Baralaba South Project

Traffic Impact Assessment

Prepared for: Baralaba South Pty Ltd

Ref: 300304981 | Date: 03 November 2023

Revision

Revision	Date	Comment	Prepared By	Approved By
A-Final	03 November 2023	Final	A. Tierney C. Berhardt	P. Robertson (RPEQ #26198)

Stantec Australia Pty Ltd

L3, 52 Merivale Street, South Brisbane QLD 4101

Acknowledgment of Country

In the spirit of reconciliation, Stantec acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples.

Limitations

CONTENTS

TRAFFIC IMPACT ASSESSMENT

Baralaba South Project

Appendices

1. Introduction

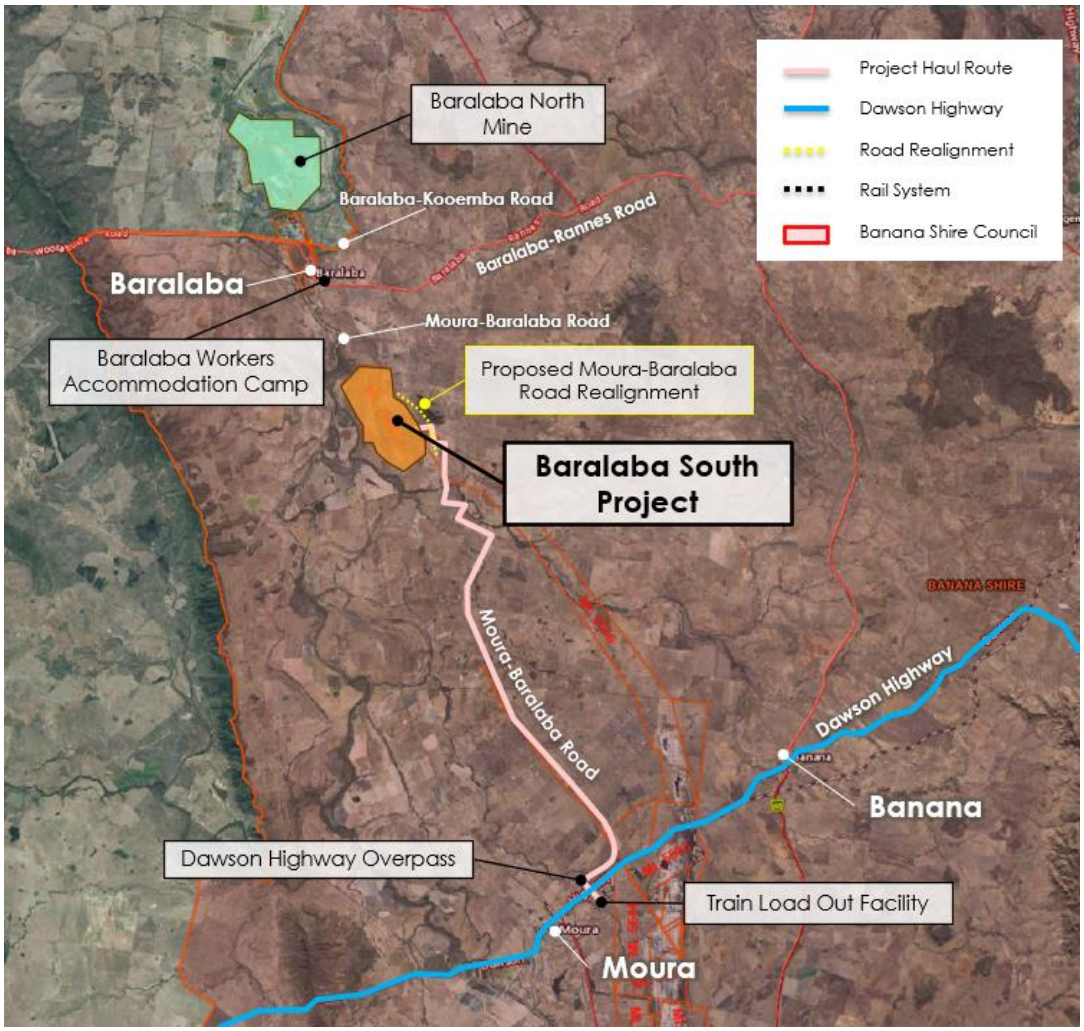
1.1 Project Background

Stantec Australia Pty Ltd (Stantec) was engaged by AARC Environmental Solutions Pty Ltd (AARC) on behalf of Baralaba South Pty Ltd (Baralaba South, the Proponent) to prepare a Traffic Impact Assessment (TIA) for the Baralaba South Project (BSP) Environmental Impact Statement (EIS) revision. The BSP is located approximately 8 kilometres (km) south of the township of Baralaba, within the Banana Shire Council Local Government Area (LGA). The BSP is approximately 115 kilometres west of Rockhampton, within the lower Bowen Basin region of Central Queensland.

The BSP is a proposed greenfield, open-cut metallurgical coal mine which is expected to extract up to 2.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal to produce pulverised coal injection (PCI) coal for export to international markets over an operational life of 23 years. BSP operations is proposed to overlap with the operations of Baralaba North Mine (BNM), maintaining a combined annual production of approximately 2.5 Mtpa product coal. The BNM operations are discussed further in Section 1.1.2.

The construction of BSP includes a realignment of Moura-Baralaba Road with two new site access intersections to be provided along the realigned road section. The realigned section of Moura-Baralaba Road requires the relocation of an approximate 4.5 km section of road within the Mining Lease Application (MLA) boundary. The BSP operations include coal haulage in ABB-Quad road trains between the BSP to a train loadout (TLO) facility located 40 km south, adjacent to the Dawson Highway. The proposed coal haulage route includes Moura-Baralaba Road and a private road connecting to the TLO facility via an underpass crossing the Dawson Highway. It is noted that whilst the TLO facility is adjacent to the Dawson Highway, the vehicles travel via a private road and do not access the State-Controlled Dawson Highway. The proposed BSP, existing BNM, TLO, and proposed realignment of Moura-Baralaba Road are shown in Figure 1.1.

Figure 1.1: Baralaba South Project Area



1.1.1 Baralaba South Project - Previous Assessments

A TIA was previously prepared by Cardno (now Stantec) in 2022 for the BSP (commissioned by Mount Ramsay Coal Company Pty Ltd). The previous assessment was undertaken for the same proposed mining lease area (for the BSP), with BSP coal extraction and haulage to occur concurrently with existing BNM operations. The previous assessment (like the current assessment) also proposed for existing operations of BNM to overlap with the construction and operation of the BSP, before being decommissioned – resulting in a transition of coal extraction and haulage operations from BNM to BSP.

The previous TIA included consideration of total peak product coal of 7.5 Mtpa comprising up to 4 Mtpa washed product coal from the BSP, and an existing 3.5 Mtpa product coal from the BNM. The previous TIA included an assessment of intersection, road link and road safety impacts. Relevant details and results of the previous TIA have been included within this report where applicable.

The BSP transport demands (operations phase) under the previous assessment included approximately 310 vehicle movements per day (one-way) split between two shifts, including the following:

- Workforce vehicle movements to support the approximate 440-person workforce arriving in passenger vehicles and buses from the Baralaba Workers Accommodation Camp, Baralaba township and surrounding townships.
- Coal haulage vehicle movements of up to 110 vehicles per day, undertaken by ABB-Quad type 2 road trains between the BSP and the TLO.
- Deliveries of equipment and materials of up to 20 vehicles per day, associated with mining operations (e.g. parts, oversized loads, explosives and fuel) originating from regional centres such as Gladstone and Rockhampton.

1.1.2 Existing Baralaba North Mine

The existing BNM operation is an open cut coal mine, located approximately 3km North of Baralaba within the Central Highlands Regional Council LGA. Current production levels at BNM are in the order of 1.8 Mtpa of coal. The mine produces PCI coal which is crushed and screened on site and transported to the Dawson Highway TLO facility, operated by Baralaba Coal and located approximately 60km south of the BNM site.

The BNM transport demands associated with the existing operations (based on information provided by the Proponent) include the following:

- Workforce vehicle movements to support the approximately 440-person workforce arriving in passenger vehicle (light vehicles) from the Baralaba Workers Accommodation Camp, Baralaba township and surrounding townships.
- Coal haulage vehicle movements of up to 49 vehicle movements per day, undertaken by ABB-Quad road trains between the BNM and the TLO.
- Deliveries of equipment and materials of up to 11 vehicles per day, associated with mining operations (e.g. parts, oversized loads, explosives and fuel) originating from regional centres such as Gladstone and Rockhampton.

Upon construction of the BSP, an initial transition phase of up to four years will facilitate the phase-out of operations and decommissioning of the existing BNM mine and wind up the BSP operations. It is noted that an overlap of operations at both mines is expected to occur. Under peak operations during the overlap transition period, the combined product coal transport from both BSP and BNM projects will temporarily surge to a combined 2.5 Mtpa.

After the transition period, production at BNM will cease, with coal production at BSP to reach approximate levels of the existing BNM operations. The BSP will operate using the same haul route and TLO facility currently in use by the BNM.

1.1.3 Coal Haulage Road Use and Infrastructure Agreement

Based on information provided by the Proponent, an existing 'Coal Haulage Road Use and Infrastructure Agreement' (CHRUIA) currently exists between Baralaba Coal Pty Ltd, Wonbindi Coal Pty Limited, and Banana Shire Council, establishing the allowable haulage activities, the obligations and standards for road maintenance, and any other relevant matters which are pertinent to the interest of the parties.

The haulage details within this agreement are guided by a 'Transport Management Plan' (TMP), allowing the haulage of up to 3.5Mtpa of coal with a predefined haulage route between BNM and the TLO facility. Specifically, haulage on public roads is limited to:

- Baralaba-Woorabinda Road;

- Baralaba-Kooemba Road;
- Theodore-Baralaba Road; and
- road reserve within the Dawson Highway (restricted access).

The following management plans were also developed and implemented under the existing agreement:

- school bus interaction management plan;
- stock movement interaction management plan;
- transport management plan; and
- road asset management plan.

The total peak coal haulage of the combined BNM and BSP is expected to reach 2.5Mtpa, below the current 3.5Mtpa allowable under the existing TMP and CHRUIA for BNM only. Given that the BSP haulage routes are to use the same roads currently used for BNM operations, it is expected that the existing TMP and CHRUIA will need to be amended for the revised haulage locations - travelling from BSP, south of Baralaba (post transition from BSP to BNM).

1.2 Purpose of this Report

It is understood that the previous TIA has already responded to Council's comments on the previous 7.5Mtpa combined project haulage. As such, the scope of this assessment and methodology have been prepared consistent with the previous TIA, modified to respond to the revised mine plan and coal production strategy.

This report sets out an assessment of the expected transport implications resulting from the construction and operational activities associated with the BSP (including consideration of the existing BNM operations). Specifically, this report considers the following:

- Existing traffic conditions proximate to the BSP, including an assessment of the haul roads expected to service the project.
- Expected traffic volume of heavy vehicle haul movements associated with the transport of equipment and materials for the construction of the BSP, movements associated with haulage during operations, and associated workforce journey-to-work traffic generated by each of these phases.
- The expected transport impact of the BSP and its associated activities on the surrounding road network (at both link and intersection levels).
- Proposed changes to road-related infrastructure planned and/or required by the BSP.
- Identification of methods and strategies to reduce and identified transport impacts.

This report has been prepared in accordance with the TMR (2018) *Guide to Traffic Impact Assessment (GTIA).*

1.3 References

This TIA has been prepared with consideration of the following reference resources and documents:

- TMR (2018) Guide to Traffic Impact Assessment (GTIA).
- TMR (2022) Road Planning and Design Manual (2nd Edition) – Volume 3: Supplement to Austroads Guide to Road Design Part 4A (RPDM Volume 3: Part 4A).
- TMR Queensland Transport and Roads Investment Program 2034-34 to 2026-27 (QTRIP).
- Austroads (2020) Guide to Traffic Management Part 3: Transport Studies and Analysis Methods (AGTM-03).
- Austroads (2023) Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (AGRD-04A).
- Traffic count data undertaken by Austraffic on Tuesday 29 January 2019 for the following intersections:
    - Baralaba Rannes Road / Wooroonah Road.
    - Wooroonah Road / Baralaba Accommodation Camp Access.
    - Baralaba Rannes Road / Theodore Baralaba Road.
    - Moura-Baralaba Road (Theodore Baralaba Road) / Train Loadout (TLO) Private Haul Road.
- Other background data and project input assumptions as agreed with the Proponent.

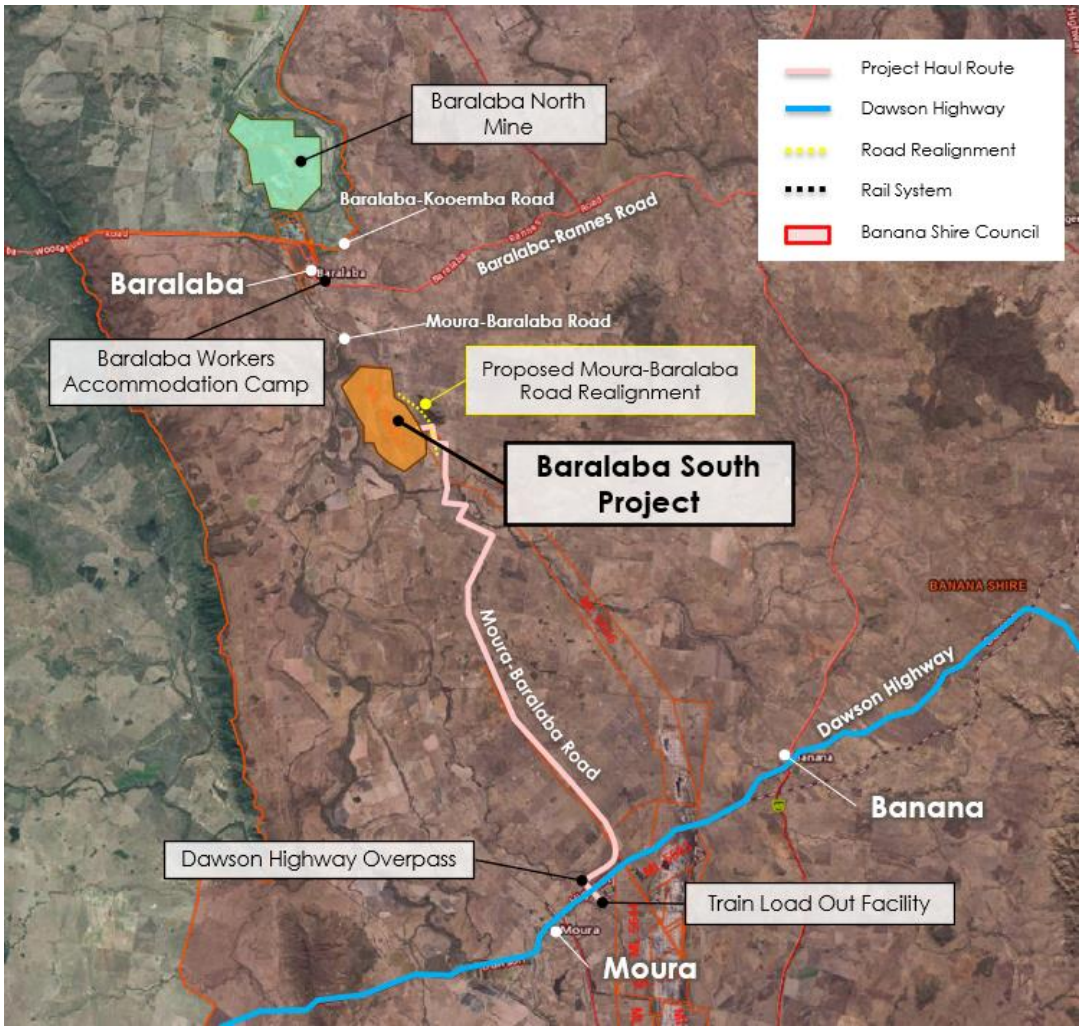
2. Project Description

2.1 Project Location

The BSP will be constructed over Mining Lease (ML) 700057, covering an area of approximately 2,214 ha (as shown in Figure 2.1). The BSP is to be located 8km south of Baralaba, within the Banana Shire LGA, with the land classified as 'Rural' under the Banana Planning Scheme 2021 Banana Shire Zoning Map. It is also noted that the existing BNM, located north of Baralaba, is located within the Central Highlands Regional Council LGA.

Access to the BSP is along Moura-Baralaba Road (which is to be realigned along the boundary of the MLA). Under the existing haulage route for BNM, access to the TLO facility is via Moura-Baralaba Road and a private haul road underpass (crossing under the Dawson Highway).

Figure 2.1: Baralaba South Project Site and Environs



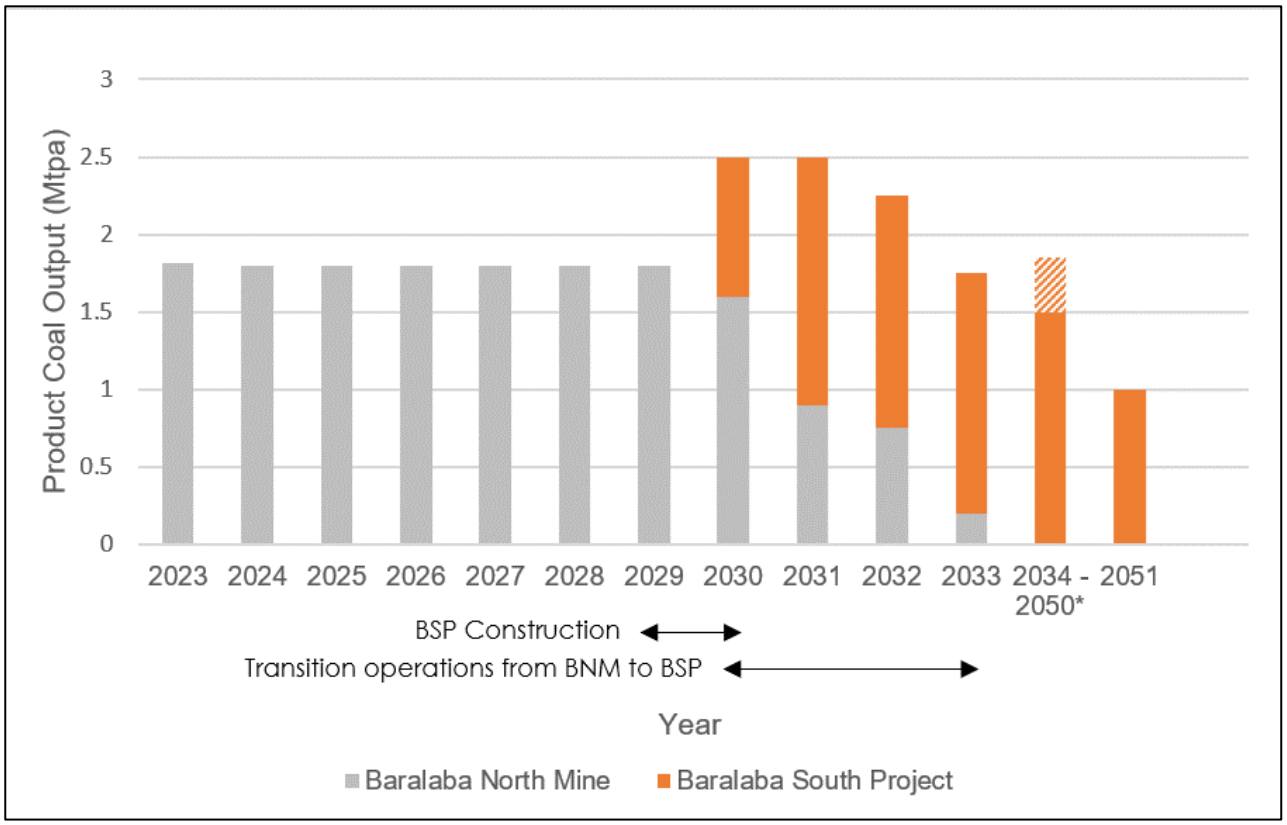
2.2 Project Schedule

Construction of the BSP is planned to be completed over a period of approximately two years commencing in 2029. Realignment of Moura-Baralaba Road is also scheduled to occur in 2029 to align with 2030 operations of the BSP. Upon completion of construction in 2030, it is understood that operations will commence immediately at the BSP.

At commencement of the BSP operations in 2030, a transitional period will occur during which BNM will phase-down operations and BSP operations will phase-up (i.e. both mines will operate concurrently). This transition from the BNM operations to BSP operations is expected to occur over a four-year period. During the transition period, the combined total annual product coal is expected to increase from 1.8 Mtpa to 2.5 Mtpa between 2030 and 2032.

Following 2032, operations at BNM will cease and BSP will maintain production between 1.5 Mtpa and 1.85 Mtpa product coal between 2034 and 2050. The final production year for the BSP is expected to occur in 2051. The forecasting of coal production for both the BSP and BNM mines (between 2023 and 2051) has been provided in Figure 2.2.

Figure 2.2: Baralaba Mine Forecast Operations – BNM and BSP Coal Product Output (Mtpa)



*BSP Product coal output ranging between 1.5 Mtpa to 1.85 Mtpa from 2034 to 2050.

2.3 Workforce Projections and Traffic Generation

2.3.1 Workforce Projections

The Proponent has advised the BSP workforce for both construction and operations periods, inclusive of the transitional period requiring workforce at the existing BNM.

The Proponent has advised that a peak construction workforce of 268 staff would be required in 2029 (the first year of construction), reducing to 40 construction staff in 2030 (second year of construction).

The operational workforce, inclusive of operators, maintenance, drill and blast staff, haulage crew, and TLO is expected to reach a combined maximum of approximately 700 staff during combined operations of BNM and BSP. The BSP operations for production of approximately 1.8 Mtpa is expected to require a peak workforce of an estimated 521 staff, reflective of the existing workforce requirements to support the BNM operations.

The projected workforce requirements have been summarised in Table 2.1.

Table 2.1: Project Workforce Projections – Daily Persons on Site

Year	Baralaba South Project		Baralaba North Mine	Total Workforce	Change from Baseline [1]
	Construction	Operations (Mine & Haulage)	Operations (Mine & Haulage)		
2028	-	-	443	443	-
2029	268	-	442	710	+268
2030	40	277	393	710	+268
2031	-	488	222	710	+268

Year	Baralaba South Project		Baralaba North Mine	Total Workforce	Change from Baseline [1]
	Construction	Operations (Mine & Haulage)	Operations (Mine & Haulage)		
2032	-	459	165	624	+182
2033	-	474	26	500	+58
2034	-	488	-	488	+46
2035	-	521	-	521	+79
2036 – 2051	-	448	-	448	+6

[1] Baseline determined as on-going workforce demands of current BNM operations.

2.3.2 Workforce Vehicle Demand

Forecast traffic generated by the construction and operations workforce has been based on information provided by the Proponent, including the existing workforce personnel projections summarised in Section 2.3.1. The following workforce assumptions have been provided by the Proponent to inform the likely vehicle demand associated with the BSP mine activities:

For the construction and operations workforce:

- 25% of the workforce are expected to live within 100km of the BSP (self-accommodated), and travel to the BSP via private vehicle on a daily basis.
- 75% of the workforce will be accommodated at the Baralaba workers accommodation camp, travelling by private vehicle or light company vehicles into the accommodation camp and between the accommodation camp and BSP.
- A portion of the staff accommodated at the Baralaba workers accommodation camp are work fly-in/fly-out (FIFO) and drive-in/drive-out (living within 5 hours of Baralaba), which have been estimated as up to 72 light vehicle movements (to both west of Baralaba and east towards Rockhampton and Gladstone)
- Construction and operations are expected to operate generally 24 hours per day, 7 days per week. It is noted that assumptions have been based on 335 days per year to account for inclement weather.
- Construction and operations workforce will be based on 2 daily shifts, with 50% of the workforce allocated to each shift.
- All vehicle movements associated with shift changeover has been conservatively assumed to occur during the background network peak hour.

Additionally, passenger vehicles are assumed to have an occupancy of 1.2 person per light vehicle.

