strictly follow the requirements. I understand that if I do not follow the requirements of the Drivers Code of Conduct, I may not be allowed to haul material from or to Bentley Quarry. I have been advised that I have access to a copy of the Drivers Code of Conduct held in the Office.

Table 16.1 *Employee acknowledgement*

[illegible]

Appendix A

Bus company consultation

Ben Luffman

From: Donna Middleton
Sent: Monday, 26 September 2022 8:37 AM
To: Ben Luffman
Subject: FW: School Bus Routes

CompleteRepository: 12547851
Description: Bentley Quarry
JobNo: 12547851
OperatingCentre: 22
RepoEmail: 12547851@ghd.com
RepoType: Project

Hi Ben

Email from Casino Bus Service below.

Regards

Donna Middleton
Team Administrator

GHD

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Level 1 230 Harbour Drive Coffs Harbour NSW 2450 Australia
D +61 2 6650 5670 E donna.middleton@ghd.com

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From: Casino Bus <casinobus@kellambus.com.au>
Sent: Friday, 23 September 2022 8:10 AM
To: Donna Middleton <Donna.Middleton@ghd.com>
Subject: RE: School Bus Routes

Good Afternoon Donna

My apologies, I thought you were going to send me a copy of the route you guys were going to use and I would confirm if buses travelled the same route.

We do provide a bus service for Manifold Public School, on Manifold Road at Bentley Road junction, during the NSW School terms.

Our services travel on Manifold Road and sections of Naughtons Gap Road and Bentley Road, during NSW School terms, between the hrs of 7.15am to approximately 9.15am and afternoon from approx. 2.30pm to approximately 4.30pm.

Please keep in mind, depending which route you are travelling, other bus operators may also be using the roads you will be travelling on.

Kind Regards

Sharon White

Administrative Assistant
Casino Bus Service Pty Ltd
27 Dyraaba Street Casino NSW 2470
Ph: 02 6662 2561
Email: casinobus@kellambus.com.au



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While all care has been taken to ensure this message and attachments are virus free, Casino Bus Service accepts no responsibility for damage caused by this message or attached files.

From: Donna Middleton <Donna.Middleton@ghd.com>

Sent: Monday, 19 September 2022 2:26 PM

To: Casino Bus <casinobus@kellambus.com.au>

Subject: School Bus Routes

Hi Sharon

Was wondering when you would be able to find time to reply to my email below?

Regards

Donna Middleton
Team Administrator

GHD

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Level 1 230 Harbour Drive Coffs Harbour NSW 2450 Australia

D +61 2 6650 5670 E donna.middleton@ghd.com

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Please consider the environment before printing this email

From: Donna Middleton

Sent: Tuesday, 13 September 2022 2:49 PM

To: casinobus@kellambus.com.au

Subject: School Bus Routes

Hi Sharon

Thank you for speaking with me on the telephone today.

I was wanting to confirm that you provide school bus services for Manifold Public School which is located on the corner of Manifold and Bentley Roads (Lismore-Kyogle Road).

- You do not use Naughtons Gap Road now that it is inaccessible due to landslides
- The bus route travels along Manifold Road via Reynolds and Savilles Roads (Backmede) to Bentley Road
- Times for the school route and between 8.15 am to 9.15 am in the morning and 2.15 pm to 3.15 pm in the afternoon.

Your assistance would be very much appreciated.

Regards

Donna Middleton
Team Administrator

GHD

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Donna Middleton

From: School Office <admin@ccs.nsw.edu.au>
Sent: Wednesday, 14 September 2022 12:58 PM
To: Donna Middleton
Subject: Re: School Bus Routes

Hi Donna

Our Lismore AM bus travels from Lismore along the Kyogle/Bentley Road and turns off at Manifold Public School between 8.33 - 8.40am

Our Kyogle AM/PM bus travels to and from our school along Manifold Rd and then to Kyogle along Kyogle/Bentley Road, they are at Manifold School at 8.45 am and 3.10pm.

Thanks

On Tue, Sep 13, 2022 at 4:53 PM Donna Middleton <Donna.Middleton@ghd.com> wrote:

Thank you for your time on the telephone this afternoon.

Deb, I would be very appreciative if you would please confirm the routes of your school buses for works we are doing with Bentley Quarry.

- Morning – Bentley Road 8:35 am – Travels from ? to ? Along which roads?
- Morning – Kyogle 8:45 am travels from ? to ? Along which roads?
- Afternoon – Kyogle ?? pm travels from ? to ? Along which roads?

Regards

Donna Middleton

Team Administrator

GHD

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