Based on the above assumptions, the workforce associated with the BSP is expected to result in the following vehicle movements:

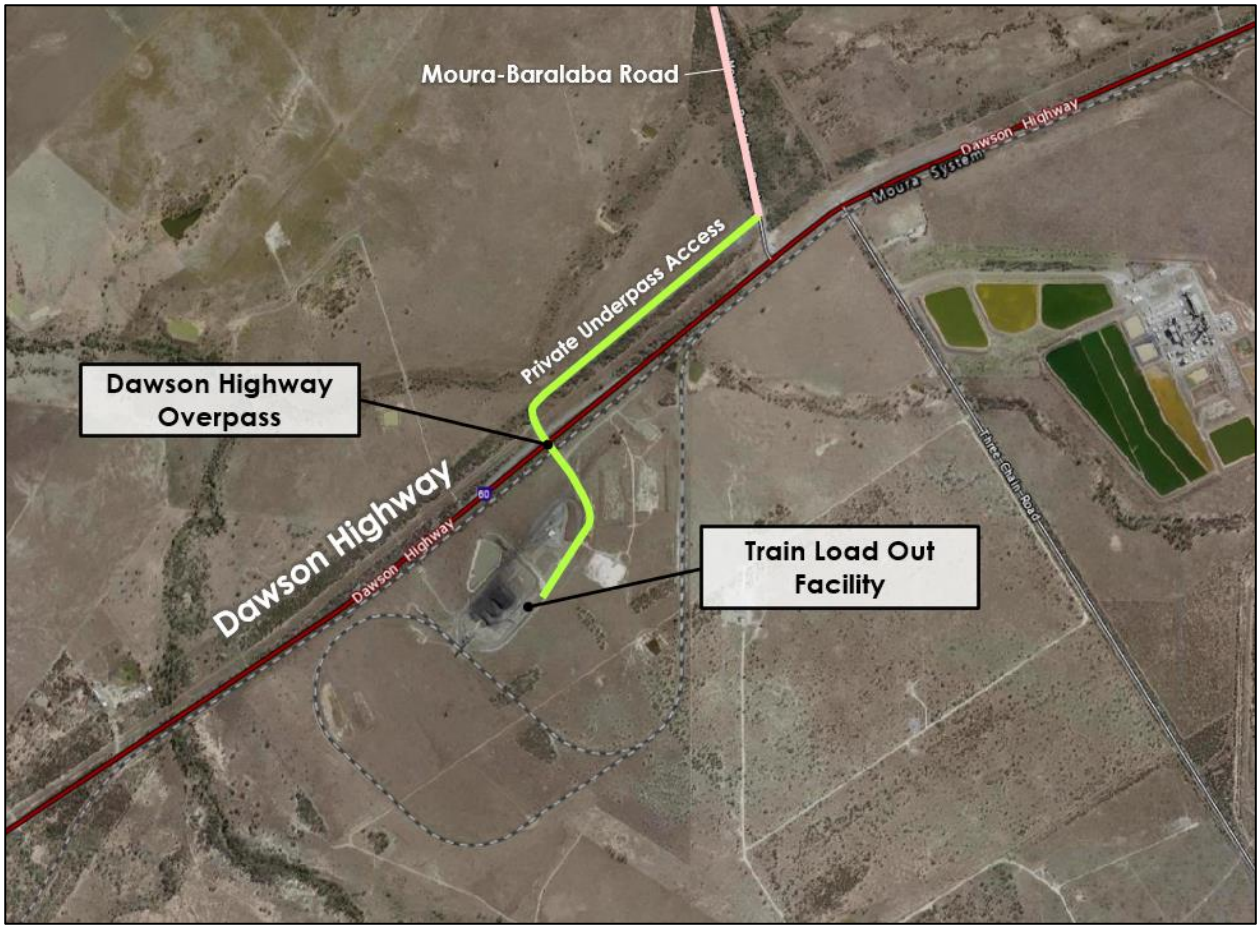
- In the order of 570 (two-way) light vehicle movements per day associated with construction (inclusive of 48 light vehicle movements for FIFO/DIDO staff).
- In the order of 1060 (two-way) light vehicle movements per day during operations (baseline) (inclusive of 72 light vehicle movements for FIFO/DIDO staff).

Traffic demands inclusive of workforce movements and heavy vehicle movements associated with both deliveries and coal haulage are detailed further in Section 4.

2.3.3 Coal Haulage Vehicle Demand

The expected traffic generation associated with BSP coal haulage has been provided by the Proponent and has been forecast based on haulage characteristics associated with existing BNM operations. Coal haulage is to be undertaken by ABB-Quad Type 2 Road Trains with a payload of 110 tonnes. The haulage vehicle route is along Moura-Baralaba Road between the BSP site access and the TLO. As shown in Figure 2.3, access to the TLO from Moura-Baralaba Road is provided using a private underpass road and avoids the use of any State Controlled Roads (i.e. the Dawson Highway) for coal haulage movements.

Figure 2.3: Coal Haulage Route – Private Road Access to Train Load Out Facility



2.3.4 Other BSP Vehicle Demand

Other heavy vehicle movements to support the BSP have been provided by the Proponent and have been based on the existing deliveries and other heavy vehicle requirements associated with the current BNM operations. It is expected that the majority of deliveries for supplies such as fuel, parts, explosives, and waste collection will predominantly originate from Gladstone and Rockhampton. The vehicles expected to complete these deliveries will consist of varying vehicle types including small trucks, semi-trailers and B-doubles.

The primary haulage routes are via Moura-Baralaba Road and Baralaba-Rannes Road. Further detail on haulage routes from Rockhampton and Gladstone are detailed in Table 2.2.

2.3.5 Principal Haulage Routes

The primary access routes from each origin for movement of personnel or equipment into the BSP is summarised in Table 2.2.

Table 2.2: Proposed Haulage Routes

Movement Description	Origin	Destination	Route
Deliveries	Rockhampton	BSP – South Access	• Bruce Highway (Rockhampton to Capricorn Highway) • Capricorn Highway (Bruce Highway to Leichhardt Highway) • Leichhardt Highway between Capricorn Highway and Baralaba-Rannes Road • Baralaba-Rannes Road • Moura-Baralaba Road

Movement Description	Origin	Destination	Route
Deliveries	Gladstone	BSP – South Access	• Dawson Highway (Gladstone to Moura) • Baralaba-Banana Road • Moura-Baralaba Road
Workforce – Camp to BSP	Baralaba Accommodation Camp	BSP – North Access	• Wooroonah Road • Baralaba-Rannes Road • Moura-Baralaba Road
Workforce – Rockhampton to Camp	Rockhampton	Baralaba Accommodation Camp	• Bruce Highway (Rockhampton to Capricorn Highway) • Capricorn Highway (Bruce Highway to Leichhardt Highway) • Leichhardt Highway between Capricorn Highway and Baralaba-Rannes Road • Baralaba-Rannes Road • Wooroonah Road
Workforce – Gladstone to Camp	Gladstone	Baralaba Accommodation Camp	• Dawson Highway (Gladstone to Moura) • Baralaba-Banana Road • Moura-Baralaba Road • Baralaba-Rannes Road • Wooroonah Road
Workforce – West of Baralaba to Camp	West of Baralaba	Baralaba Accommodation Camp	• Fitzroy Development Road • Baralaba-Woorabinda Road • Moura-Baralaba Road • Wooroonah Road
Coal Haulage	BSP – South Access	TLO Facility	• Moura-Baralaba Road (Middle Road) • Private Road

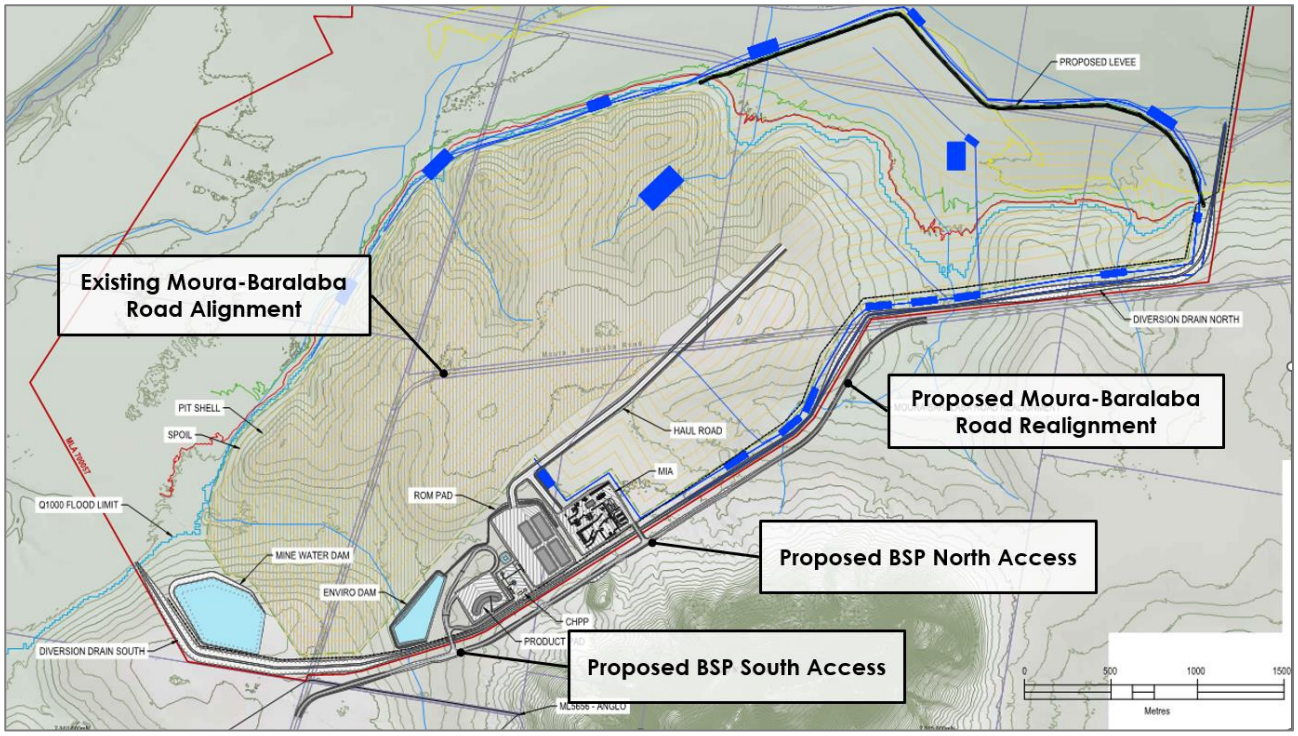
2.4 Proposed Mine Accesses and Road Realignment

The primary access to the BSP will be via two new access roads connecting to the realigned section of Moura-Baralaba Road. The proposed north access will support access for all workforce vehicles, and the proposed south access will support access for all heavy vehicles, including coal haulage and delivery activities.

The proposed BSP accesses will require the realignment of an approximately 4.5km of the existing Baralaba Mine Haul Route along Moura-Baralaba Road. The proponent will work with Banana Shire Council to provide safe movement for the public with minimum disruption to existing patterns of movements while allowing mine operations to occur. The suitability of the proposed site accesses to Moura-Baralaba Road in accordance with relevant design standards is discussed further in Section 5.

The indicative location of the proposed BSP accesses, realigned segment along Moura-Baralaba Road, and route to the TLO facility is shown in Figure 2.4.

Figure 2.4: Proposed BSP Access Location



Source: Baralaba South Coal Project – Conceptual Project Loayout (BC-1070, dated 27/09/23)

3. Existing Environment

3.1 Road Network

Further to the proposed haulage routes provided in Section 2.3.5, a summary of the existing road network characteristics for roads within proximity of the BSP is provided in Table 3.1.

Table 3.1: Project Road Network Characteristics

Road	Jurisdiction	Cross-Section	Pavement	Road Width [1]	Posted Speed Limit
Baralaba-Banana Road	Council	Two-lane / Two-way / Undivided	Sealed	7m	100km/hr
Baralaba-Rannes Road	TMR	Two-lane / Two-way / Undivided	Sealed	8m	60-100km/hr
Moura-Baralaba Road	Council	Two-lane / Two-way / Undivided	Sealed	11m	100km/hr
Wooroonah Road	Council	Two-lane / Two-way / Undivided	Sealed	8m	60km/hr

[1] Sealed pavement width, measured from Queensland Globe aerial imagery.

A review of the speed limits show that roads are generally posted at 100km/hr within the project area, with speed reductions located appropriately around curves and on approaches to intersections.

3.1.1 Background Traffic Volumes

To understand the existing traffic volumes, traffic surveys were sourced for a 3-hour AM and PM peak periods on Tuesday 29 January 2019, for the following intersections:

- Wooroonah Road / Baralaba Accommodation Camp Access
- Baralaba-Rannes Road / Wooroonah Road
- Moura-Baralaba Road / Baralaba-Rannes Road / Private Haul Road
- Moura-Baralaba Road / TLO Private Haul Road.

A review of the surveys indicated that the AM and PM peak period differed between each intersection. To undertake a conservative assessment, the peak periods observed for each individual intersection were adopted. Detailed traffic count information is included in Appendix A.

3.1.2 Traffic Growth

A review of TMR's 2021 Traffic Census Data along the project's haul routes indicates that zero growth has been recorded for the preceding one, five, and ten-year periods. This can be expected in regional towns such as Baralaba where employment and population is strongly linked to the mining industry.

Similarly, a review of council development planning in the Baralaba region of the Banana Shire council indicates that no new significant development is proposed for the vicinity of the project area. Table 8.2.2 of the Banana Shire Planning Scheme 2021, which provides assumptions on population and employment for the LGA has indicated that in the order of 2% population growth and up to 2% employment growth is forecasted beyond 2021. As such, a 2% growth rate has been adopted for the purpose of forecasting background traffic volumes from traffic survey for analysis.

3.1.3 Road Network Upgrades

A review of TMR's *Queensland Transport and Roads Investment Program 2023-24 to 2026-27* (QTRIP) has been undertaken, indicating that no state level network upgrades to the project's key haul routes are proposed. A review of Banana Shire Council's Schedule of Works and Local Government Infrastructure Plan (LGIP) 2016 Plan for Trunk Transport Infrastructure Map (LGIP-PFTI-003) indicates that no transport infrastructure works are proposed for the project area proximate to Baralaba or any of the BSP key haul routes.

3.2 Rail Network

The BSP does not interact with any rail infrastructure beyond the TLO Facility east of Moura providing connection to the Moura Rail System, which is currently used by the BNM. The Moura Coal Rail System is one of four systems on Aurizon's Central Queensland Coal Network, servicing multiple mines between Moura and the Port of Gladstone. Two export terminals are located at the Port of Gladstone, the RG Tanna Coal Terminal and Wiggins Island Coal Export Terminal.

No changes are proposed to the rail network as a result of the construction or operations of the BSP, which will transition operations and assume the existing haulage arrangements from BNM.

3.3 Public Transport & Active Travel

There are no public or active transport provisions on the road network proximate to the BSP or wider project. This is a result of the adjacent land uses being mining / resource sector developments and pastoral properties which do not require access via public or active transport.

The Project is not expected to result in any increase of or impact to the public transport or active travel demand surrounding the site. The Proponent does not propose to provide any modifications to the existing public transport or active travel network.

School bus routes are known to travel from the east and west to Baralaba State School. It is understood that the existing BNM / proposed BSP haulage route is also used as a school bus route, and as such a school bus interaction management plan has been developed and implemented under the existing 'Coal Haulage Road Use and Infrastructure Agreement'. It is understood that this management is to be extended to incorporate the BSP haulage operations.

4. Project Traffic

4.1 Design Horizons for Assessment

The GTIA describes key impact years which would ordinarily form part of a TIA. GTIA defined design horizons for each assessment type are summarised in Table 4.1.

Table 4.1: GTIA Specified Design Horizons for Assessment

Assessment / Impact Type	Assessment / Impact Year
Road Safety	Year of opening of each stage including the final stage.
Access and Frontage	Year of opening of each stage including the final stage and 10 years after the year of opening of the final stage for access intersections.
Intersection Delay	Year of opening of each stage including the final stage.
Road Link Capacity	Year of opening of each stage including the final stage.

Source: TMR's GTIA Table 6.5 (2018)

Taking into consideration the Project schedule, the following years are of relevance to this TIA:

- Project Year 0 (expected 2029): BSP Construction.
- Project Year 1 (expected 2030): Year 1 of operations for the BSP.
- Project Year 11 (expected 2040): 10-year design horizon from the opening of the final stage of the BSP - for assessment of BSP site accesses.

The design horizons as shown in Table 4.2 have been selected for this assessment.

Table 4.2: Adopted Design Horizons

Assessment / Impact Type	Assessment / Impact Year
Road Safety	Construction – Project Year 0 (2029) Operations – Project Year 1 (2030)
Access and Frontage	Construction – Project Year 0 (2029) Operations – Project Year 1 (2030) 10-year design horizon from year of opening – Project Year 11 (2040)
Intersection Delay	Construction – Project Year 0 (2029) Operations – Project Year 1 (2030)
Road Link Capacity	Construction – Project Year 0 (2029) Operations – Project Year 1 (2030)

4.2 Workforce Traffic Generation

Vehicle demands generated by the BSP workforce has been estimated based on the workforce projections outlined in Section 2 and assumptions made regarding the location of the workforce, proposed shift operating times and vehicle occupancies. These assumptions and overall vehicle demands are generally reflective of the existing BNM and those included within the previous TIA. A summary of the expected vehicle movements generated by the BSP is provided in Table 4.3.

Table 4.3: Project Workforce Traffic Generation

Item	Origin	Destination	Typical Vehicle	Peak Trips per Day (One Way)	
				Construction	Operation
Workforce Shift Change (Local)	Local from North (e.g. Baralaba)	BSP Mine	Light Vehicle	23	46

Item	Origin	Destination	Typical Vehicle	Peak Trips per Day (One Way)	
				Construction	Operation
	Local from South (e.g. Banana and Moura)	BSP Mine	Light Vehicle	44	86
Workforce (Accommodated by Baralaba Coal)	Baralaba	BSP Mine	Light Vehicle	168	326
Workforce Roster Change (DIDO and FIFO)	West of Site	Baralaba	Light Vehicle	4	6
	East of Site (e.g. Rockhampton, Gladstone)	Baralaba	Light Vehicle	44	66
			Total	**283**	**530**

It is noted that during the BSP construction and transition period, the vehicle demands provided in Table 4.3 will run concurrently with the workforce related vehicle movements from the BNM.

Based on information provided by the Proponent, the peak combined workforce will be in the order of 710 staff during construction and transition, but reflective of existing BNM workforce following the transition to BSP (as detailed in Table 2.1). As such, additional vehicle demands could be expected during the construction and transition periods, but reflective of the current BNM baseline following this period. It is however noted that the BSP vehicle demands would not operate on the same routes due to their locations.

4.3 Heavy Vehicle Traffic Generation

The Proponent has provided estimates of the heavy vehicle movements required to support the construction of the BSP and Moura-Baralaba Road realignment, with operational requirements of BSP to be generally reflective of BNM demands. A summary of anticipated daily two-way vehicle movements is provided in Table 4.6.

It is noted that given that BSP coal extraction is expected to align with existing BNM coal extraction, the heavy vehicle traffic generation associated with the BSP operations are expected to be a transition of existing heavy vehicle demands associated with existing BNM operations. It is only expected that heavy vehicle demands exceeding current the BNM volumes would be expected during the BSP construction years and transition years (as detailed in Figure 2.2).

4.3.1 Construction

As identified within the schedule provided in Section 2.2, the BSP construction is proposed to occur concurrently with BNM operations. This overlap is expected to result in a temporarily increase in vehicle demands during the construction period. During this period, the total number of heavy vehicle movements is expected to be in the order of 9 vehicles per day, which is expected to run concurrently with the BNM haulage.

4.3.2 Operations

4.3.2.1 Coal Haulage

The following assumptions summarise the proposed coal haulage movements for the BSP:

- Baseline operations are for 1.8 Mtpa product coal.
- Coal haulage is to be undertaken exclusively using ABB-Quad Type 2 Road Trains (110 tonne payload).
- Coal haulage is to operate 24 hours a day, 7 days a week (24/7).
- Assumed 335 operational days per year, with 30 work days lost to public holidays or inclement weather.

Table 4.4: BSP Coal Haulage Traffic Generation (1.8 Mtpa Coal Haulage)

Item	Origin	Destination	Typical Vehicle	Peak Trips per Day (One Way)	
				Construction	Operation
Coal Haulage (Loaded)	Baralaba South Mine	Train Load Out	ABB-Quad Type 2 Road Train	-	49
			Total	**-**	**49**

As identified within the schedule provided in Section 2.2, an overlap in operations is proposed to occur at the BSP and BNM. This overlap is expected to result in a temporary increase in coal product output of up to 2.5 Mtpa combined (from both mines) for a period of 3 years. During this period, the total number of coal haulage movements is expected to be in the order of 68 loaded, one-way trips per day, which represents an increase of up to 19 vehicles per day from the baseline conditions shown in Table 4.4.

4.3.2.2 Deliveries

A summary of the expected deliveries required to support the BSP has been provided by the Proponent as shown in Table 4.5.

Table 4.5: BSP Delivery Vehicles Traffic Generation

Item	Origin	Destination	Typical Vehicle	Peak Trips per Day (One Way)	
				Construction	Operation
Deliveries – parts, explosives, waste	Gladstone/ Rockhampton	BSP Mine	Class 9 truck	2	3
Oversized Loads	Gladstone/ Rockhampton	BSP Mine	Low Loader	1	1
Other deliveries – Small Trucks	Gladstone/ Rockhampton	BSP Mine	Class 3 truck	5	5
Fuel	Gladstone/ Rockhampton	BSP Mine	B-Double	1	2
			Total	**9**	**11**

Deliveries for goods including parts, explosives, waste, oversize loads (such as machinery) and fuel are expected to be in the order of 9 vehicles per day during BSP construction and 11 vehicles per day during BSP operations. Fuel is expected to be a regular delivery, with all other deliveries occurring on an ad-hoc basis. Goods and deliveries associated with both mines are expected to originate from both Gladstone and Rockhampton.

4.4 Peak Hour Vehicle Movements

To determine peak hour vehicle trips for the purpose of intersection and link analysis in accordance with TMR's GTIA, an estimation on the proportion of peak to daily vehicle movements was developed based on information provided by the Proponent and the volumes provided in Sections 4.2 and Section 4.3. The peak hour proportions for each project activity are shown in Table 4.6.

Table 4.6: Peak Hour Vehicle Proportions

Activity	Daily Trips in Peak hour
Haulage	5%
Deliveries	20%
Shift Change (Light Vehicles from workers accommodation)	50%
Shift Change (Light Vehicles / Self Accommodated)	50%

Additionally, the following directional distributions have been assumed based on information provided by the Proponent for the purpose of intersection analysis:

- For deliveries, 50% are expected to originate from Gladstone and 50% from Rockhampton.
- For the local workforce (self-accommodated, 25% of the workforce and drive to site daily), approximately a third are expected to live Baralaba, Woorabinda and Banana respectively. This results in:
    - approximately 35% of vehicles travelling to site from the south (Banana)
    - approximately 65% of vehicles travelling to site from the north (Woorabinda and Baralaba).

Table 4.7 to Table 4.9 provide the peak hour one-way movements for each of the project's activities associated with construction and operations of the BSP. These volumes are derived from the daily volumes provided by the Proponent.

While daily volumes for delivery activities are very low (i.e., around 10 vehicles per day) and likely to occur on an ad-hoc basis, they have been assumed to occur within the peak hour for the purpose of a conservative assessment.

Table 4.7: Project Workforce Peak Hour Traffic Generation

Item	Origin	Destination	Typical Vehicle	Peak Hour % of Daily Volumes	Peak Hour Trips (One Way)	
					Construction	Operation
Workforce Shift Change (Local)	Local from North (e.g. Baralaba)	BSP Mine	Light Vehicle	50%	12	23
	Local from South (e.g. Moura)	BSP Mine	Light Vehicle	50%	22	43
Workforce (Accommodated by Baralaba Coal)	Baralaba	BSP Mine	Light Vehicle	50%	84	163
Workforce Roster Change (DIDO and FIFO)	West of Site	Baralaba	Light Vehicle	25%	1	2
	East of Site (e.g. Rockhampton)	Baralaba	Light Vehicle	25%	11	17
				Total	**130**	**248**

Table 4.8: BSP Coal Haulage Peak Hour Traffic Generation (1.8 Mtpa Coal Haulage)

Item	Origin	Destination	Typical Vehicle	Peak Hour % of Daily Volumes	Peak Hour Trips (One Way)	
					Construction	Operation
Coal Haulage (Loaded)	Baralaba South Mine	Train Load Out	ABB-Quad Type 2 Road Train	5%	-	3
				Total	**-**	**3**

Table 4.9: BSP Delivery Vehicles Peak Hour Traffic Generation

Item	Origin	Destination	Typical Vehicle	Peak Hour % of Daily Volumes	Peak Trips per Day (One Way)	
					Construction	Operation
Deliveries – parts, explosives, waste	Gladstone/ Rockhampton	BSP Mine	Class 9 truck	20%	1	1
Oversized Loads	Gladstone/ Rockhampton	BSP Mine	Low Loader		1	1
Other deliveries – Small Trucks	Gladstone/ Rockhampton	BSP Mine	Class 3 truck		1	1
Fuel	Gladstone/ Rockhampton	BSP Mine	B-Double		1	1
				Total	**4**	**4**

5. Intersection Impact Assessment

Each of the intersections located along the key project haul routes have been assessed via turn warrant assessments (assessing the form of the intersection from a safety perspective based on minor and major road volumes), a desktop assessment of available sight distance, and SIDRA intersection modelling software to assess the operational performance of each intersection under key project years for with and without the proposed BSP traffic.

Given the rural nature of the project and low traffic volumes observed, it is expected that all project routes are to exceed the 5% impact threshold for increase in volumes from background (without development) conditions. As such, all intersections have been assessed in SIDRA with analysis and commentary on any impacts to operational performance with respect to DOS, delay, and vehicle queues on approaches.

Design requirements for the proposed BSP access along the realigned Moura-Baralaba has also been assessed in Section 5.2.

5.1 Assessment Criteria

5.1.1 Modelling Methodology

The performance of the study intersections has been analysed using SIDRA Intersection 9 (SIDRA), a computer-based modelling package that calculates intersection performance that estimates the capacity and performance of intersections based on input parameters, including geometry and traffic volumes, and provides estimates of an intersection's degree of saturation (DOS), queues and delays.

While the movement delay is considered to provide a better indication of intersection performance and safety for priority-controlled intersections (typical of the project haul routes in the rural locality), the DOS should still be considered when assessing the performance of the intersection. The typical DOS thresholds adopted for the assessment of priority-controlled intersections for the rural context of the project is a DOS less than or equal to 0.80. Turn movement diagrams for base and BSP development scenarios used for the SIDRA assessments are provided in Appendix B.

5.1.2 Turn Warrant Assessment

While the DOS and critical delay statistic provide an indication of the operational performance of an intersection, the Austroads warrants for turn treatments provide an indication of which turn treatments will likely provide an appropriate level of safety.

The warrants for turn treatments provide guidance where deceleration lanes and turning lanes should be used based on traffic volumes. They have been undertaken in accordance with the Austroads Guide to Traffic Management Part 6, which is accepted methodology for use under the Queensland Guide to Traffic Management Part 6 (Intersections, Interchanges and Crossing Management).

Each of the project intersections assessed outlines the existing turn treatment and the required treatment under 2030 BSP volumes. The turn warrant assessment graph for each intersection has been provided in Appendix C.

5.2 Moura-Baralaba Road / BSP South Access Intersection

The configuration of the intersection is proposed to be a three-way priority-controlled intersection along the realigned section of Moura-Baralaba Road. Section 5.2.1 outlines the design criterion for the proposed intersection. This intersection will accommodate the heavy vehicle demand associated with BSP (i.e. haulage vehicles and delivery vehicles), with all BSP workforce vehicles utilising the BSP North Access.

However, for the purpose of a conservative assessment, the assessment of the BSP South Access intersection has considered a scenario whereby all BSP vehicle demands (i.e. workforce, deliveries and haulage vehicle demands) are serviced by a single site access intersection.

Table 5.1: Moura-Baralaba Road / BSP South Access Intersection Layout Assessment

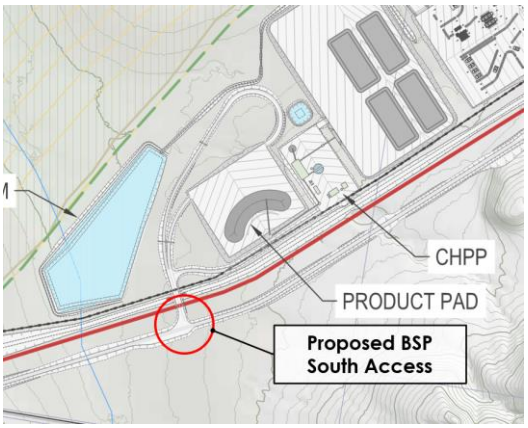
Moura-Baralaba Road / Baralaba South Project Access Intersection		
	**Existing Condition:**	
	Formation:	-
	Left Turn Standard:	-
	Right Turn Standard:	-
	Speed Limit:	100km/h
	Sight Distance:	-
	Turn Warrant Assessment with BSP traffic:	
	Required Left Turn Standard:	BAL
	Required Right Turn Standard:	BAR

Table 5.2: Moura-Baralaba Road / BSP South Access Intersection Operational Performance Assessment

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th Percentile Queue	DOS	Average Delay	95th Percentile Queue
2029 - Project Year 0 (Construction), with BSP	0.10	5s	4m	0.10	5s	4m
2030 – Project Year 1 (Operations), with BSP	0.20	6s	8m	0.20	6s	8m
2040 – Project Year 11 (Operations), with BSP	0.20	6s	8m	0.20	6s	8m

Turn warrant analysis performed for the 2030 BSP operations year indicate that a basic left (BAL) and basic right (BAR) turn provisions are required under the conservative scenario of all BSP vehicle traffic utilising this access intersection. It should be noted that the proposed BSP south access will cater for heavy vehicle movements and it is recommended that AUL(s) and CHR (s) treatments are constructed to improve road safety. These treatments will allow additional deceleration space for turning vehicles to manoeuvre in a safe manner.

The results of the analysis indicate that the three-way priority controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled), for both assessed scenarios including BSP construction and operations.

5.2.1 Proposed Access Intersection Design

The following subsections illustrate the design criteria for the proposed BSP South access. The proposed BSP South access will ensure the criterion is satisfied to appropriate rural conditions for the current and future traffic volumes.

Approach Sight Distance (ASD) and Safe Intersection Sight Distance (SISD)

Approach sight distance and safe intersection sight distance are to be designed with guidance of Austroads Guide to Road Design 4A: Unsignalised and Signalised Intersections (AGRD Part 4A). The provision of Approach Sight Distance for trucks in AGRD Part 4A, are numerically the same as the Stopping Sight Distance (SSD) values for trucks provided in Austroads Guide to Road Design Part 3: Geometric Design.

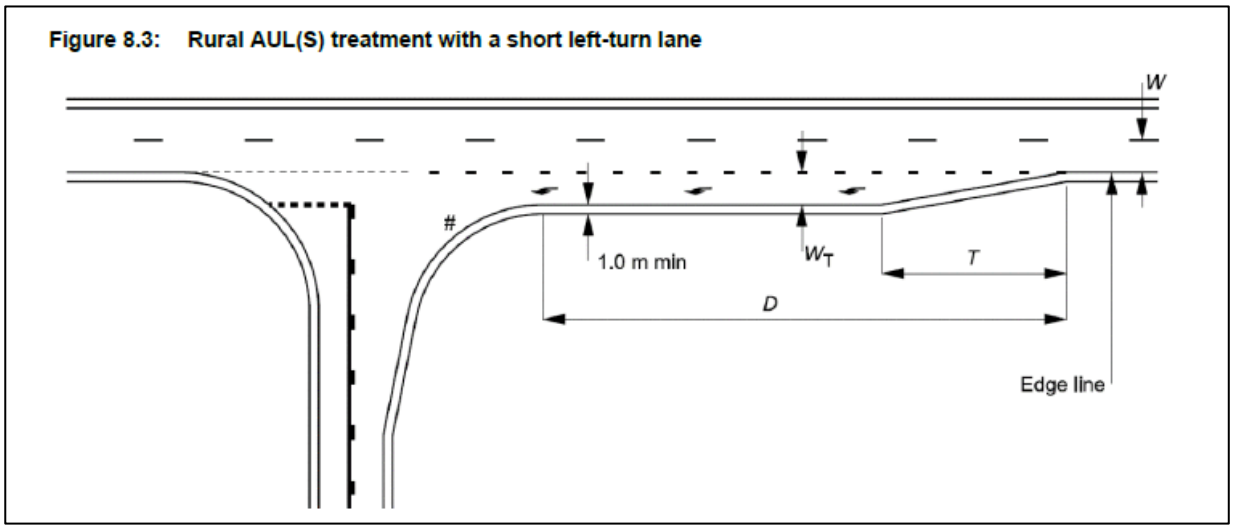
ASD has been determined based on a frontage road design speed of 110km/hr, driver reaction time of 2.5 seconds (general minimum value for high-speed rural freeways and intersections), and longitudinal grades from Google Earth survey compared with mine plans provided by the Proponent. From these design values, an average slope along the frontage road of 2% results in a minimum of 230m ASD for trucks from the south (uphill grade) and 253m ASD from the north (downhill grade) to be provided (from Table 5.6 of AGRD Part 3). The corresponding safe intersection sight distance for the design speed and reaction time is expected to be a minimum of 300m in each direction for cars (from Table 3.2 of AGRD Part 4A).

These values provide general guidance only and are to be reviewed during detailed design of the realignment of Moura-Baralaba Road.

Rural Left-Turn Treatment

Left turn treatments of the intersection are to be in accordance with Section 7 and 8 of Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections. An extract of Section 7 is represented below in Figure 5.1 and gives an example of the design requirements and layout of a rural Auxiliary Left Short (AUL(s)).

Figure 5.1: Rural Left Turn Treatment (AUL(s))



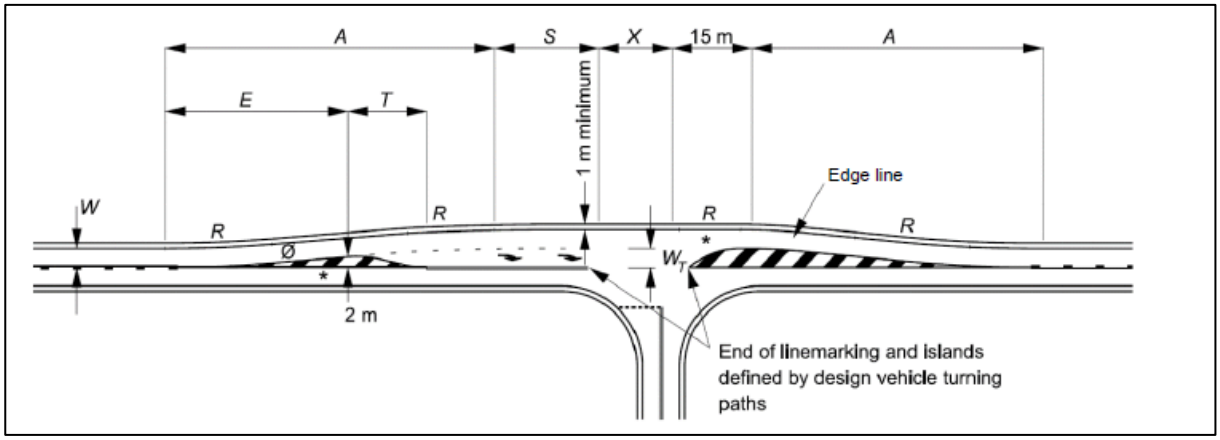
Source: Austroads Guide to Road Design Part 4A, Figure 8.3

Right-Turn Treatment (Rural)

Right turn treatments of the intersection are to be in accordance with Austroads Guide to Road Design 4A. An extract is taken from Austroads Guide to Road Design Part 4A.

An example of a channelised right turn treatment is provided in Figure 5.2.

Figure 5.2: Channelised Right (CHR) Turn Treatment



Source: Austroads Guide to Road Design Part 4A, Figure 7.2

Lane Width

Lane widths on approach to an intersection from a minor link are to be in accordance with the current link strategy and in accordance with Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.

Roadside Areas and Linemarking

Roadside safety including potential location of barriers, road furniture and signage, utilities and lighting are to be designed with guidance of Guide to Road Design: Part 5, 5A, 5B, 6.

Location of linemarking, including stop lines, give way lines, lane lines, turning lines, pavement arrows and symbols are to be designed to AS1742.2-2009 with guidance from the Guide to Traffic Management Part 10.

Baralaba South Project Access Treatment Recommendation

Turn warrant analysis performed for 2040 background plus the BSP operations (Project Year 11) indicate that a basic left (BAL) and basic right (BAR) turn provisions are required. However, the proposed mine access will cater for heavy vehicle movements and it is recommended that AUL(s) and CHR(s) treatments are constructed to improve road safety. These treatments will allow additional deceleration space for turning vehicles to manoeuvre in a safely manner.

5.3 Moura-Baralaba Road / BSP North Access Intersection

The configuration of the intersection is proposed to be a three-way priority-controlled intersection along the realigned section of Moura-Baralaba Road, north of the BSP South site access intersection. Section 5.2.1 outlines the design criterion for the proposed intersection.

This intersection assessment has only considered site access for the BSP workforce vehicle demand.

Table 5.3: Moura-Baralaba Road / Baralaba South Project Road Intersection Layout Assessment

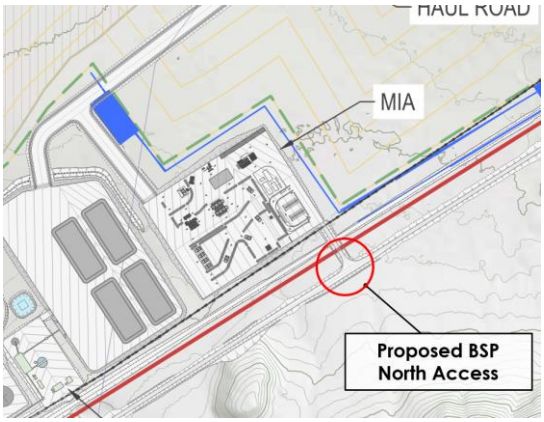
Moura-Baralaba Road / Baralaba South Project Access Intersection		
	**Existing Condition:**	
	Formation:	-
	Left Turn Standard:	-
	Right Turn Standard:	-
	Speed Limit:	100km/h
	Sight Distance:	-
	Turn Warrant Assessment with BSP traffic:	
	Required Left Turn Standard:	BAL
	Required Right Turn Standard:	BAR

Table 5.4: Moura-Baralaba Road / NSP North Access Intersection Operational Performance Assessment

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th Percentile Queue	DOS	Average Delay	95th Percentile Queue
2029 - Project Year 0 (Construction), with BSP	0.10	5s	3m	0.10	5s	4m
2030 – Project Year 1 (Operations), with BSP	0.20	6s	8m	0.20	6s	8m
2040 – Project Year 11 (Operations), with BSP	0.20	6s	8m	0.20	6s	8m

Turn warrant analysis performed for the 2030 BSP operations year indicate that a basic left (BAL) and basic right (BAR) turn provisions are required.

The results of the analysis indicate that the three-way priority controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled), for both assessed scenarios including BSP construction and operations.

5.3.1 Proposed Access Intersection Design

The following subsections illustrate the design criteria for the proposed BSP North access. The proposed BSP North access will ensure the criterion is satisfied to appropriate rural conditions for the current and future traffic volumes.

Approach Sight Distance (ASD) and Safe Intersection Sight Distance (SISD)

Approach sight distance and safe intersection sight distance are to be designed with guidance of Austroads Guide to Road Design 4A: Unsignalised and Signalised Intersections (AGRD Part 4A). The provision of Approach Sight Distance for trucks in AGRD Part 4A, are numerically the same as the Stopping Sight Distance (SSD) values for trucks provided in Austroads Guide to Road Design Part 3: Geometric Design.

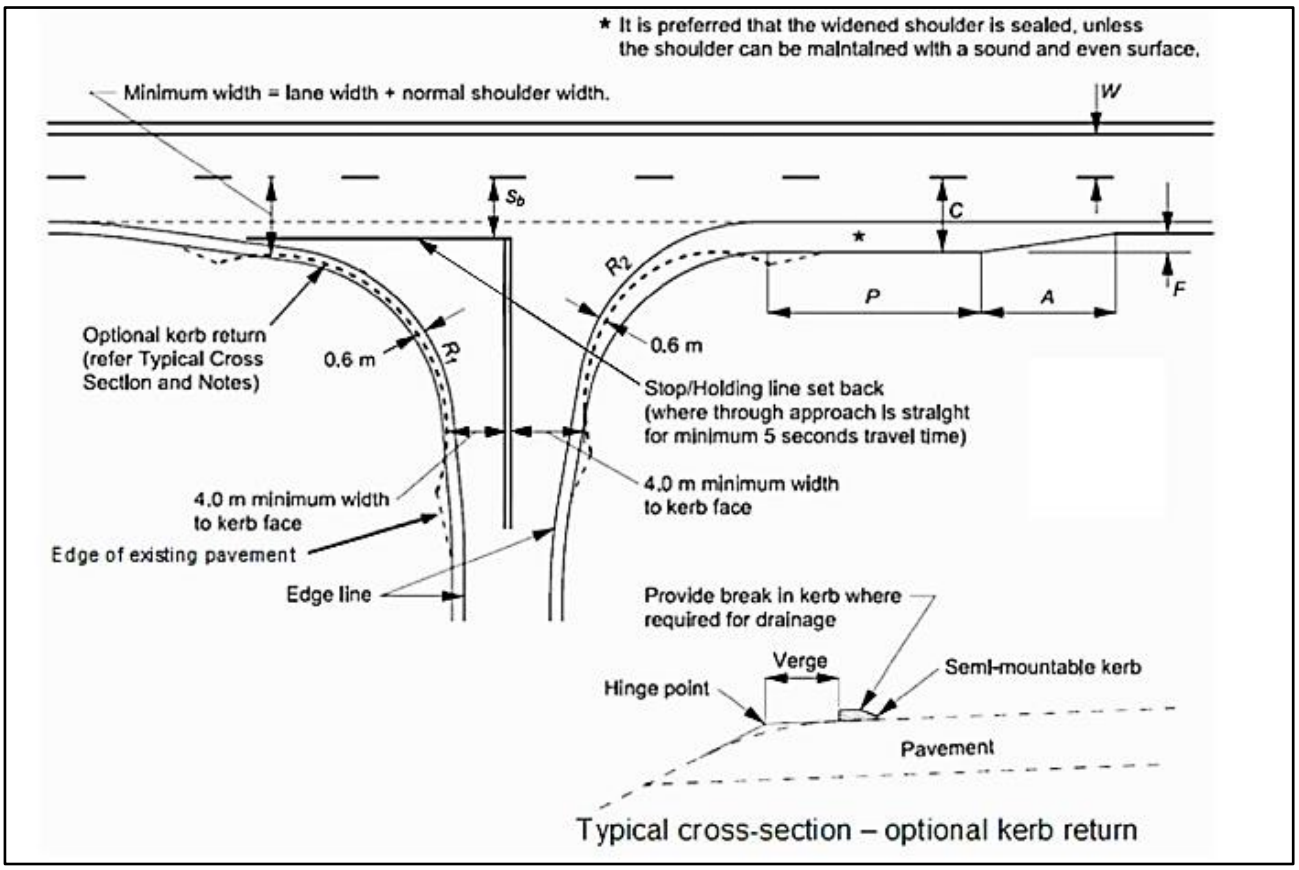
ASD has been determined based on a frontage road design speed of 110km/hr, driver reaction time of 2.5 seconds (general minimum value for high-speed rural freeways and intersections), and longitudinal grades from Google Earth survey compared with mine plans provided by the Proponent. From these design values, an average slope along the frontage road of 2% results in a minimum of 230m ASD for trucks from the south (uphill grade) and 253m ASD from the north (downhill grade) to be provided (from Table 5.6 of AGRD Part 3). The corresponding safe intersection sight distance for the design speed and reaction time is expected to be a minimum of 300m in each direction for cars (from Table 3.2 of AGRD Part 4A).

These values provide general guidance only and are to be reviewed during detailed design of the realignment of Moura-Baralaba Road.

Rural Left-Turn Treatment

Left turn treatments of the intersection are to be in accordance with Section 7 and 8 of Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections. An extract of Section 7 is represented below in Figure 5.1 and gives an example of the design requirements and layout of a rural Basic Left (BAL) turn treatment.

Figure 5.3: Rural Basic Left (BAL) Turn Treatment



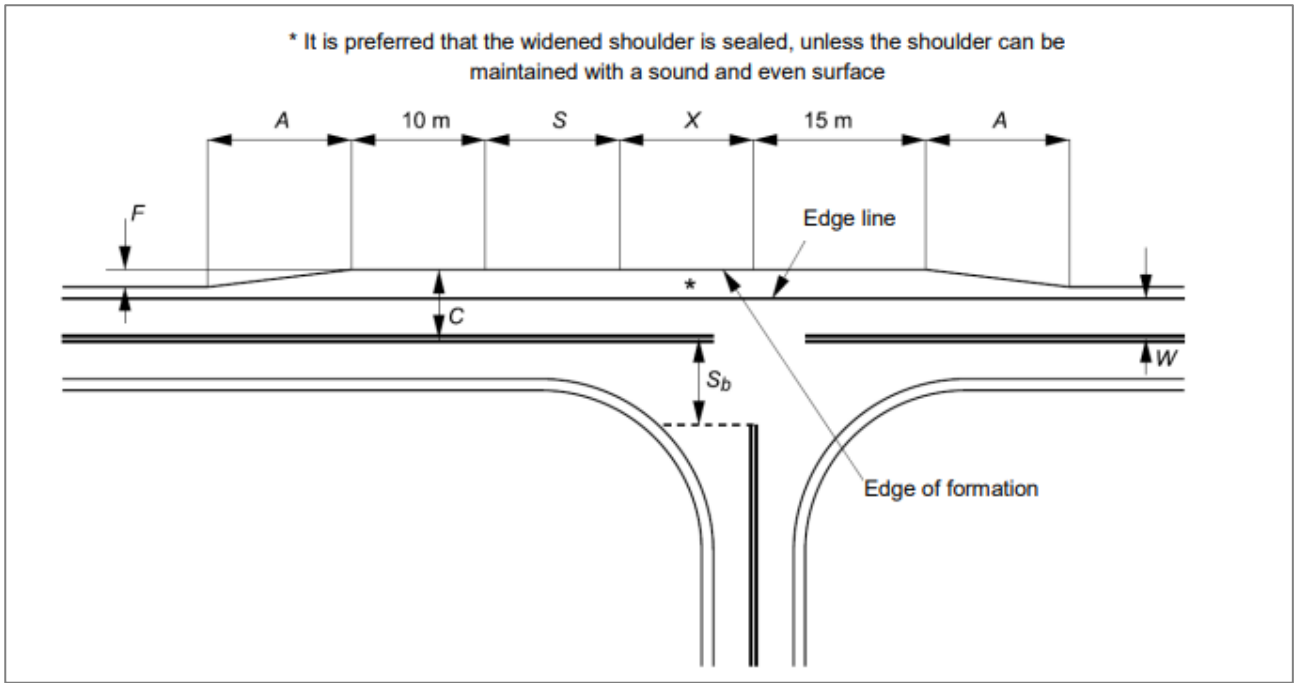
Source: Austroads Guide to Road Design Part 4A, Figure 8.2

Right-Turn Treatment (Rural)

Right turn treatments of the intersection are to be in accordance with Austroads Guide to Road Design 4A. An extract is taken from Austroads Guide to Road Design Part 4A.

An example of a channelised right turn treatment is provided in Figure 5.2.

Figure 5.4: Rural Basic Right (BAR) Turn Treatment



Source: Austroads Guide to Road Design Part 4A, Figure 7.1

Lane Width

Lane widths on approach to an intersection from a minor link are to be in accordance with the current link strategy and in accordance with Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.

Roadside Areas and Linemarking

Roadside safety including potential location of barriers, road furniture and signage, utilities and lighting are to be designed with guidance of Guide to Road Design: Part 5, 5A, 5B, 6.

Location of linemarking, including stop lines, give way lines, lane lines, turning lines, pavement arrows and symbols are to be designed to AS1742.2-2009 with guidance from the Guide to Traffic Management Part 10.

Baralaba South Project Access Treatment Recommendation

Turn warrant analysis performed for 2040 background plus the BSP operations (Project Year 11) indicate that a basic left (BAL) and basic right (BAR) turn provisions are required.

5.4 Wooroonah Road / Baralaba Accommodation Camp Access A Intersection

The current configuration of this intersection is a three-way priority-controlled arrangement. The existing layout and intersection assessment is illustrated in Table 5.5.

Table 5.5: Wooroonah Rd / Baralaba Accommodation Camp Access A Intersection Layout Assessment

Wooroonah Rd / Baralaba Accommodation Camp Access A Intersection		
	**Existing Condition:**	
	Formation:	Sealed
	Left Turn Standard:	BAL
	Right Turn Standard:	BAR
	Speed Limit:	60km/h
	Sight Distance:	Unrestricted
	Turn Warrant Assessment with BSP traffic:	
	Required Left Turn Standard:	BAL
	Required Right Turn Standard:	BAR

Table 5.6: Wooroonah Rd / Baralaba Accommodation Camp Access A Intersection Operational Performance Assessment

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th Percentile Queue	DOS	Average Delay	95th Percentile Queue
2019 Base	0.01	5s	< 1m	0.01	5s	< 1m
2029 - Project Year 0 (Construction), Base	0.01	5s	< 1m	0.01	5s	< 1m
2029 - Project Year 0 (Construction), with BSP	0.11	7s	3m	0.11	7s	3m
2030 – Project Year 1 (Operations), Base	0.01	5s	< 1m	0.01	5s	< 1m
2030 – Project Year 1 (Operations), with BSP	0.21	7s	7m	0.21	7s	7m

The existing formation consists of a basic left (BAL), and a basic right (BAR). Turn warrant analysis performed for 2030 (BSP Year 1) operations indicate that this formation will satisfactorily cater for the traffic volumes assessed.

The results of the analysis indicate that the three-way priority-controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled), for all assessed scenarios. All scenarios through to 2030 including with BSP traffic operate under a DOS of 0.3. It is noted that with the inclusion of the proposed development traffic, the average delay and 95th percentile queue are not significantly impacted, when compared to the background scenarios.

5.5 Wooroonah Road / Baralaba Accommodation Camp Access B Intersection

The current configuration of this intersection is a three-way priority-controlled arrangement. The existing layout and intersection assessment is illustrated in Table 5.7.

Table 5.7: Wooroonah Rd / Baralaba Accommodation Camp Access B Layout Assessment

Wooroonah Rd / Baralaba Accommodation Camp Access B Intersection		
	**Existing Condition:**	
	Formation:	Sealed
	Left Turn Standard:	BAL
	Right Turn Standard:	BAR
	Speed Limit:	60km/h
	Sight Distance:	Unrestricted
	Turn Warrant Assessment with BSP traffic:	
	Required Left Turn Standard:	BAL
	Required Right Turn Standard:	BAR

Table 5.8: Wooroonah Rd / Baralaba Accommodation Camp Access B Intersection Operational Performance Assessment

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th Percentile Queue	DOS	Average Delay	95th Percentile Queue
2019 Base	0.02	5s	< 1m	0.01	6s	< 1m
2029 - Project Year 0 (Construction), Base	0.02	5s	< 1m	0.02	3s	< 1m
2029 - Project Year 0 (Construction), with BSP	0.12	7s	4m	0.11	6s	4m
2030 – Project Year 1 (Operations), Base	0.02	5s	< 1m	0.02	3s	< 1m
2030 – Project Year 1 (Operations), with BSP	0.03	5s	1m	0.02	3s	< 1m

The existing formation consists of a basic left (BAL), and a basic right (BAR). Turn warrant analysis performed for 2030 (BSP Year 1) operations indicate that this formation will satisfactorily cater for the traffic volumes assessed.

The results of the analysis indicate that the three-way priority-controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled), for all assessed scenarios. All scenarios through to 2030 including with BSP traffic operate under a DOS of 0.2. It is noted that with the inclusion of the proposed development traffic, the average delay and 95th percentile queue are not significantly impacted, when compared to the background scenarios.

5.6 Baralaba-Rannes Road / Wooroonah Road Intersection

The current configuration of this intersection is a three-way priority-controlled arrangement. The existing layout and intersection assessment is illustrated in Table 5.9.

Table 5.9: Baralaba-Rannes Road / Wooroonah Road intersection Layout Assessment

Baralaba-Rannes Road / Wooroonah Road Intersection		
	**Existing Condition:**	
	Formation:	Sealed
	Left Turn Standard:	BAL
	Right Turn Standard:	BAR
	Speed Limit:	60km/h
	Sight Distance:	Unrestricted
	Turn Warrant Assessment with BSP traffic:	
	Required Left Turn Standard:	BAL
	Required Right Turn Standard:	BAR

Table 5.10: Baralaba-Rannes Road / Wooroonah Road Intersection Operational Performance Assessment

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th Percentile Queue	DOS	Average Delay	95th Percentile Queue
2019 Base	0.01	1s	< 1m	0.02	1s	< 1m
2029 - Project Year 0 (Construction), Base	0.02	1s	< 1m	0.03	1s	< 1m
2029 - Project Year 0 (Construction), with BSP	0.11	5s	3m	0.11	4s	3m
2030 – Project Year 1 (Operations), Base	0.02	1s	< 1m	0.03	1s	< 1m
2030 – Project Year 1 (Operations), with BSP	0.22	5s	7m	0.23	5s	8m

The existing formation consists of a basic left (BAL), and a basic right (BAR). Turn warrant analysis performed for 2030 (BSP Year 1) operations indicate that this formation will satisfactorily cater for the traffic volumes assessed.

The results of the analysis indicate that the three-way priority controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled), for all assessed scenarios. All scenarios through to 2030 including with BSP traffic operate under a DOS of 0.3. It is noted that with the inclusion of the proposed development traffic, the average delay and 95th percentile queue are not significantly impacted, when compared to the background scenarios.

5.7 Baralaba-Rannes Road / Moura-Baralaba Road Intersection

The current configuration of this intersection is a four-way priority-controlled arrangement, with the northern approach being a private haul road. The existing layout and intersection assessment is illustrated in Table 5.11.

As per the Turning Movement Diagrams provided in Appendix B, no left or right turning volumes are to occur from the Private Haul Road (northern approach) indicated in Table 5.11. Movements from the Private Haul Road will consist of through movements only, occurring from BNM southbound onto Moura-Baralaba Road (towards the TLO). As such, a turn warrant assessment has been undertaken for the intersection of Baralaba-Rannes Road and Moura-Baralaba Road for which BSP turning volumes are proposed.

Table 5.11: Baralaba-Rannes Road / Moura-Baralaba Road Intersection Layout Assessment

Baralaba-Rannes Road / Moura-Baralaba Road Intersection		
	**Existing Condition:**	
	Formation:	Sealed
	Left Turn Standard:	BAL
	Right Turn Standard:	BAR
	Speed Limit:	100km/h
	Sight Distance:	Unrestricted
	Turn Warrant Assessment with BSP traffic:	
	Required Left Turn Standard:	BAL
	Required Right Turn Standard:	BAR

Table 5.12: Baralaba-Rannes Road / Moura-Baralaba Road Intersection Operational Performance Assessment

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th Percentile Queue	DOS	Average Delay	95th Percentile Queue
2019 Base	0.02	6s	< 1m	0.02	7s	< 1m
2029 - Project Year 0 (Construction), Base	0.02	6s	< 1m	0.03	7s	1m
2029 - Project Year 0 (Construction), with BSP	0.10	8	4m	0.11	7s	5m
2030 – Project Year 1 (Operations), Base	0.02	6s	< 1m	0.03	7s	1m
2030 – Project Year 1 (Operations), with BSP	0.17	8s	7m	0.17	8s	8m

The existing formation for the southern approach of the intersection (Baralaba-Rannes Road and Moura-Baralaba Road) which are impacted by BSP traffic consists of a basic left (BAL), and a basic right (BAR). Turn warrant analysis performed for 2030 (BSP Year 1) operations indicate that this formation will satisfactorily cater for the traffic volumes assessed.

The results of the analysis indicate that the four-way priority-controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled), for all assessed scenarios. All scenarios through to 2030 including with BSP traffic operate under a DOS of 0.2. It is noted that with the inclusion of the proposed development traffic, the average delay and 95th percentile queues are not significantly impacted, when compared to the background scenarios.

5.8 Moura-Baralaba Road / TLO Private Haul Road

The current configuration of this intersection is a three-way priority controlled arrangement. The existing layout and intersection assessment is illustrated in Table 5.13.

Table 5.13: Moura-Baralaba Rd / TLO Private Haul Rd Intersection Layout Assessment

Moura-Baralaba Road / TLO Private Haul Road Intersection	
	**Existing Condition:**
Formation:	Sealed
Left Turn Standard:	CHL
Right Turn Standard:	CHR
Speed Limit:	100km/h
Sight Distance:	Unrestricted
Turn Warrant Assessment at 2030 with BSP traffic:	
Required Left Turn Standard:	BAL
Required Right Turn Standard:	BAR

Table 5.14: Moura-Baralaba Rd / TLO Private Haul Rd Intersection Operational Performance Assessment

Scenario	AM Peak			PM Peak		
	DOS	Average Delay	95th Percentile Queue	DOS	Average Delay	95th Percentile Queue
2019 Base	0.01	3s	< 1m	0.01	4s	< 1m
2029 - Project Year 0 (Construction), Base	0.01	3s	< 1m	0.01	4s	< 1m
2029 - Project Year 0 (Construction), with BSP	0.02	1s	< 1m	0.02	2s	< 1m
2030 – Project Year 1 (Operations), Base	0.01	3s	< 1m	0.01	4s	< 1m
2030 – Project Year 1 (Operations), with BSP	0.04	1s	< 1m	0.03	1s	< 1m

The existing formation consists of a channelised left turn lane (CHL), and a channelised right turn (CHR) lane. Turn warrant analysis performed for 2030 (BSP Year 1) operations indicate that this formation will satisfactorily cater for the traffic volumes assessed, given the volumes indicate a BAR and BAL are required.

The results of the analysis indicate that the three-way priority controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled), for all assessed scenarios. All scenarios through to 2030 including with BSP traffic operate under a DOS of 0.1. It is noted that with the inclusion of the proposed development traffic, the average delay and 95th percentile queue are not significantly impacted, when compared to the background scenarios.

6. Road Link Assessment

6.1 Context of Road Link Assessment

The following section has been prepared to assess anticipated project impacts on the road network resulting from both construction of the BSP and its operations, with due consideration of forecast traffic volumes 'with' and 'without' the BSP. This assessment has been undertaken using the principles outlined in the GTIA which defines the impact assessment area to be:

"All road links where the development traffic exceeds 5% of the base traffic in either direction on the link's annual average daily traffic (AADT) in the year of opening of each stage".

All road segments are considered to be very low volume based on the peak hour survey volumes recorded. This is considered to be typical for regional areas of Queensland such as Baralaba, with very limited development for uses other than mining found outside town centres. Given the low volume nature of these roads, any project traffic added from BSP activities will exceed 5% of the base traffic.

As such, all key project roads have been assessed by comparing the combined background peak hour volumes and development traffic with the theoretical link capacity of each respective road.

6.2 Link Capacity

The theoretical link capacity of each of the key project roads has been calculated in accordance with guidance provided in the Austroads 'Guide to Traffic Management Part 3 – Transport Study and Analysis Methods' (Chapter 5 Uninterrupted Flow Facilities).

A summary of the input assumptions relevant to the calculation is presented in Table 5.2. Typical geometric features and operational characteristics for the overall road section (inclusive of typical lane widths, lateral clearances, the proportion of heavy vehicles, and the terrain) are used to determine the Fw and Fhv reduction factors, which reduce the theoretical capacity (C) of each road section from the base uninterrupted flow of 1800 vehicles per hour per lane.

Table 6.1: Project Road Section Theoretical Capacity

Road	Section	Typical Lane Width	Lateral Clearance	Fw	Fhv	Theoretical Capacity, C (vph)
Wooroonah Road	Baralaba-Woorabinda Road to Baralaba-Rannes Road	3.2m	1m	0.8	0.63	900
Baralaba-Rannes Road	Woorabinda Road to Moura-Baralaba Road	3.7m	1m	0.9	0.63	1013
Baralaba-Rannes Road	Moura-Baralaba Road to Leichhardt Highway	3.7m	1m	0.9	0.40	648
Moura-Baralaba Road (A)	Baralaba-Rannes Road to BSP	3.7m	1m	0.9	0.40	648
Moura-Baralaba Road (B)	BSP to Baralaba-Banana Road	3.7m	1m	0.9	0.40	648
Moura-Baralaba Road (C)	Baralaba-Banana Road to TLO	3.7m	1m	0.9	0.40	648

The background peak hour volumes as sourced from 2019 survey has been forecasted using the 2% background traffic growth as described in Section 3.1.2. Development Peak Hour Volumes, being the expected BSP traffic travelling on each road section in the peak hour has been summarised in Table 6.3.

Table 6.2: Background Peak Hour Volumes

Road	2019		2029		2030	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Wooroonah Road	46	39	55	47	56	48
Baralaba-Rannes Road	42	57	50	68	51	70
Baralaba-Rannes Road	16	16	19	19	20	20
Moura-Baralaba Road (A)	22	49	26	59	27	60
Moura-Baralaba Road (B)	22	39	26	47	27	48
Moura-Baralaba Road (C)	14	18	17	22	17	22

Table 6.3: BSP Peak Hour Volumes

Road	2029		2030	
	AM Peak	PM Peak	AM Peak	PM Peak
Wooroonah Road	247	239	420	412
Baralaba-Rannes Road	264	282	457	476
Baralaba-Rannes Road	47	59	60	60
Moura-Baralaba Road (A)	224	257	405	438
Moura-Baralaba Road (B)	70	91	119	140
Moura-Baralaba Road (C)	61	66	109	114

The available road capacity represented as a proportion of the available theoretical capacity (C) has been summarised in Table 6.4, based on the background peak hour volumes provided in Table 6.2 and the BSP traffic summarised in Table 6.3.

Table 6.4: Remaining Capacity on affect road sections

Road	Theoretical Capacity, C (vph)	2029		2030	
		AM Peak	PM Peak	AM Peak	PM Peak
Wooroonah Road	900	73%	73%	53%	54%
Baralaba-Rannes Road	1013	74%	72%	55%	53%
Baralaba-Rannes Road	648	93%	91%	91%	91%
Moura-Baralaba Road (A)	648	65%	60%	38%	32%
Moura-Baralaba Road (B)	648	89%	86%	82%	78%
Moura-Baralaba Road (C)	648	91%	90%	83%	82%

It can be seen that a minimum of 32% spare capacity is available in the 2030 PM Peak scenario on Section A of Moura-Baralaba Road between Baralaba-Rannes Road and the BSP. Based on the above analysis there is sufficient capacity across all of the project's key haul routes after the addition of BSP traffic. As such no improvements to roads to provide additional capacity are required or proposed by the Proponent.

7. Road Safety Risk Assessment

Safety on the road network is an important consideration for new developments. The following road safety risks are of relevance to this TIA:

- Increased through traffic on key project routes resulting in additional delays and potential for vehicle collision.
- Increased risk of vehicle collision due to driver fatigue.
- Debris / haulage material on roads during the construction and operations phases.
- Transportation of Hazardous and Dangerous materials (i.e., fuel, explosives) during construction and operations phases.
- Increased risk of vehicle collision at key intersections providing access to the BSP.

7.1 Risk Assessment and Mitigation

In accordance with the GTIA, "development should ensure that a road's safety is not significantly worsened as a result of the development and that any pre-existing or development-introduced unacceptable safety risk is addressed". GTIA defines 'significantly worsened' as change in safety risk (i.e. medium to high). Traffic safety risks are scored based on the matrix shown in Figure 7.1.

Figure 7.1: Traffic Safety Risk Scoring Matrix

		Potential consequence				
		Property only (1)	Minor injury (2)	Medical treatment (3)	Hospitalisation (4)	Fatality (5)
Potential likelihood	Almost certain (5)	M	M	H	H	H
	Likely (4)	M	M	M	H	H
	Moderate (3)	L	M	M	M	H
	Unlikely (2)	L	L	M	M	M
	Rare (1)	L	L	L	M	M

L: Low risk
M: Medium risk
H: High risk

Potential road safety risks as a result of the Project have been scored as presented in Table 7.1. Where a change in safety risk was identified, appropriate measures for mitigation have been suggested.

Table 7.1: Project Related Road Safety Risk Assessment

Risk Item	Without Development			With Development			Mitigation measures	With Development & Mitigation		
	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Increased through traffic on the road network resulting in additional delays and potential for vehicle collision	**1**	**2**	**L**	**2**	**2**	**L**	No Action			
Increased traffic at intersections may cause congestion for motorists	**1**	**1**	**L**	**2**	**1**	**L**	No Action			
Increase risk of vehicle collision due to driver fatigue	**2**	**5**	**M**	**3**	**5**	**H**	Ensure a haulage management plan which includes appropriate fatigue management strategies and policy for BSP haulage vehicle drivers.	**2**	**5**	**M**
Increased risk of collision due to Interaction with school bus vehicles along the project haul route	**2**	**5**	**M**	**3**	**5**	**H**	Ensure a haulage management plan is in place which includes a School Bus Interaction Management Plan for BSP haulage vehicle drivers	**2**	**5**	**M**
Debris / haulage material on roads during the construction and operations phases	**2**	**2**	**L**	**4**	**2**	**M**	Ensure a haulage management plan is in place to address impacts on the road network as a result of project generated debris and haulage material	**2**	**2**	**L**
Transportation of Hazardous and Dangerous materials during construction and operations phases	**2**	**5**	**M**	**3**	**5**	**H**	Transportation of hazardous and dangerous goods is to comply with requirements of Australian Dangerous Goods Code	**2**	**2**	**L**
Increased risk of vehicle collision at key intersections providing access to the BSP	**1**	**5**	**M**	**2**	**5**	**M**	Intersection treatments as outlined herein are implemented	**1**	**5**	**M**

While a number of mitigation measures are recommended based on the presented in Table 7.1, operations of the BSP are expected to be a continuation of the BNM, and hence are not expected to pose any additional risks beyond what has been identified and addressed as part of the BNM approval.

It is understood that the following management plans were developed and implemented under the existing CHRUIA:

- School bus interaction management plan
- Stock movement interaction management plan
- Transport management plan
- Road asset management plan.

The agreements and the requirements of the CHRUIA are considered to provide adequate mitigation measures satisfactory for the BSP.

7.2 Road Crash History

In addition to the Road Safety Risk Assessment, analysis of road crash data for the key BSP routes was undertaken to assess current levels of road safety. Road crash data for the key haulage routes was sourced from TMR (obtained August 2023) for a five-year period between 1 January 2017 – 31 December 2021 (it is noted that a limitation of this data set is that no crash data has been published by TMR for 2022). This crash data provides information on the number of crashes along the key project routes including Moura-Baralaba Road and Baralaba-Banana Road (used predominantly by local workforce and coal haulage vehicles during the construction and operations phases of the project), categorised into the following:

- Crash resulting in fatality.
- Crash resulting in hospitalisation.
- Crash resulting medical treatment.
- Crash resulting in minor injury.

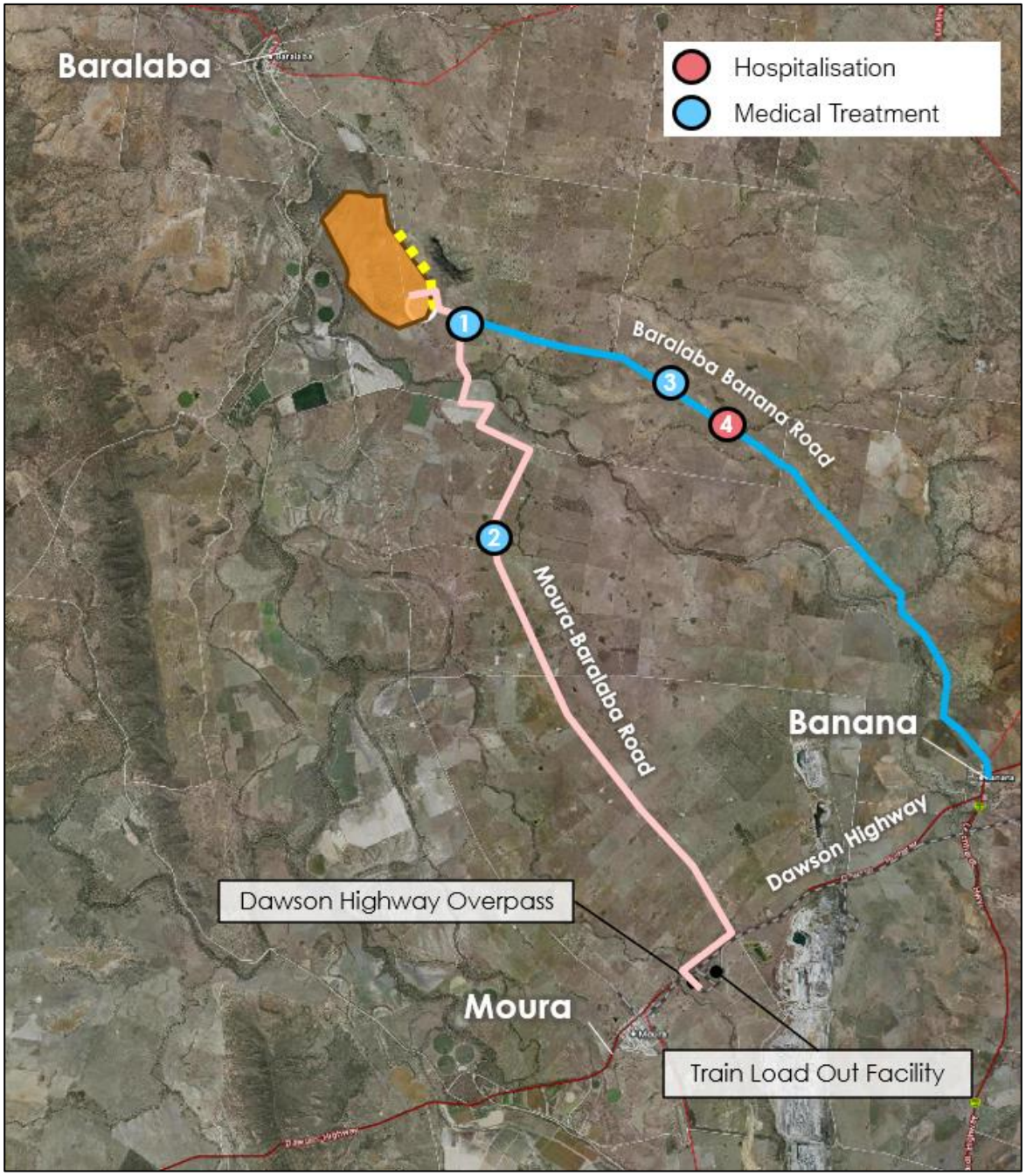
A review of the recorded crashes within the surrounding area found that two crashes have been identified along the key project coal haulage route, Moura-Baralaba Road. An additional two crashes were reported between Banana and Baralaba along Baralaba-Banana Road (a route expected to be undertaken by local workers to Baralaba). All four documented crashes were single vehicle crashes, and occurred on the council-controlled road network. A summary of the crashes, including location, crash type, severity and the Definition for Coding Accidents (DCA) code is as follows:

- Moura–Baralaba Road (BSP Coal Haulage Route):
    1. January 2019, single vehicle crash (vehicle overturned) at T-Junction intersection requiring medical treatment. 0-50km /hr speed environment (DCA Code 707 – off path, on straight right turn).
    2. September 2019, vehicle hit animal on path requiring medical treatment, 100-110 km/hr speed environment. (DCA Code 609, on path, hit animal).
- Baralaba–Banana Road (Banana to Baralaba local workforce movement):
    3. July 2018, single vehicle hit object, requiring medical treatment, 100-110km/hr speed environment. (DCA Code 700, off path-straight: other).
    4. March 2020, single vehicle crash (vehicle overturned) resulting in hospitalisation. 100-110km/hr speed environment. (DCA Code 703, off path, on straight, left off carriageway into object).

In addition to the documented, publicly-available crashes discussed above, Stantec has been informed by the proponent that five further crashes have occurred in the within the considered time period. While the details of these crashes are not within the public domain, three of the five incidents were attributed to driver error. Based on this knowledge and an appreciation of the intersection through the undertaking of site inspections, Stantec does not believe there is an underlying road safety issue for the haulage route. Irrespective, it is recommended that the road use management plan is revisited to ensure adequate measures are in place to mitigate and address the likelihood of driver error.

Locations of the publicly available crashes described above are shown relevant to the project in Figure 7.2.

Figure 7.2: BSP Route TMR Recorded Crash Locations



Based on the information presented, it is observed that there is no incident clustering along any specific locations of the project road sections or proximate to the proposed BSP access. All vehicle crashes recorded along these road sections involved single vehicles, and do not appear to be a result of design deficiencies. The DCA codes recorded for the crashes predominantly relate to vehicles leaving the main carriageway / run off road crashes, which could be attributable to driver fatigue or inattentiveness.

It is therefore considered that this crash history is typical for the use, type and function of these project routes including Moura-Baralaba Road and Baralaba-Banana Road. The crash data suggests that the project routes proximate to the BSP do not pose any atypical safety risks or hazards that need to be factored into the access design or vehicle movement considerations beyond the intersection upgrade for the BSP access as presented in Section 5.2.1.

8. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

1. Peak traffic demands for the BSP are expected to occur in the first three project years (expected between 2029 and 2031), which includes construction workforce (occurring over two years) overlapping with one year of operational workforce where operations will occur at both BSP and BNM, with a total workforce (including BNM) during this peak transition period expected to be in the order of 710 persons.
2. During the peak project activity, in the order of 570 (two-way) light vehicle movements per day are associated with BSP construction. Similarly, in the order of 1060 (two-way) light vehicle movements per day are associated with coal extraction and haulage operations.
3. For the transition period between 2030 and 2033, the combined product coal haulage is expected to peak at 2.5Mtpa (equating to 68 loaded, one-way coal haulage trips using ABB-Quad road trains), during which a phase up of BSP operations and phase down of BNM operations will occur. From 2034 onwards (after the transition), production levels are expected to return to baseline BNM conditions, i.e., a maximum of 1.8 Mtpa (49 loaded, one-way coal haulage trips). The proposed combined maximum haulage of 2.5 Mtpa product coal is below the existing approved product coal haulage of 3.5 Mtpa for BNM.
4. The BSP routes including Moura-Baralaba Road (the key haulage route) is expected to have significant spare capacity to cater for the Project's proposed traffic movements (inclusive of heavy vehicles). An assessment of route capacity based on existing background traffic and proposed development traffic indicates that there is expected to be a minimum of 32% spare capacity along the project haul route. Based on this analysis, impact mitigation works are not required.
5. Turn warrant assessments and SIDRA intersection modelling have been undertaken for each of the proposed project intersections and accesses, which demonstrate that the existing intersection forms are suitable for the transition of haulage between the Baralaba accommodation camp, proposed BSP and existing TLO facility near Moura through to 2030 (the year of opening for BSP operations). All intersections are expected to operate under a degree of saturation of 0.1 (i.e. with ample spare intersection capacity), being below the operational performance limit of 0.8 for priority-controlled intersections.
6. Turn warrant analysis performed for the proposed BSP south access along the realigned Moura-Baralaba Road for 2040 background traffic plus the BSP operations (Project Year 11) indicate that a basic left (BAL) and basic right (BAR) turn provisions are required. However, given the proposed south mine access will cater for heavy vehicle movements, it is recommended that AUL(s) and CHR(s) treatments are constructed to improve road safety and accommodate the proposed ABB-Quad road trains.
7. Turn warrant analysis performed for the proposed BSP north access along the realigned Moura-Baralaba Road for 2040 background traffic plus the BSP operations (Project Year 11) workforce traffic demands indicate that a basic left (BAL) and basic right (BAR) turn provisions are required.
8. A project-related road safety risk assessment has been undertaken which identifies that key project risks are predominantly associated with coal haulage between BSP and the TLO. It is recommended that the existing management plans (including the school bus interaction management plan, stock movement interaction management plan, transport management plan, and road asset management plan) developed under the existing Coal Haulage Road Use and Infrastructure Agreement (CHRUIA) for BNM are updated to reflect the proposed haulage characteristics of the BSP as identified within this TIA.
9. A review of recent TMR Crash Statistics between 2017 and 2021 (for which public road crash data is available) indicates that there is no incident clustering along the proposed key project routes. The recorded crashes are deemed to be typical for the use, type and function of Moura-Baralaba Road and Baralaba-Banana Road. The crash data suggests that the relevant haulage route sections of these roads and proximate to the BSP do not pose any atypical safety risks or hazards that need to be factored into the access design or vehicle movement considerations. Crash data received from the proponent to date also reveals accidents which are often attributed to driver error.

Based on the assessment and findings of this Transport Impact Assessment, it is concluded that there are no reasonable or relevant transport planning and engineering grounds that may arise which would give reason not to approve the Baralaba South Project's environmental authority and development applications.

Appendix A. Traffic Surveys

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 1 **Weather:** Fine

Location: Mine Access/Baralaba Woorabinda Road

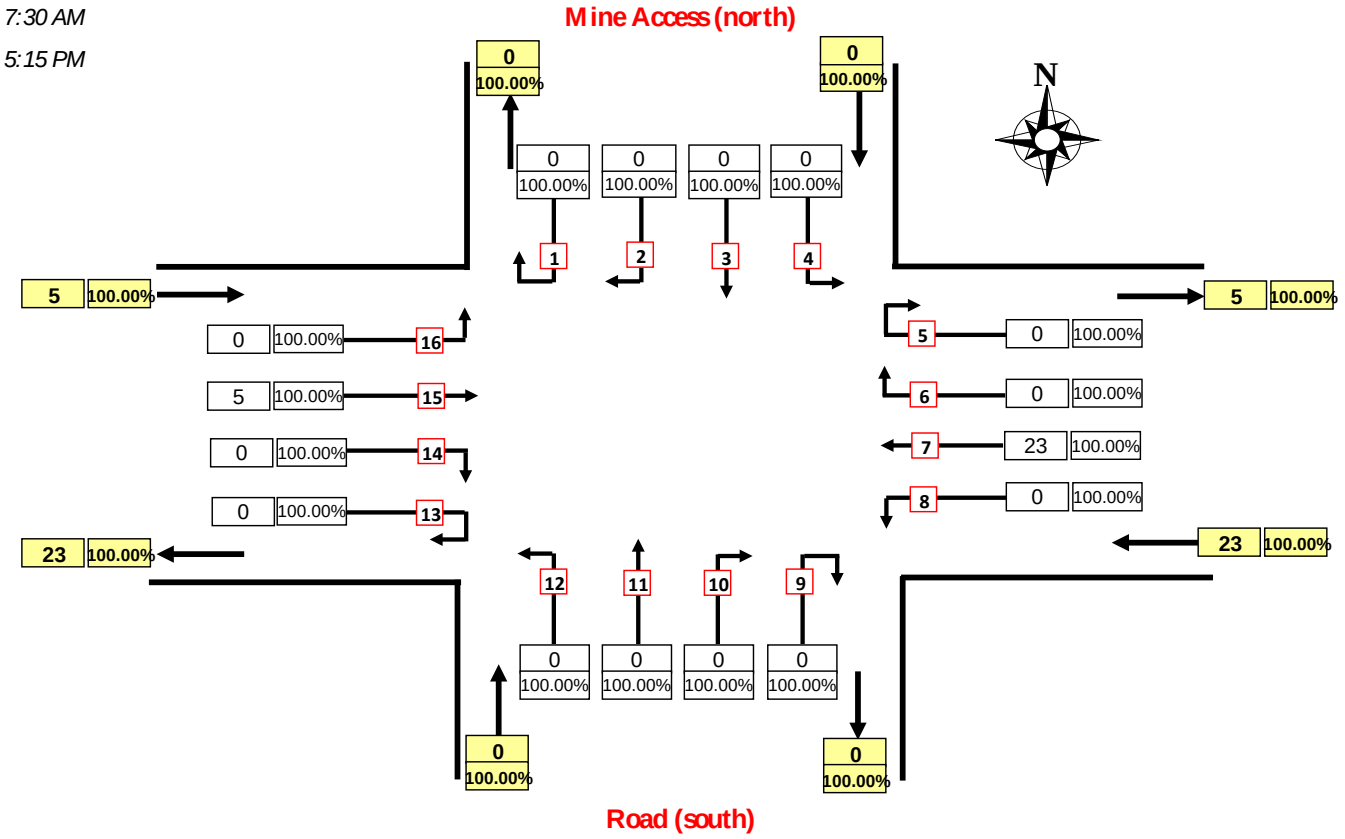
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 7:30 AM*

PM Peak : *Hour ending - 5:15 PM*

Hour Ending: 7:30 AM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 1 **Weather:** Fine

Location: Mine Access/Baralaba Woorabinda Road

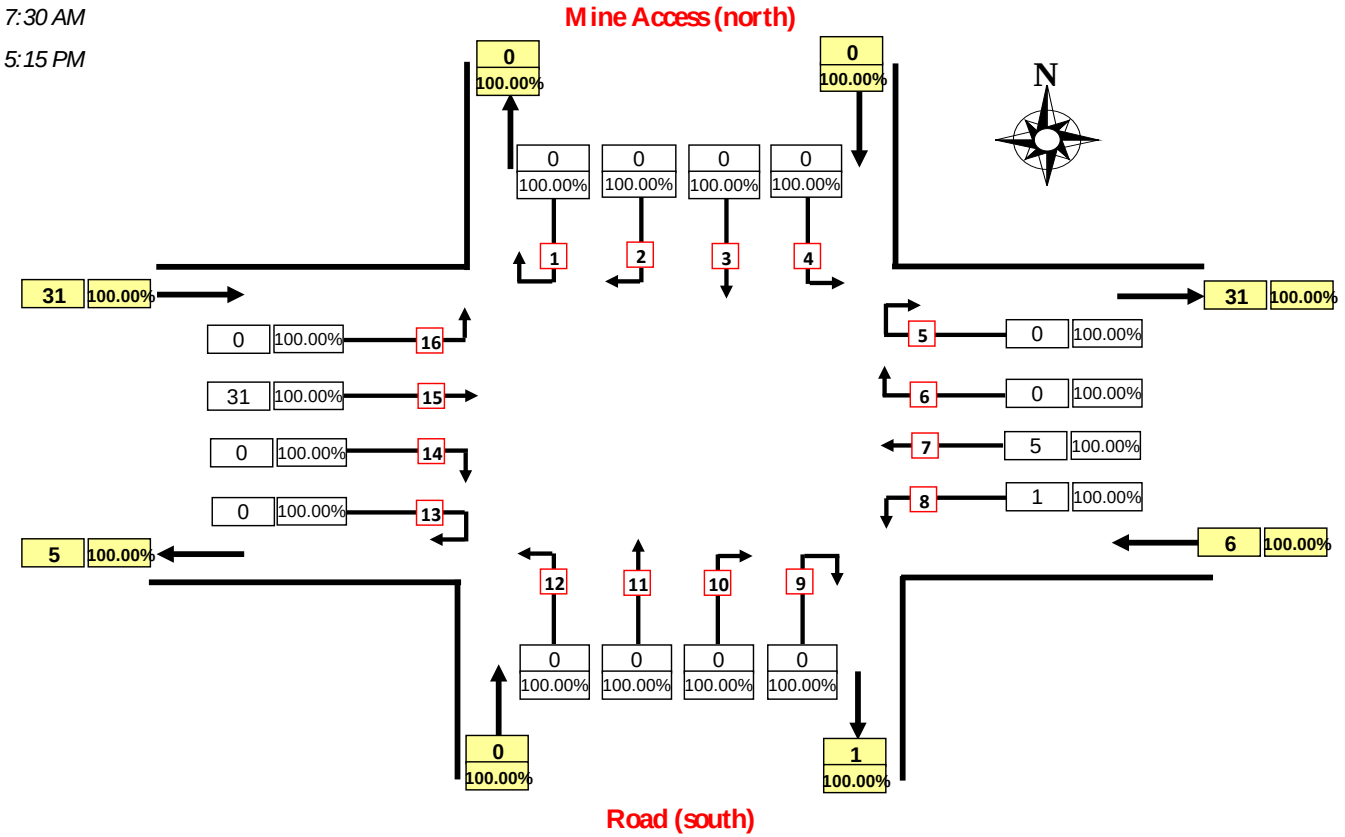
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 7:30 AM*

PM Peak : *Hour ending - 5:15 PM*

Hour Ending: 5:15 PM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 2 **Weather:** Fine

Location: Baralaba Woorabinda Road/Baralaba Kooemba Road

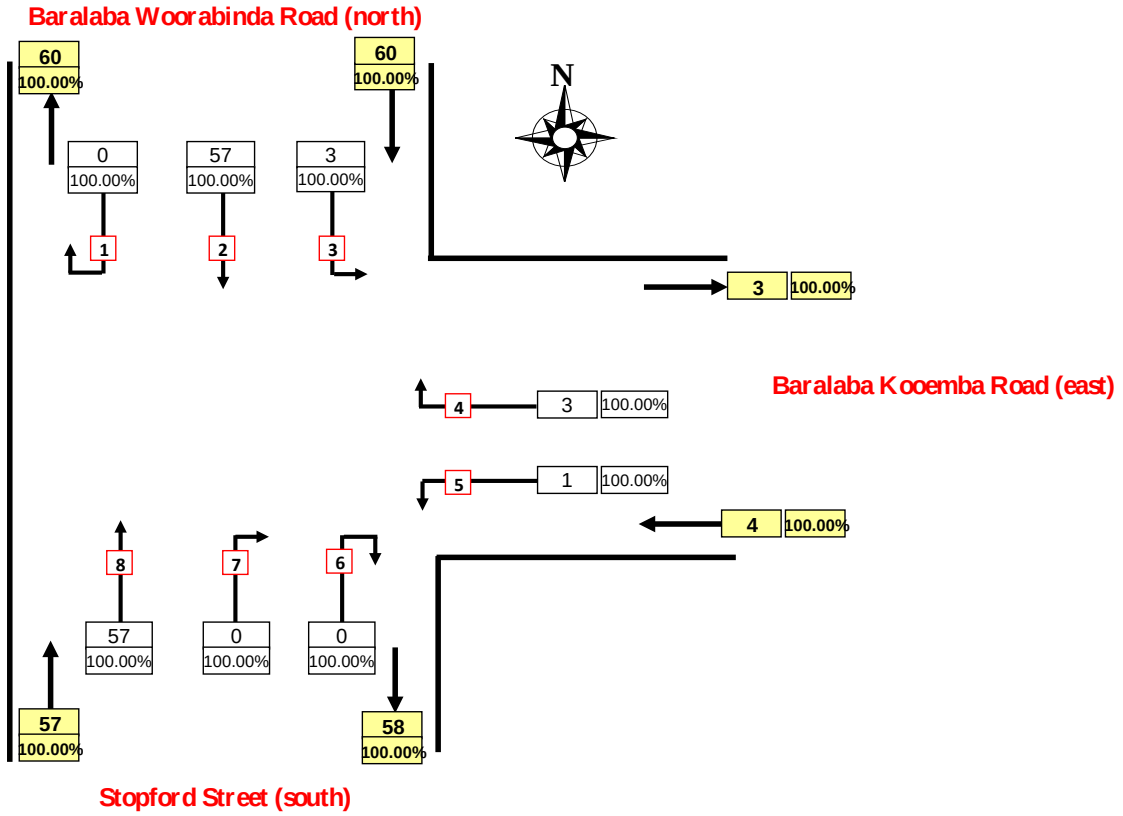
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:45 PM*

Hour Ending: 5:45 PM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 2 **Weather:** Fine

Location: Baralaba Woorabinda Road/Baralaba Kooemba Road

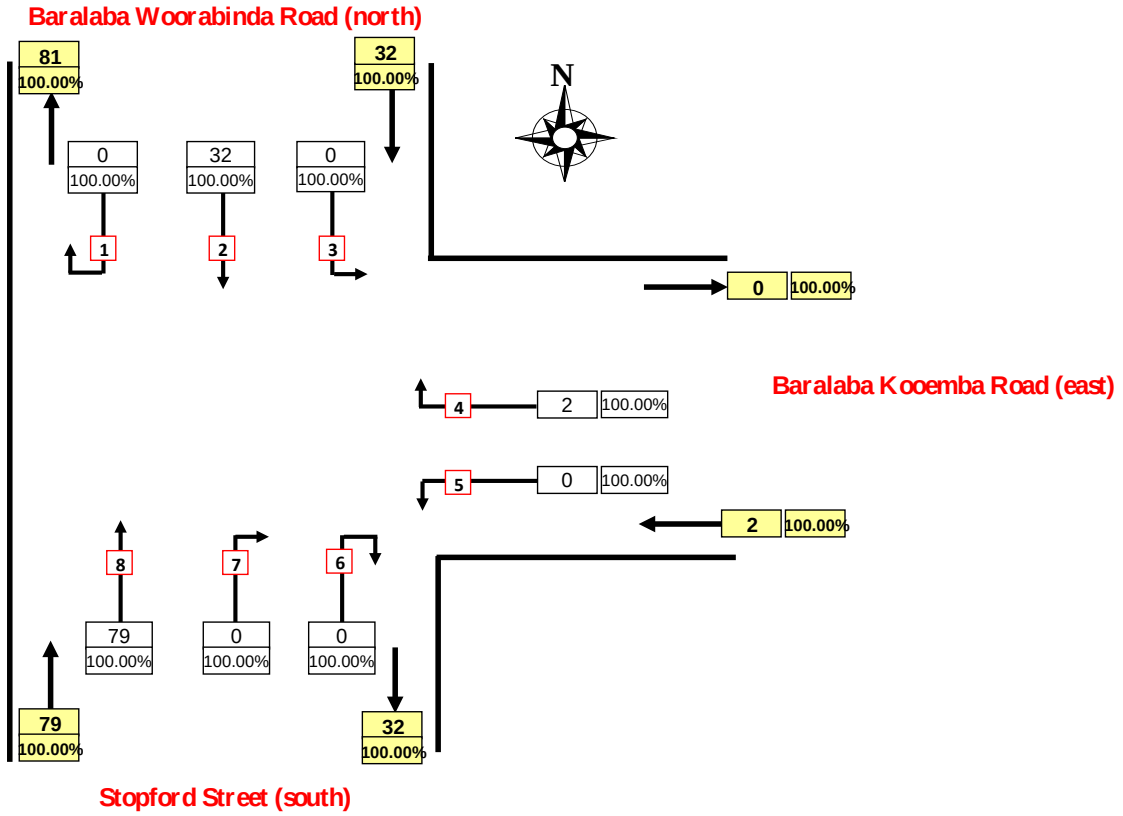
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:45 PM*

Hour Ending: 6:00 AM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 3 **Weather:** Fine

Location: Baralaba Kooemba Road/Private Haul Route

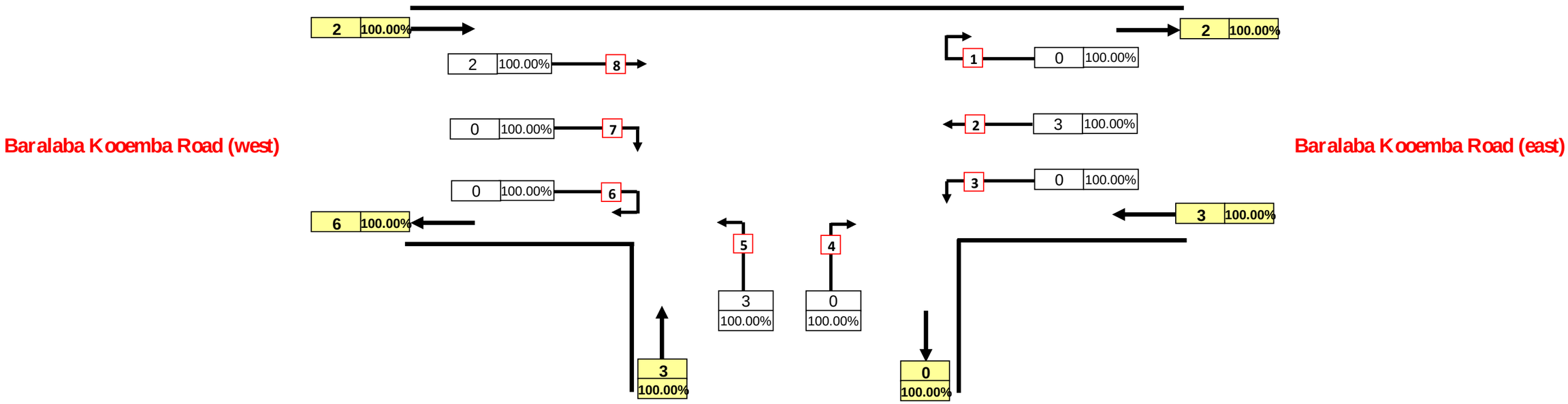
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 8:00 AM*

PM Peak : *Hour ending - 6:15 PM*

Hour Ending: 8:00 AM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 3 **Weather:** Fine

Location: Baralaba Kooemba Road/Private Haul Route

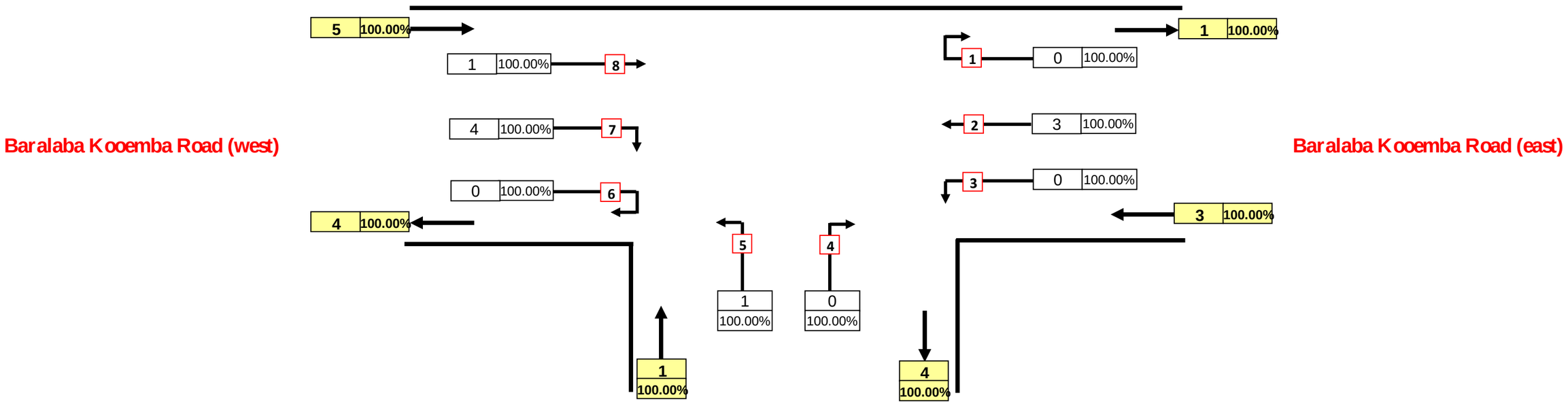
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 8:00 AM*

PM Peak : *Hour ending - 6:15 PM*

Hour Ending: 6:15 PM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 4 **Weather:** Fine

Location: Baralaba Rannes Road/Wooroonah Road

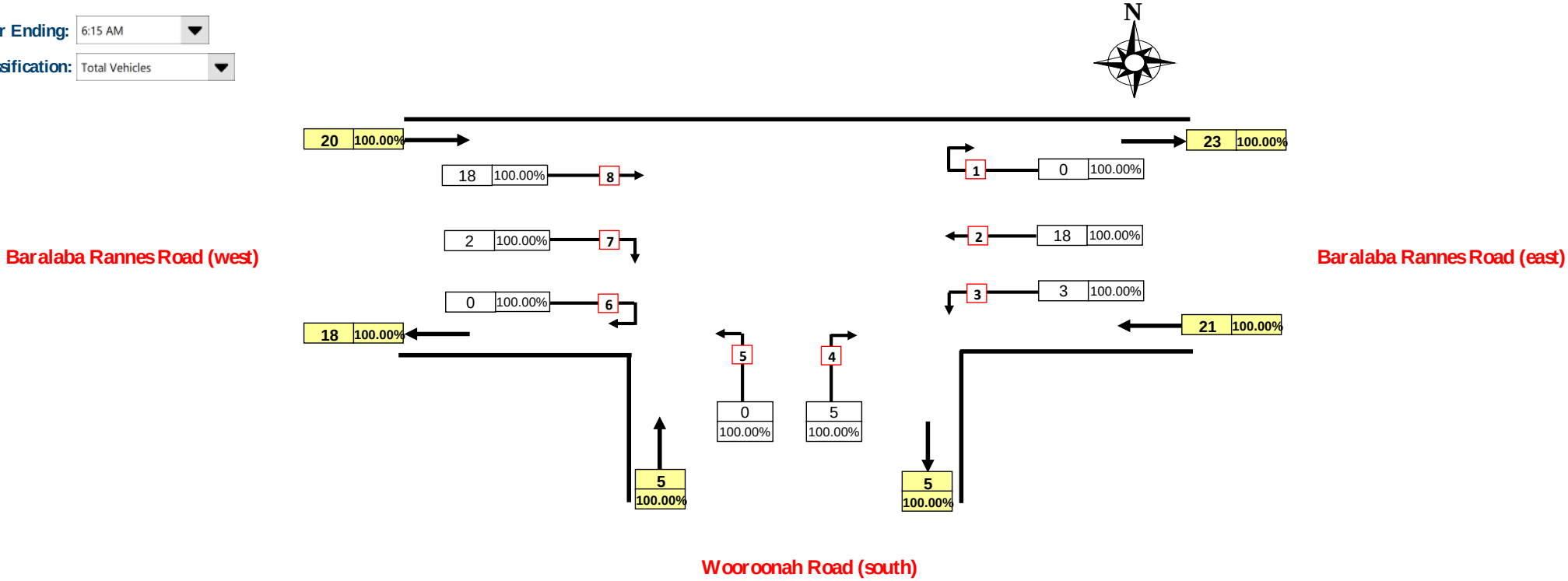
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:15 AM*

PM Peak : *Hour ending - 5:45 PM*

Hour Ending: 6:15 AM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 5A **Weather:** Fine

Location: Baralaba Caravana Park Access/Wooroonah Road

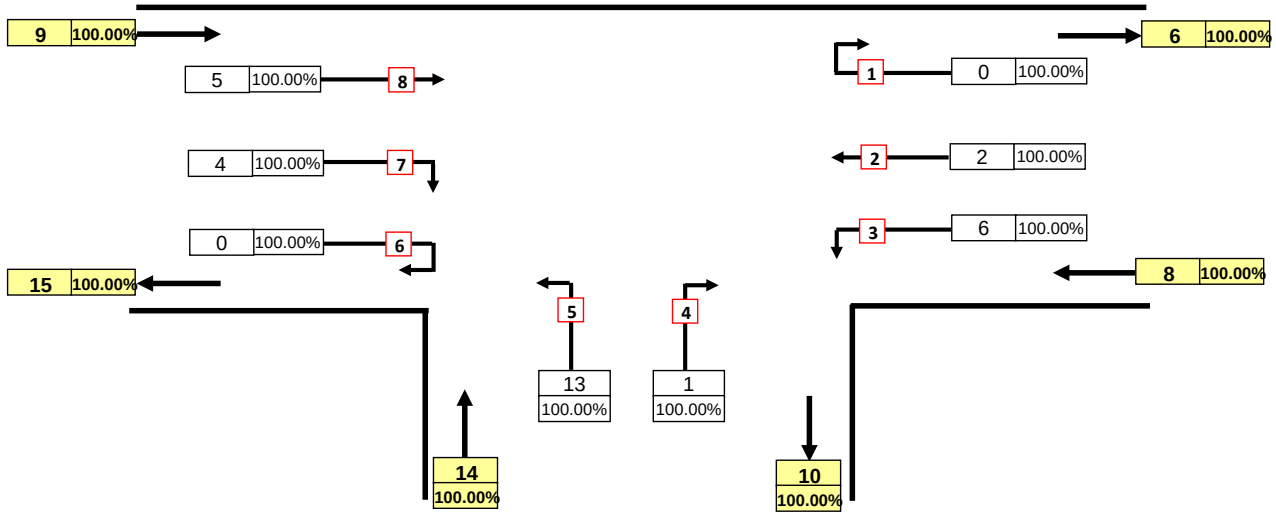
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:30 PM*

Hour Ending: 5:30 PM

Classification: Total Vehicles



Wooroonah Road (west)

Wooroonah Road (east)

Baralaba Caravana Park Access (south)

Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 5A **Weather:** Fine

Location: Baralaba Caravana Park Access/Wooroonah Road

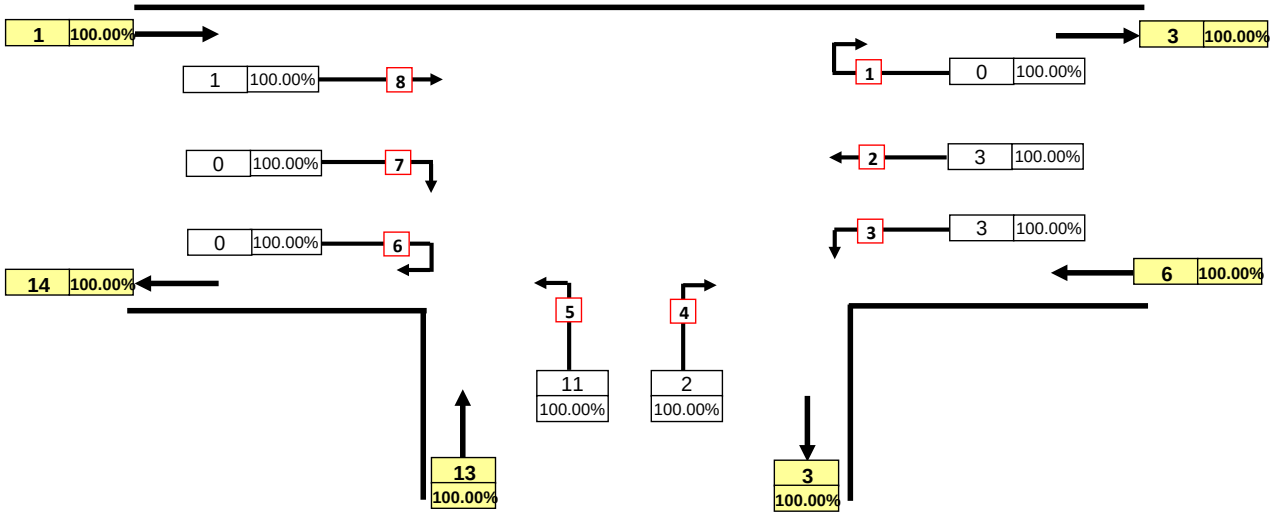
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:30 PM*

Hour Ending: 6:00 AM

Classification: Total Vehicles



Wooroonah Road (west)

Wooroonah Road (east)

Baralaba Caravana Park Access (south)

Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 5B **Weather:** Fine

Location: Baralaba Caravana Park Access/Wooroonah Road

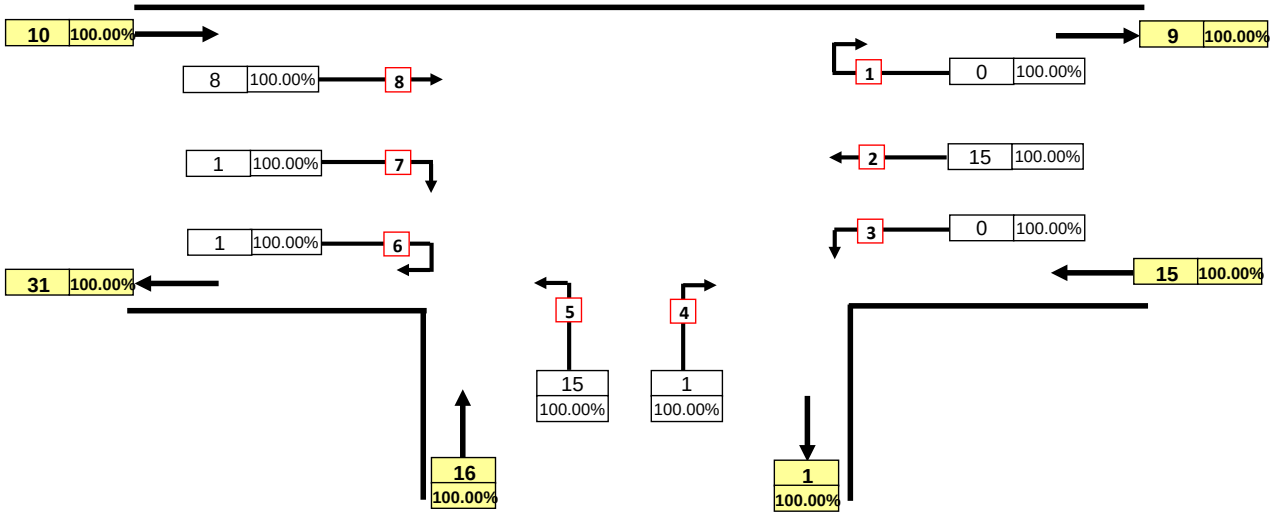
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:30 PM*

Hour Ending: 5:30 PM

Classification: Total Vehicles



Wooroonah Road (west)

Wooroonah Road (east)

Baralaba Caravana Park Access (south)

Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 5B **Weather:** Fine

Location: Baralaba Caravana Park Access/Wooroonah Road

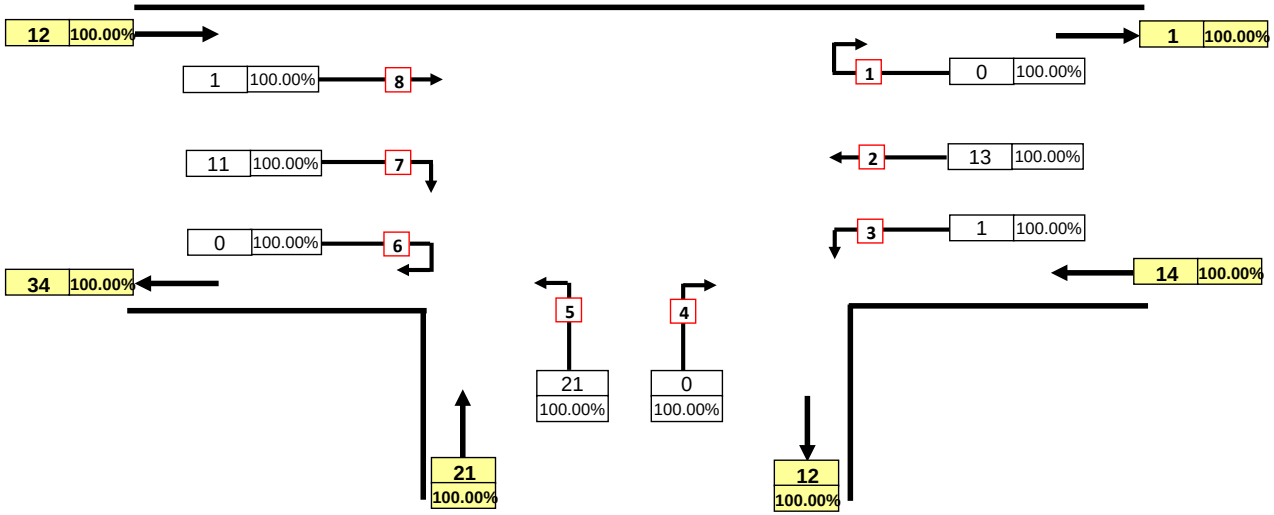
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:30 PM*

Hour Ending: 6:00 AM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 6 **Weather:** Fine

Location: Baralaba Rannes Road/Theodore Baralaba Road

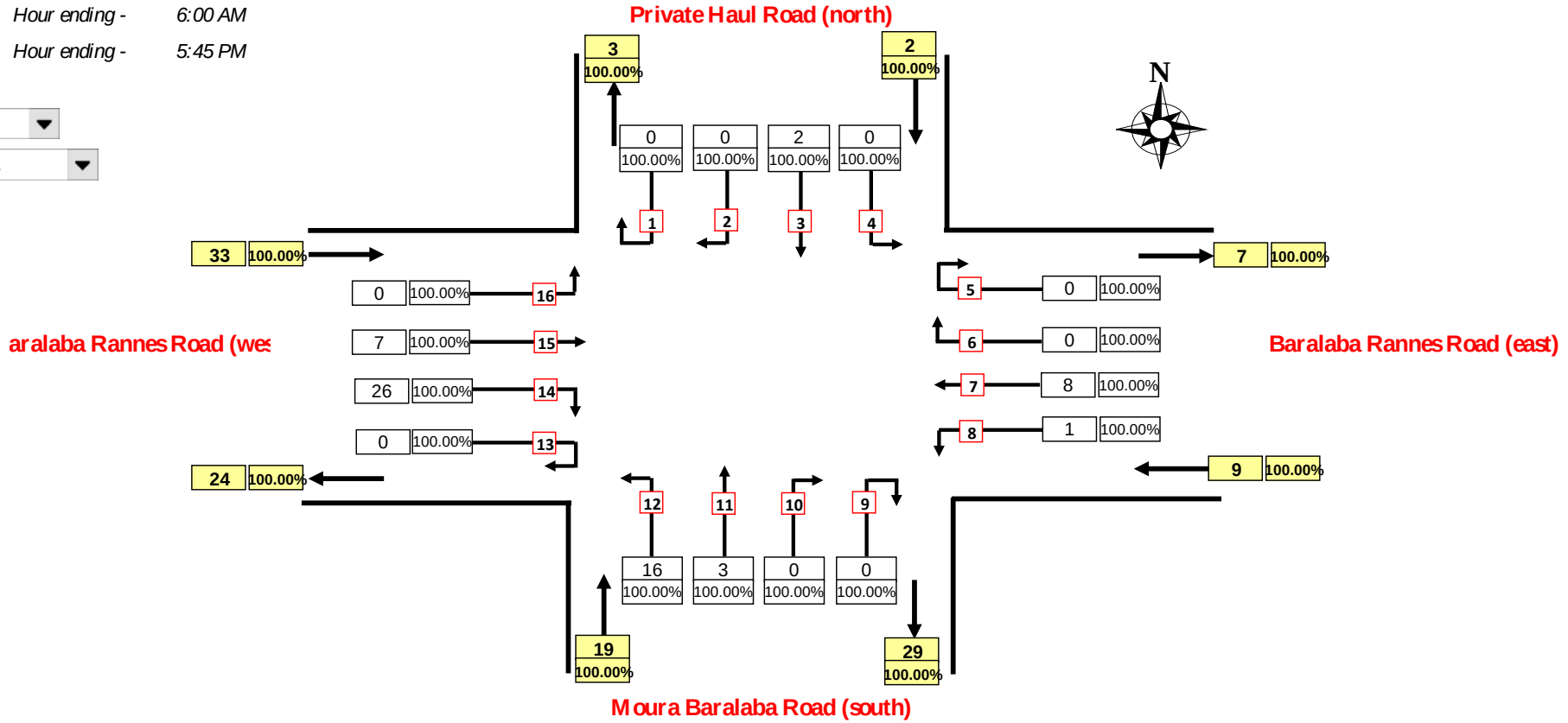
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:45 PM*

Hour Ending: 5:45 PM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 6 **Weather:** Fine

Location: Baralaba Rannes Road/Theodore Baralaba Road

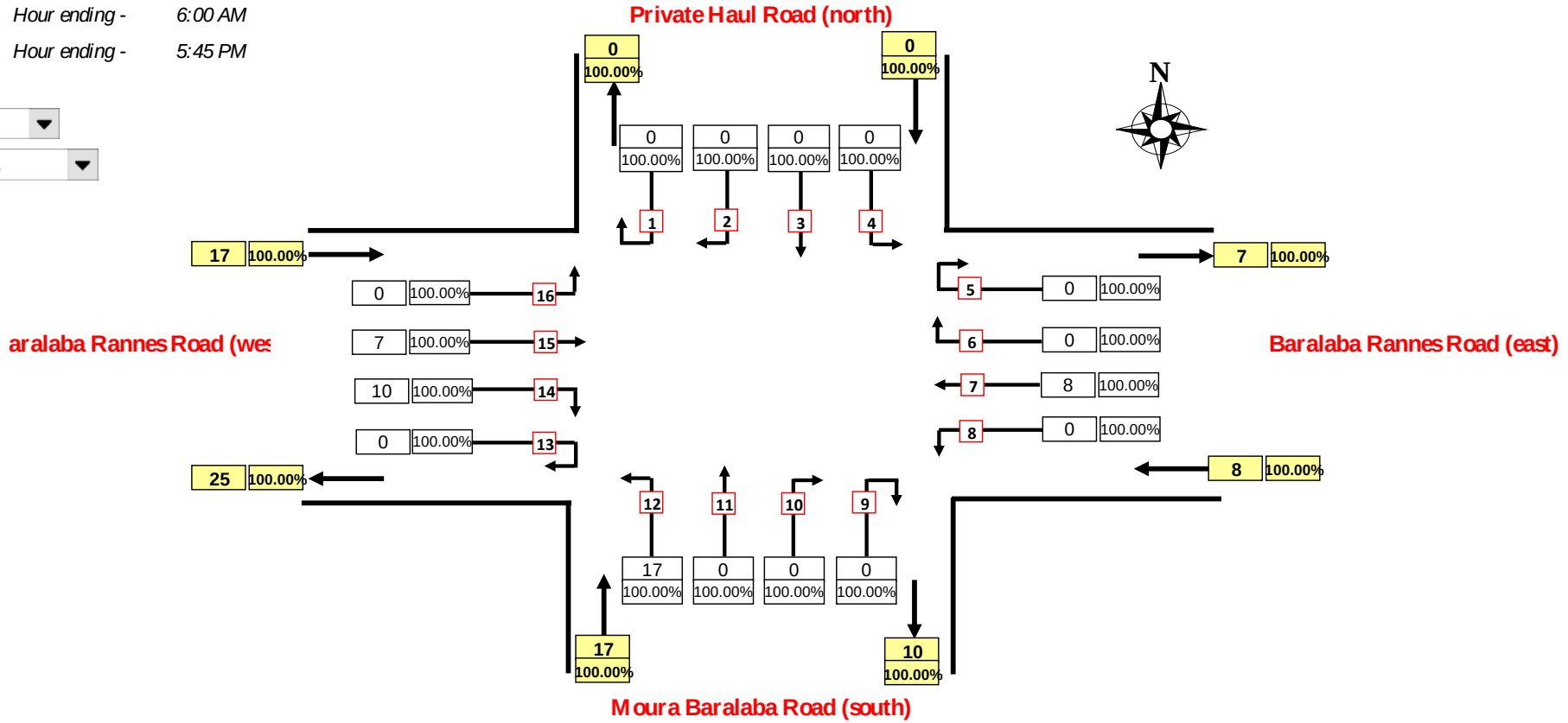
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 6:00 AM*

PM Peak : *Hour ending - 5:45 PM*

Hour Ending: 6:00 AM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 7 **Weather:** Fine

Location: Theodore Baralaba Road/TLO Private Haul Road

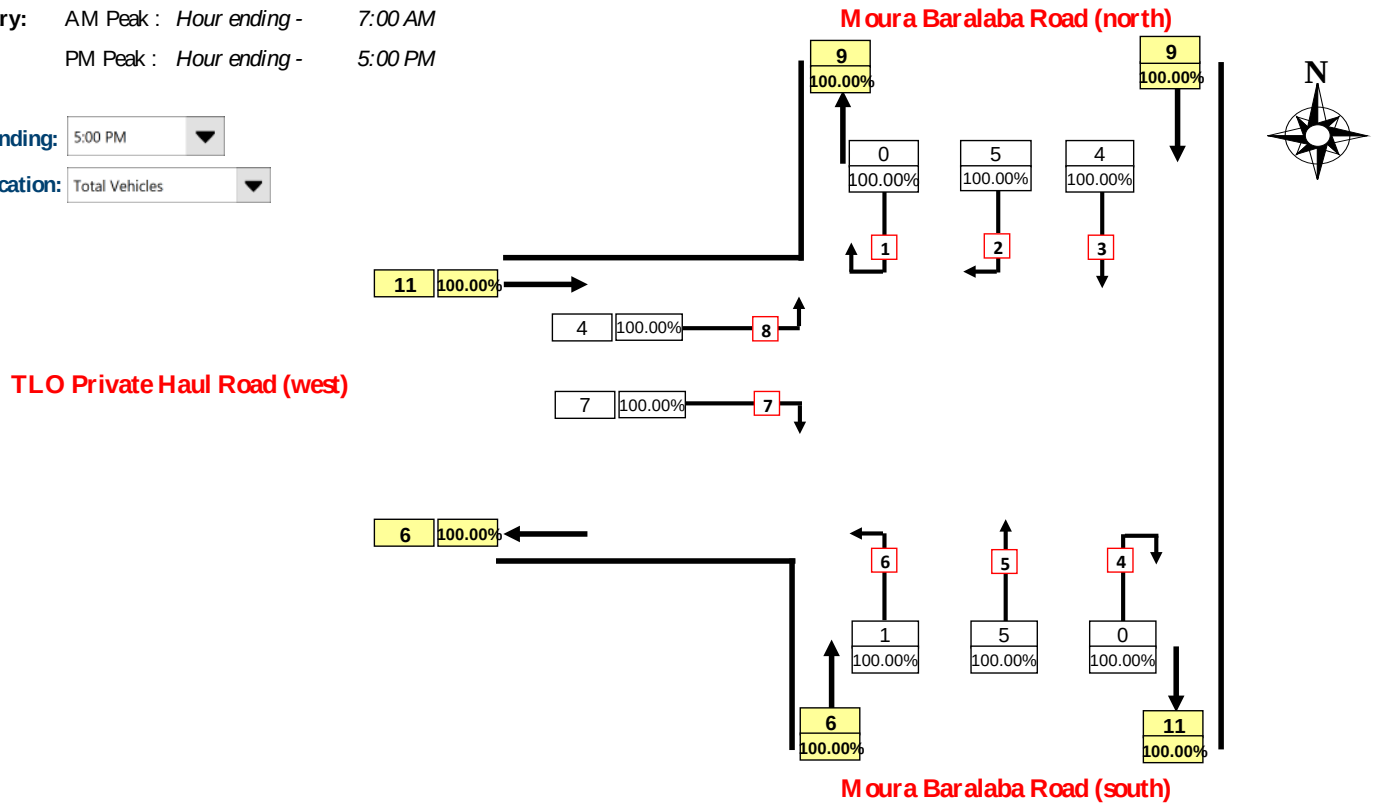
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 7:00 AM*

PM Peak : *Hour ending - 5:00 PM*

Hour Ending: 5:00 PM

Classification: Total Vehicles



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 7 **Weather:** Fine

Location: Theodore Baralaba Road/TLO Private Haul Road

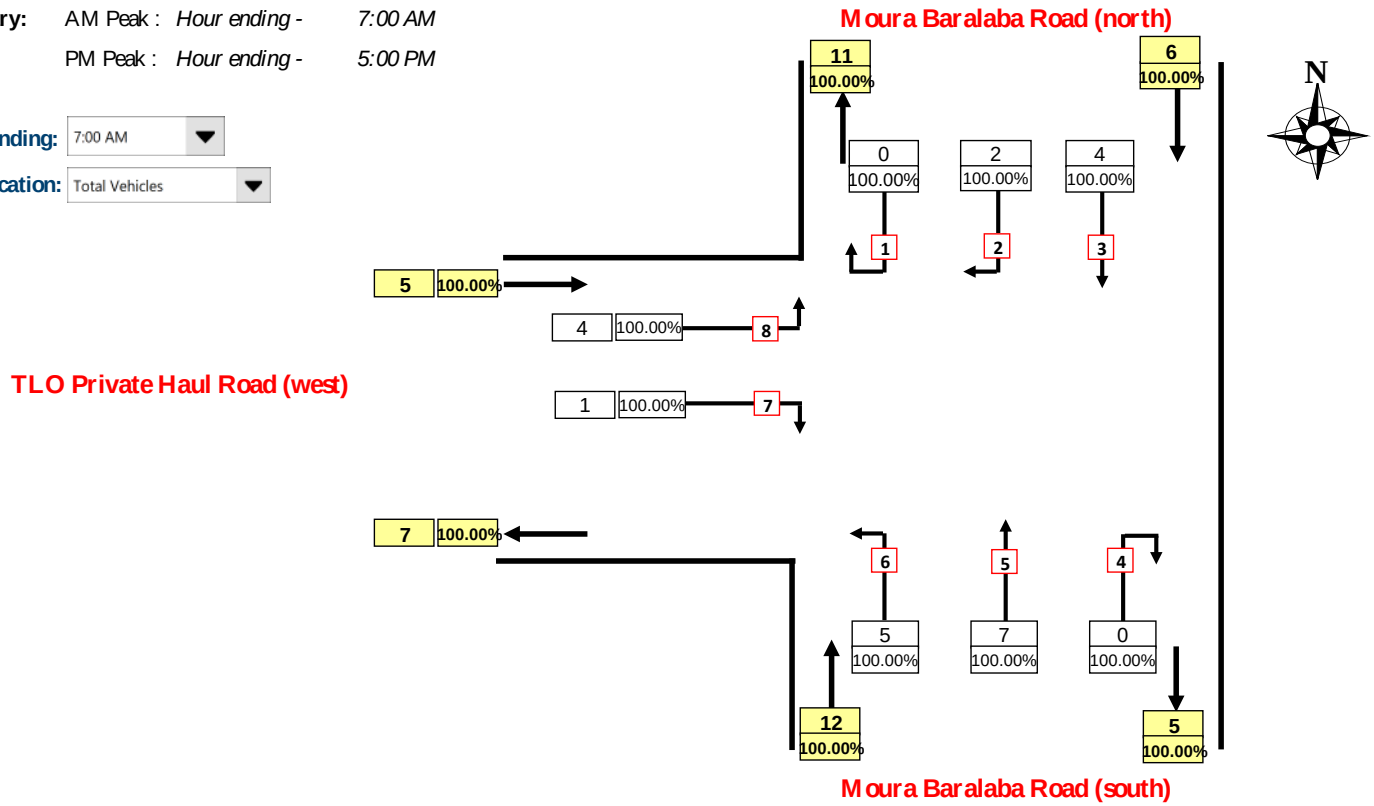
Day/Date: Tuesday, 29 January 2019

Summary: AM Peak : *Hour ending - 7:00 AM*

PM Peak : *Hour ending - 5:00 PM*

Hour Ending: 7:00 AM

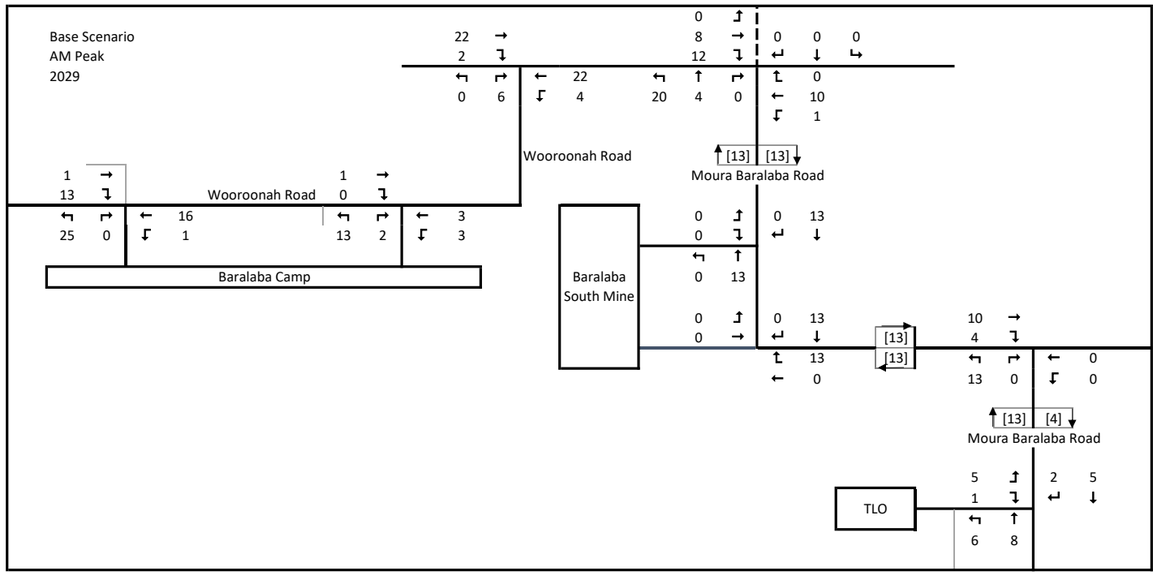
Classification: Total Vehicles

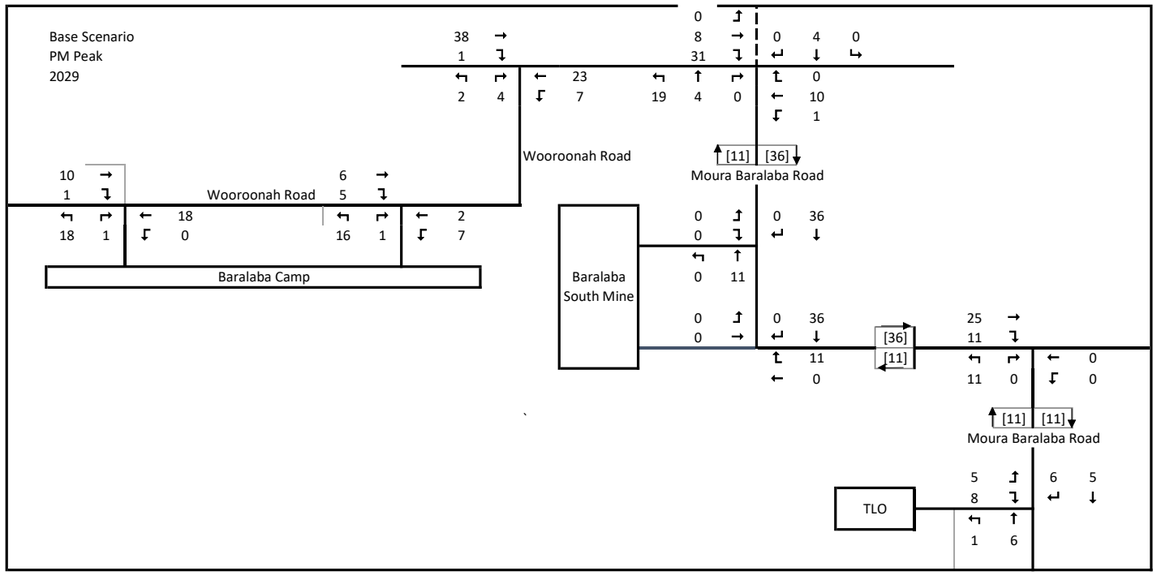


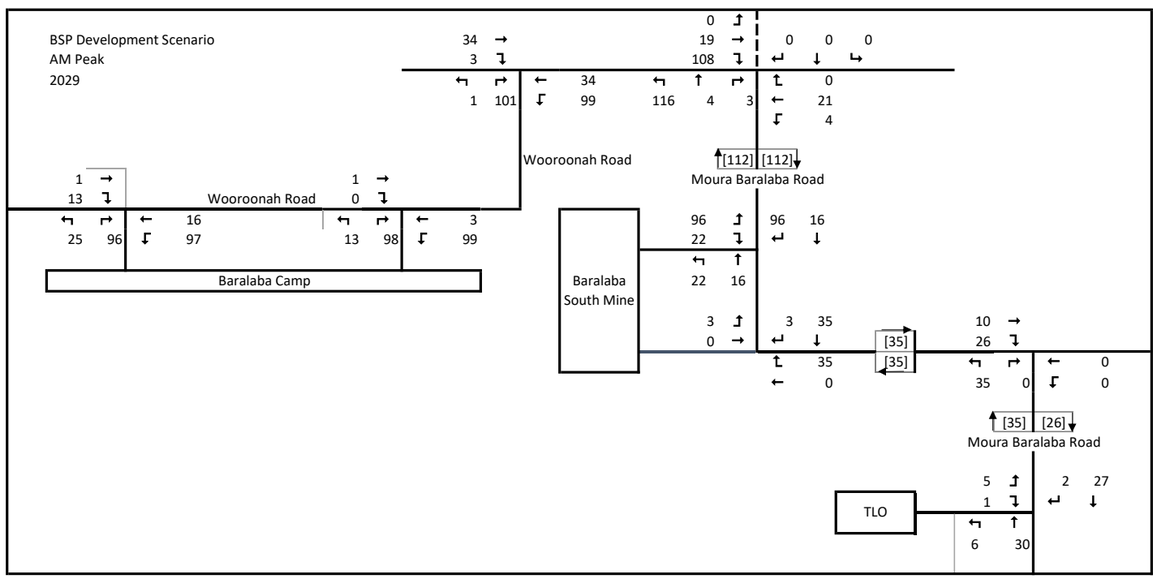
Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

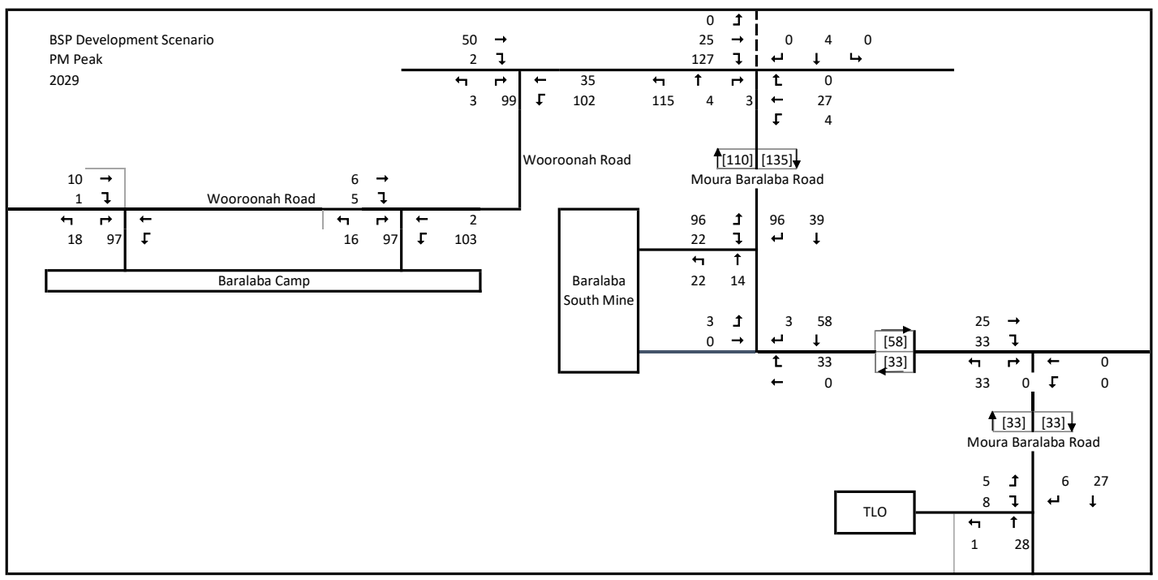
Appendix B. Turning Movement Diagrams

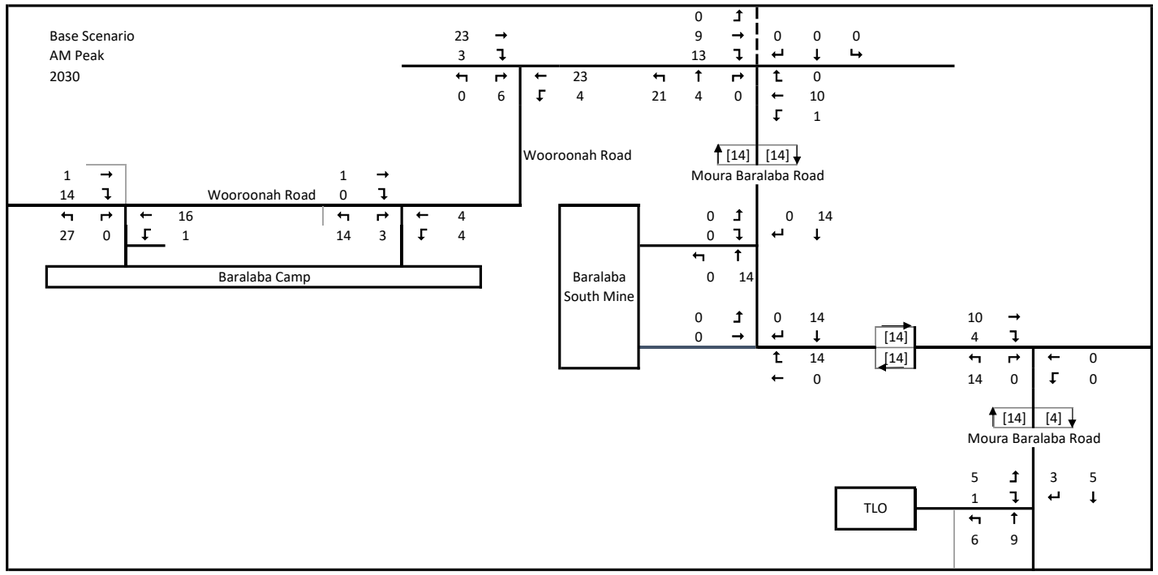
Turning Movement Diagrams - Intersection Assessment

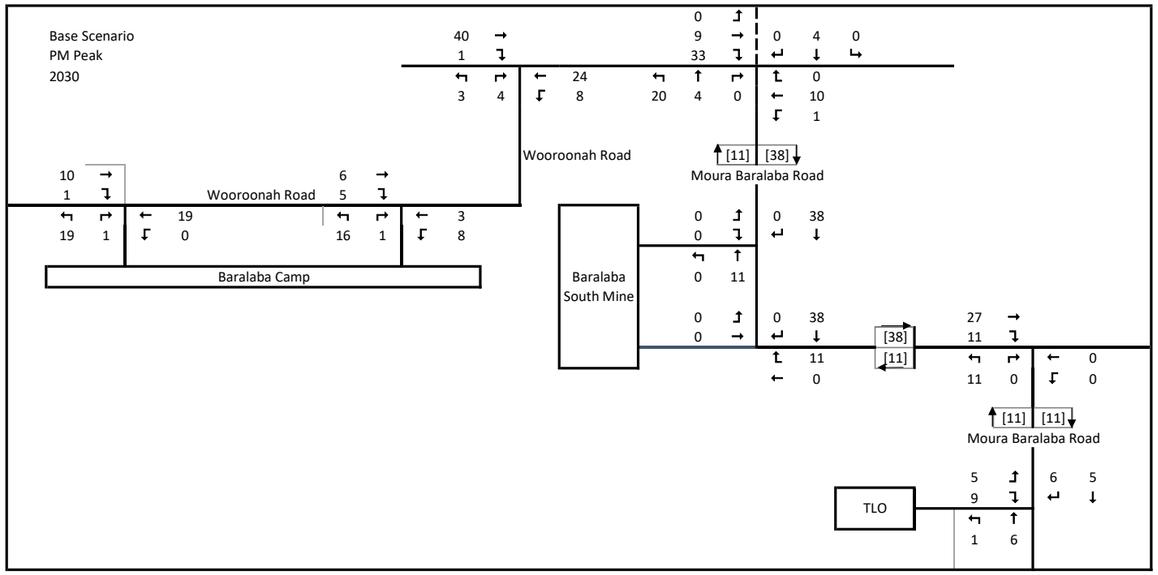


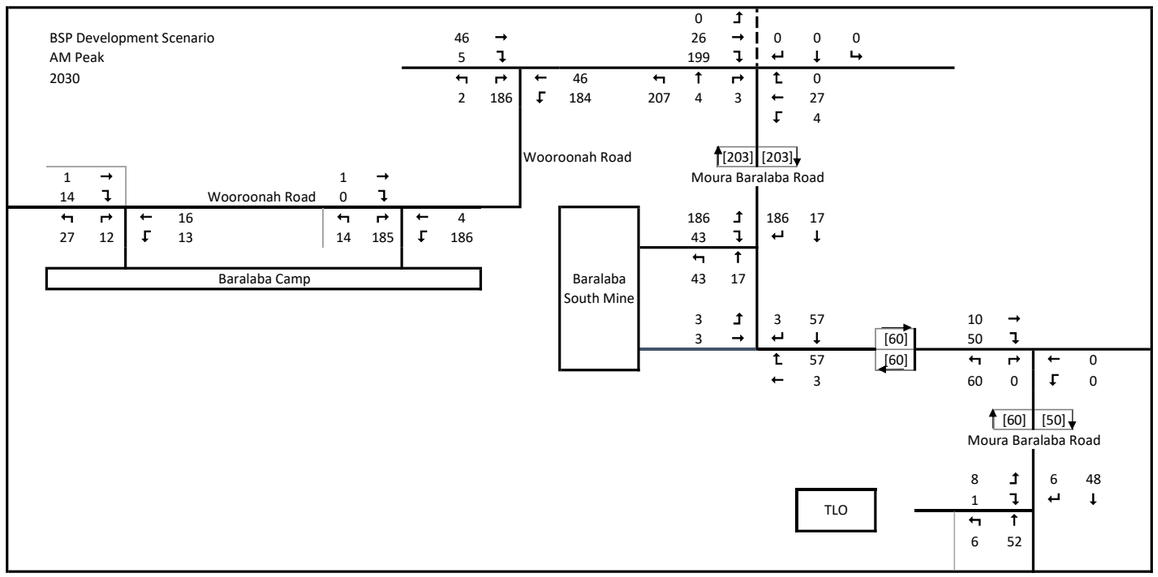


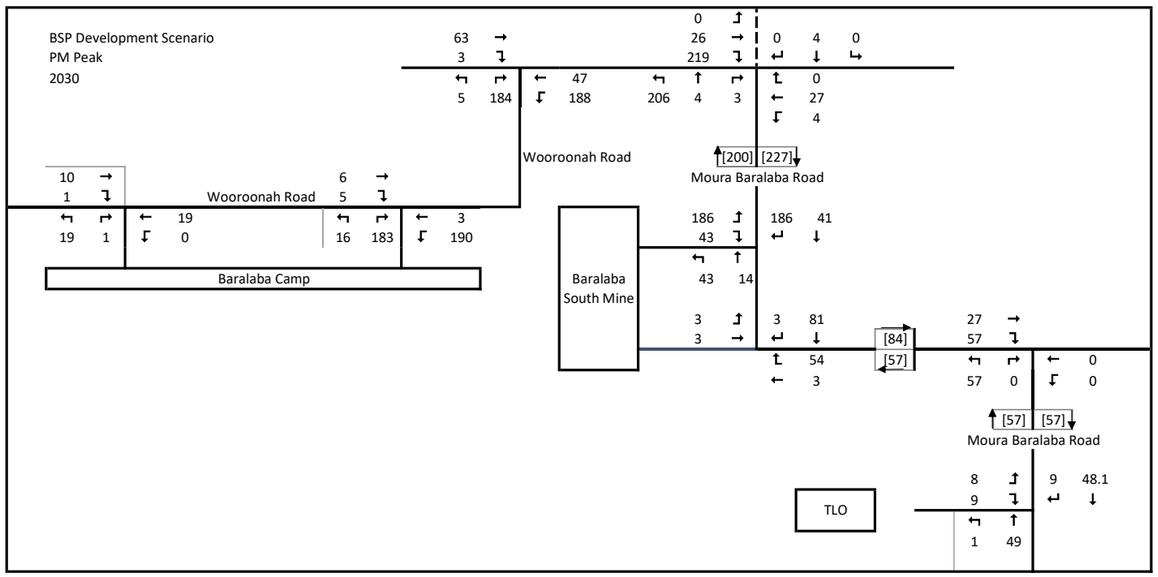





Base Scenario
AM Peak
2030
Wooroonah Road
Moura Baralaba Road
Baralaba Camp
Baralaba South Mine
TLO


Base Scenario
PM Peak
2030
Wooroonah Road
Moura Baralaba Road
Baralaba Camp
Baralaba South Mine
TLO


BSP Development Scenario
AM Peak
2030
Wooroonah Road
Moura Baralaba Road
Baralaba Camp
Baralaba South Mine
TLO


BSP Development Scenario
PM Peak
2030
Wooroonah Road
Moura Baralaba Road
Baralaba Camp
Baralaba South Mine
TLO

Appendix C. Turn Warrant Assessment

Turn Warrant Assessment

Date:	14/08/2023
Completed By:	Caleb Berhardt
Project Code:	300304981
Job Address:	Baralaba South Project (BSP), Baralaba
Methodology:	Queensland Guide to Traffic Management Part 6 (Intersections Interchanges and Crossings Management), accepted use of Austroads Guide to Traffic Management Part 6
Turn Description:	Baralaba Caravan Access 5A - Wooroonah Road
Assessment Years:	2030

Aerial / Map of Turn Warrant Locations:

Turn Warrant Assessment

Scenario:	BSP Operations 2030		
Design Speed:	Design Speed < 70km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	16	*Veh/hr*
Q_L:	13	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	30	*Veh/hr*
Q_R:	14	*Veh/hr*

Left In PM

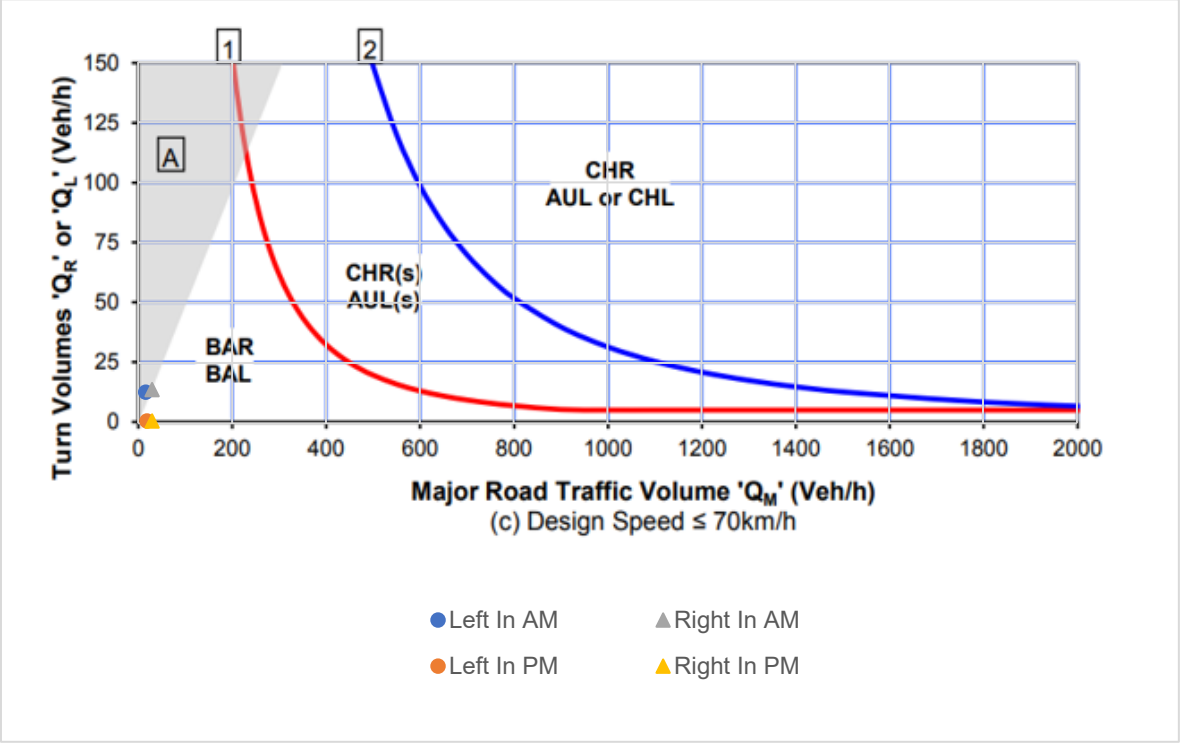
	Input	Units
Q_M:	Q_{T2}	
Q_M:	19	*Veh/hr*
Q_L:	1	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	30	*Veh/hr*
Q_R:	1	*Veh/hr*

Results:

Baralaba Caravan Access 5A



Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Date:	14/08/2023
Completed By:	Caleb Berhardt
Project Code:	300304981
Job Address:	Baralaba South Project (BSP), Baralaba
Methodology:	Queensland Guide to Traffic Management Part 6 (Intersections Interchanges and Crossings Management), accepted use of Austroads Guide to Traffic Management Part 6
Turn Description:	Baralaba Caravan Access 5B - Wooroonah Road
Assessment Years:	2030

Aerial / Map of Turn Warrant Locations:

Turn Warrant Assessment

Scenario:	BSP Operations 2030		
Design Speed:	Design Speed < 70km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	4	*Veh/hr*
Q_L:	16	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	21	*Veh/hr*
Q_R:	1	*Veh/hr*

Left In PM

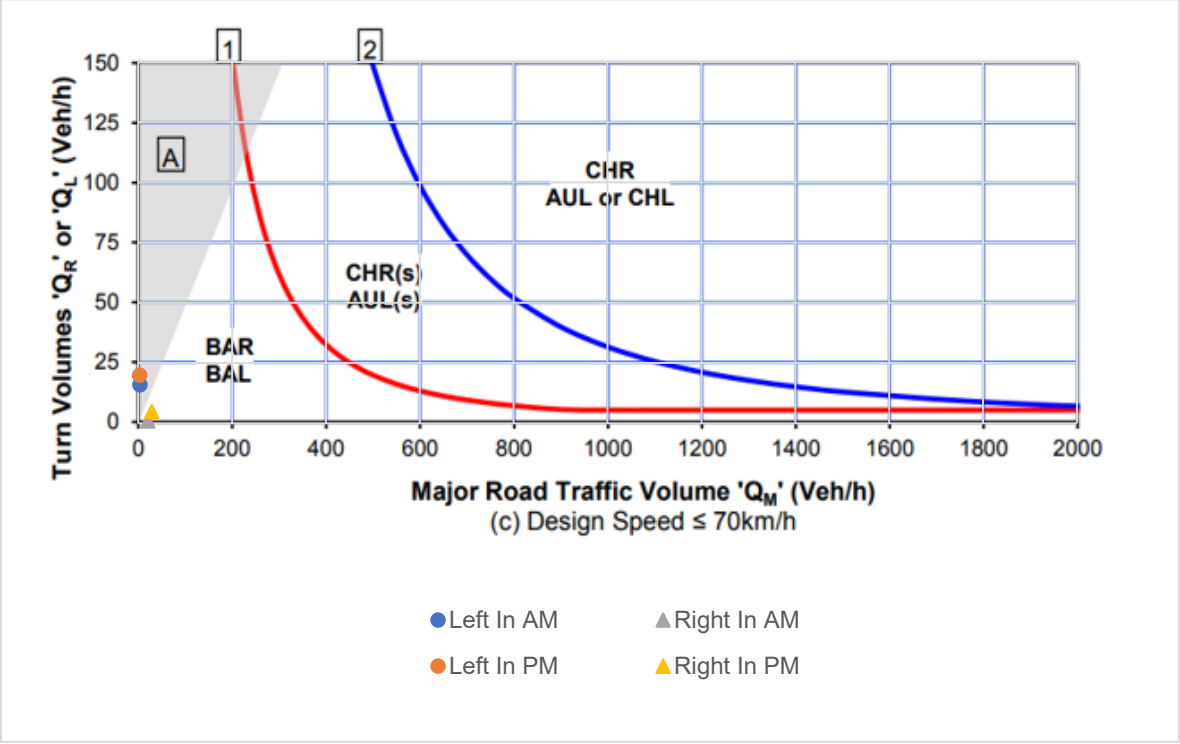
	Input	Units
Q_M:	Q_{T2}	
Q_M:	3	*Veh/hr*
Q_L:	20	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	29	*Veh/hr*
Q_R:	5	*Veh/hr*

Results:

Baralaba Caravan Access 5B



Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Date:	14/08/2023
Completed By:	Caleb Berhardt
Project Code:	300304981
Job Address:	Baralaba South Project (BSP), Baralaba
Methodology:	Queensland Guide to Traffic Management Part 6 (Intersections Interchanges and Crossings Management), accepted use of Austroads Guide to Traffic Management Part 6
Turn Description:	Baralaba Rannes Road / Wooroonah Road
Assessment Years:	2030

Aerial / Map of Turn Warrant Locations:

Turn Warrant Assessment

Scenario:	BSP Operations 2030		
Design Speed:	Design Speed < 70km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	54	*Veh/hr*
Q_L:	14	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	122	*Veh/hr*
Q_R:	5	*Veh/hr*

Left In PM

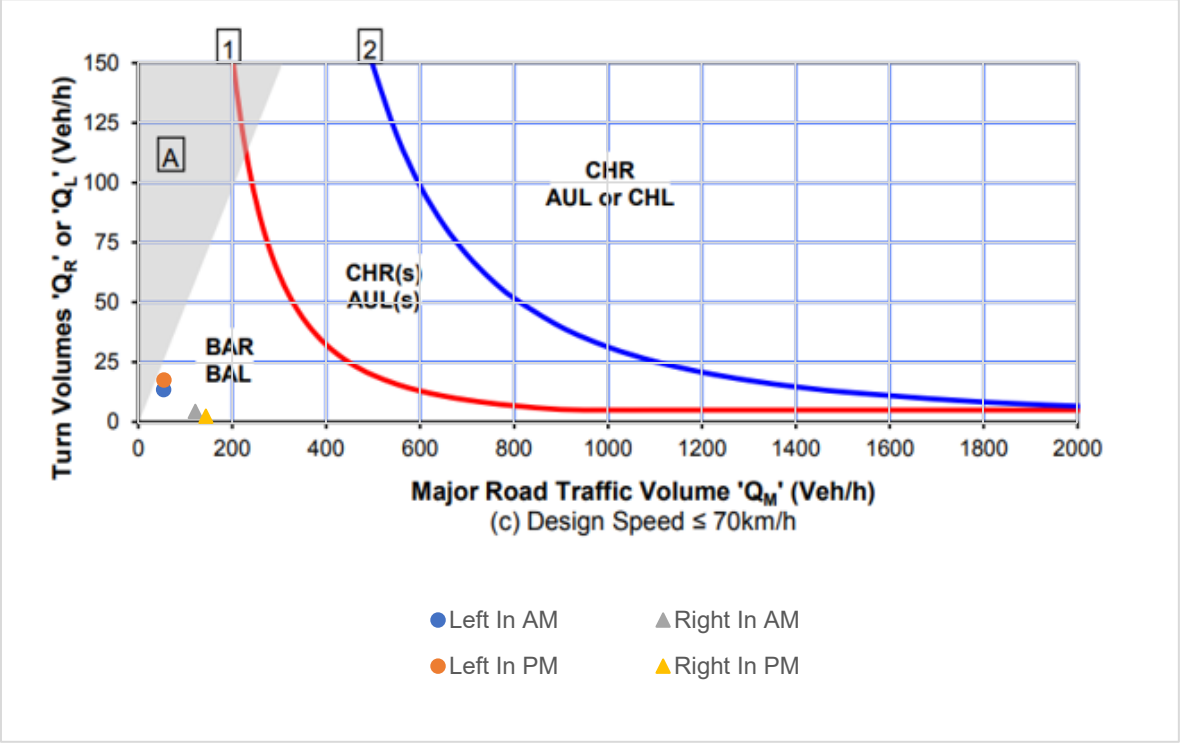
	Input	Units
Q_M:	Q_{T2}	
Q_M:	55	*Veh/hr*
Q_L:	18	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	144	*Veh/hr*
Q_R:	3	*Veh/hr*

Results:

Baralaba Rannes Road / Wooroonah Road



Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Date:	14/08/2023
Completed By:	Caleb Berhardt
Project Code:	300304981
Job Address:	Baralaba South Project (BSP), Baralaba
Methodology:	Queensland Guide to Traffic Management Part 6 (Intersections Interchanges and Crossings Management), accepted use of Austroads Guide to Traffic Management Part 6
Turn Description:	Baralaba-Rannes Road / Moura Baralaba Road
Assessment Years:	2030

Aerial / Map of Turn Warrant Locations:

Turn Warrant Assessment

Scenario:	BSP Operations, 2030		
Design Speed:	>100km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	11	*Veh/hr*
Q_L:	5	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	26	*Veh/hr*
Q_R:	53	*Veh/hr*

Left In PM

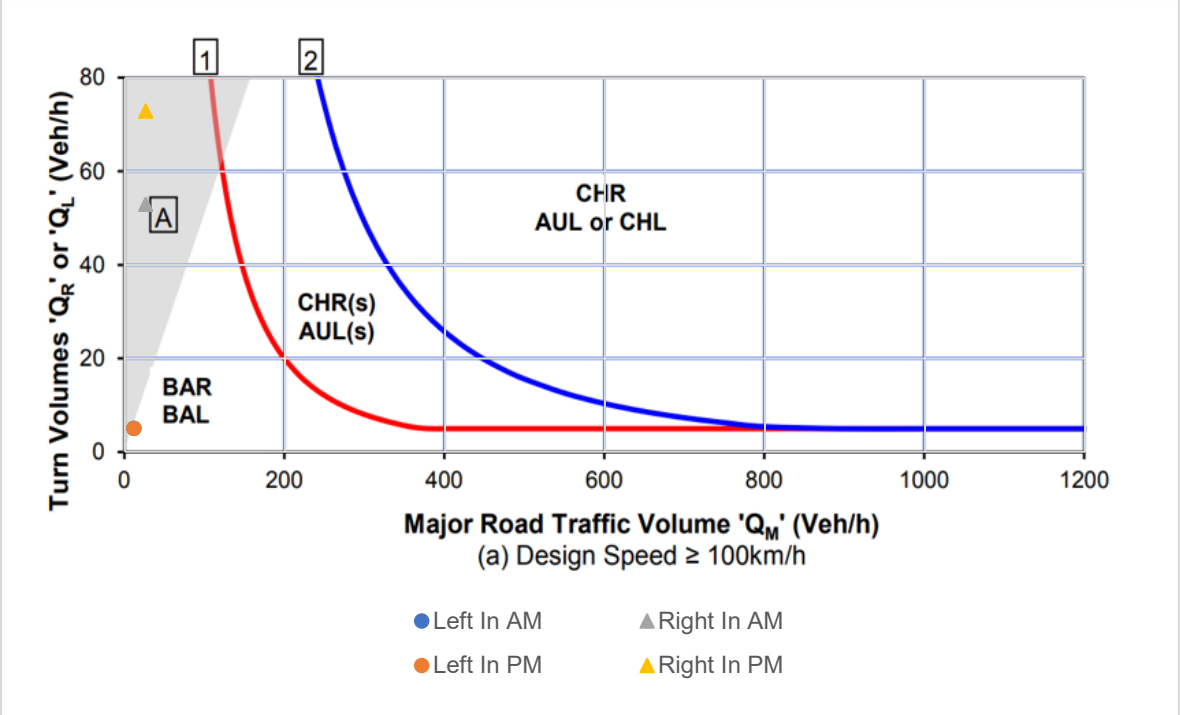
	Input	Units
Q_M:	Q_{T2}	
Q_M:	11	*Veh/hr*
Q_L:	5	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	26	*Veh/hr*
Q_R:	73	*Veh/hr*

Results:

Baralaba-Rannes Road / Moura Baralaba Road



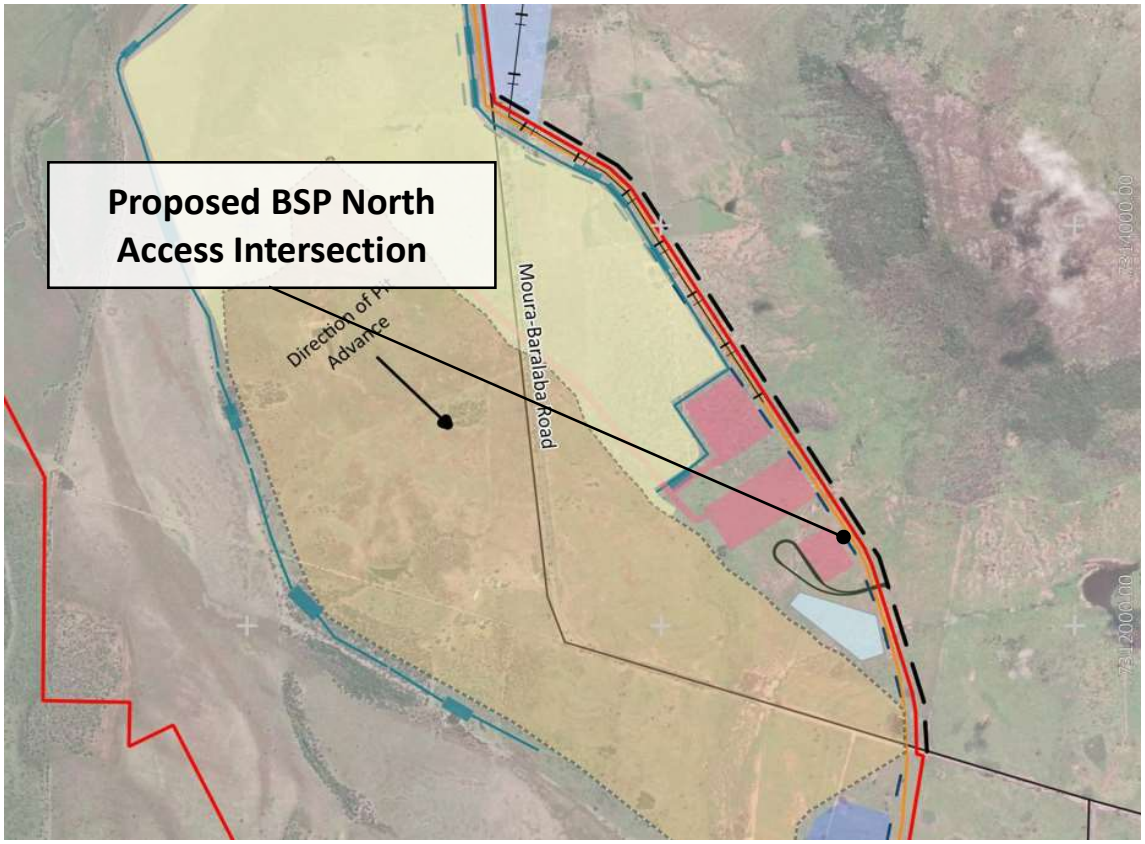
Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Date:	7/09/2023
Completed By:	Caleb Berhardt
Project Code:	300304981
Job Address:	Baralaba South Project (BSP), Baralaba
Methodology:	Queensland Guide to Traffic Management Part 6 (Intersections Interchanges and Crossings Management), accepted use of Austroads Guide to Traffic Management Part 6
Turn Description:	Moura Baralaba Road / Proposed BSP Access
Assessment Years:	2030, 2040

Aerial / Map of Turn Warrant Locations:



Turn Warrant Assessment

Scenario:	BSP Operations, 2030		
Design Speed:	>100km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	17	*Veh/hr*
Q_L:	43	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	77	*Veh/hr*
Q_R:	186	*Veh/hr*

Left In PM

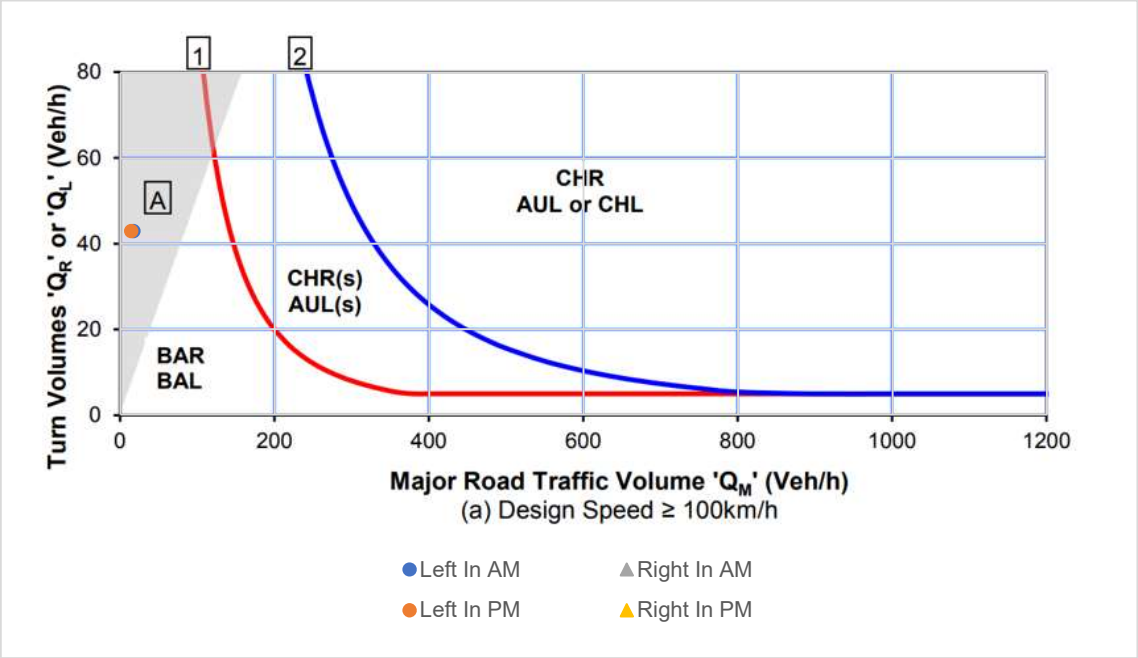
	Input	Units
Q_M:	Q_{T2}	
Q_M:	14	*Veh/hr*
Q_L:	43	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	98	*Veh/hr*
Q_R:	186	*Veh/hr*

Results:

Moura Baralaba Road / Proposed BSP Access



Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Scenario:	BSP Operations, 2040		
Design Speed:	>100km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	17	*Veh/hr*
Q_L:	43	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	83	*Veh/hr*
Q_R:	186	*Veh/hr*

Left In PM

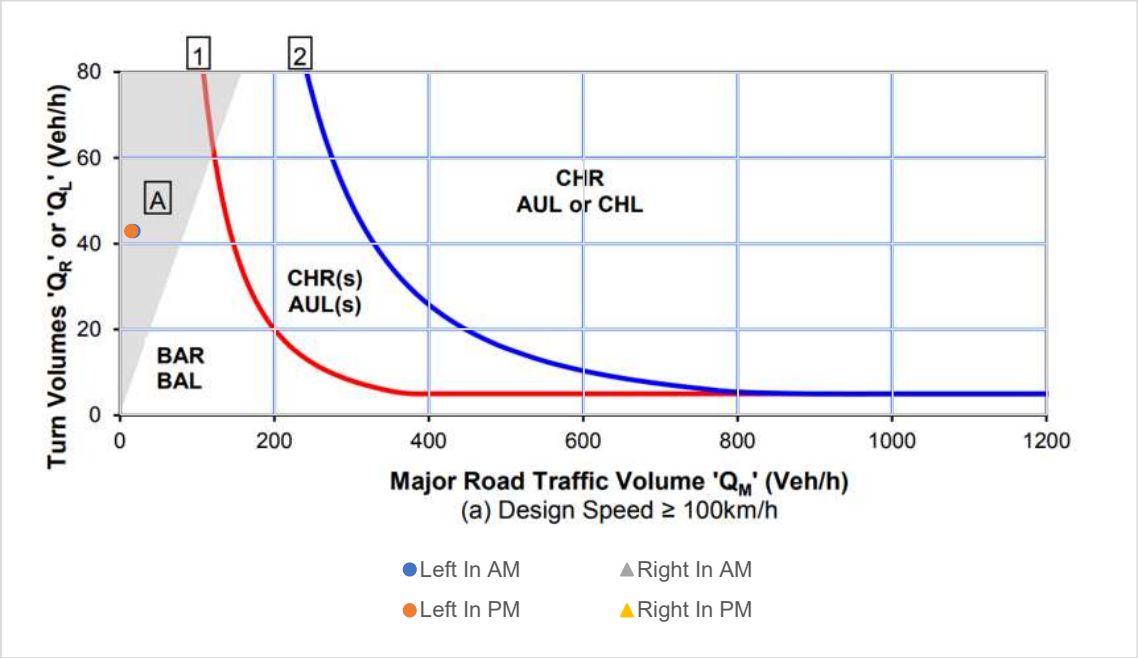
	Input	Units
Q_M:	Q_{T2}	
Q_M:	14	*Veh/hr*
Q_L:	46	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	109	*Veh/hr*
Q_R:	186	*Veh/hr*

Results:

Moura Baralaba Road / Proposed BSP Access



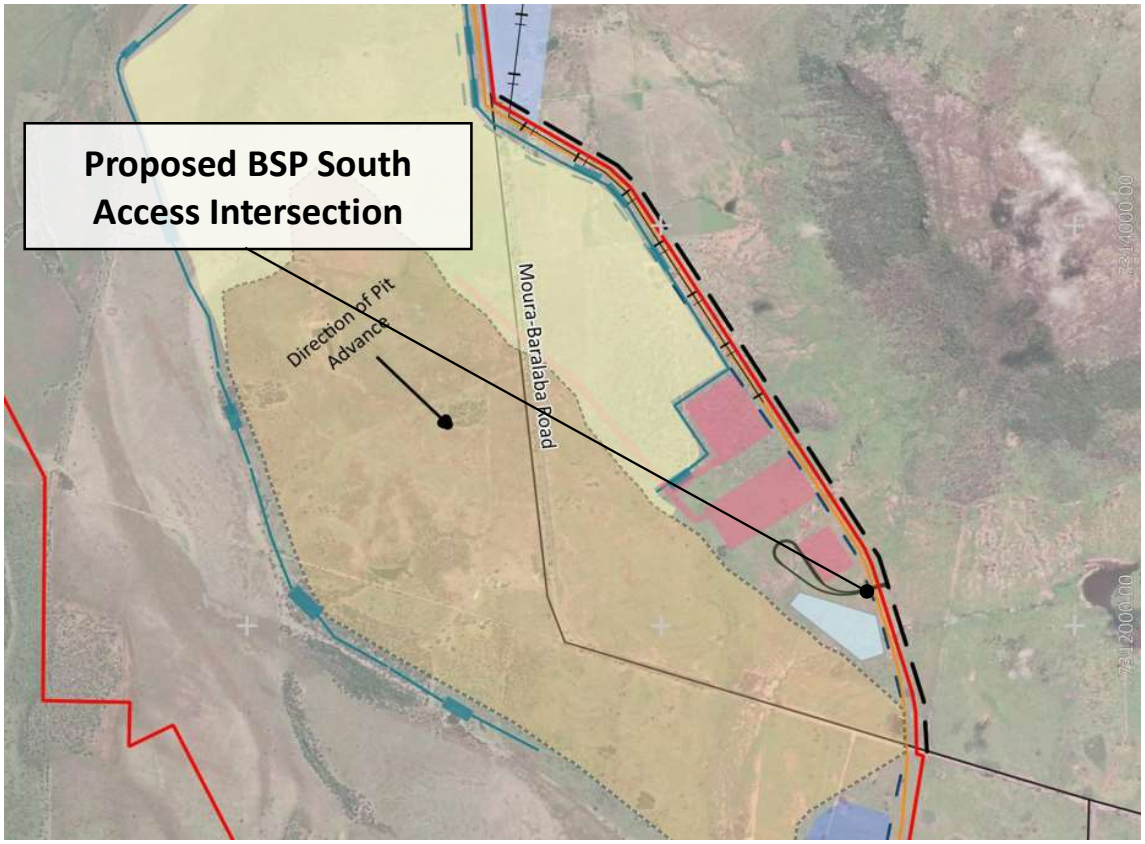
Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Date:	7/09/2023
Completed By:	Caleb Berhardt
Project Code:	300304981
Job Address:	Baralaba South Project (BSP), Baralaba
Methodology:	Queensland Guide to Traffic Management Part 6 (Intersections Interchanges and Crossings Management), accepted use of Austroads Guide to Traffic Management Part 6
Turn Description:	Moura Baralaba Road / Proposed BSP Access
Assessment Years:	2030, 2040

Aerial / Map of Turn Warrant Locations:



Turn Warrant Assessment

Scenario:	BSP Operations, 2030		
Design Speed:	>100km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	14	*Veh/hr*
Q_L:	46	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	76	*Veh/hr*
Q_R:	189	*Veh/hr*

Left In PM

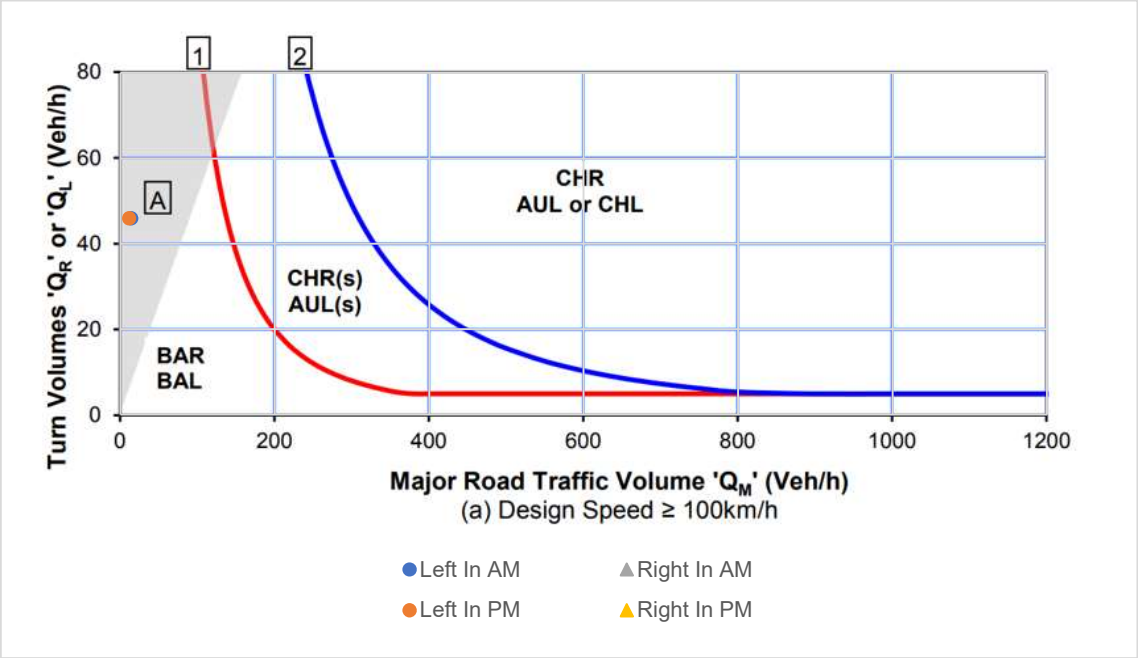
	Input	Units
Q_M:	Q_{T2}	
Q_M:	11	*Veh/hr*
Q_L:	46	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	95	*Veh/hr*
Q_R:	189	*Veh/hr*

Results:

Moura Baralaba Road / Proposed BSP Access



Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Scenario:	BSP Operations, 2040		
Design Speed:	>100km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	17	*Veh/hr*
Q_L:	46	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	82	*Veh/hr*
Q_R:	189	*Veh/hr*

Left In PM

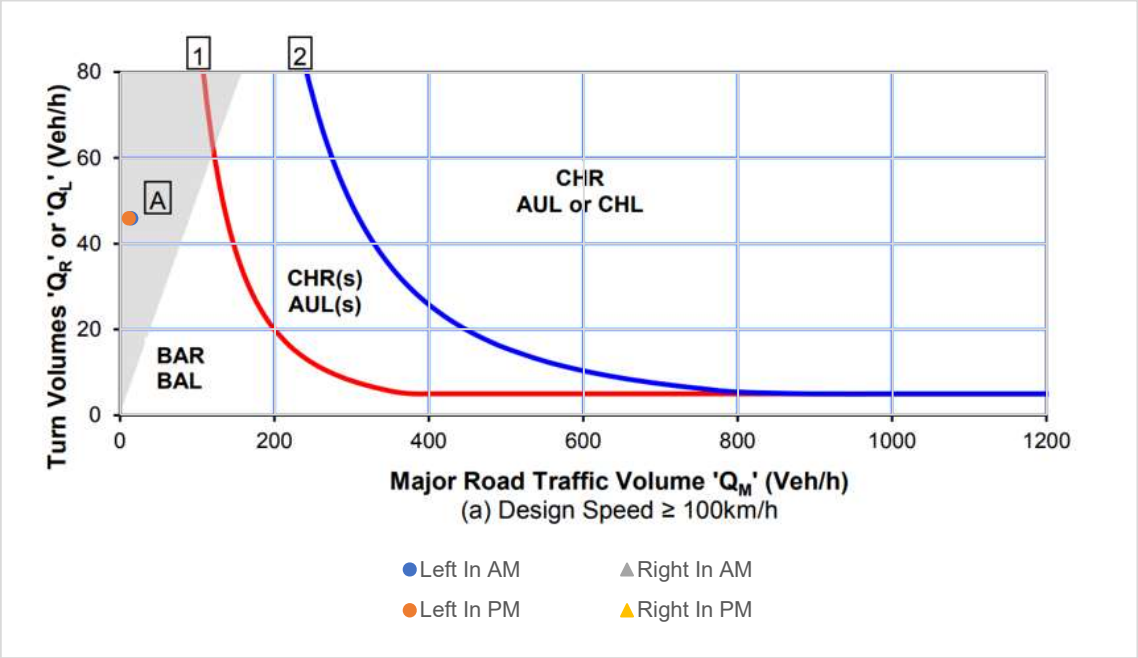
	Input	Units
Q_M:	Q_{T2}	
Q_M:	14	*Veh/hr*
Q_L:	46	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	106	*Veh/hr*
Q_R:	189	*Veh/hr*

Results:

Moura Baralaba Road / Proposed BSP Access



Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

Turn Warrant Assessment

Date:	14/08/2023
Completed By:	Caleb Berhardt
Project Code:	300304981
Job Address:	Baralaba South Project (BSP), Baralaba
Methodology:	Queensland Guide to Traffic Management Part 6 (Intersections Interchanges and Crossings Management), accepted use of Austroads Guide to Traffic Management Part 6
Turn Description:	Moura Baralaba Road / Proposed BSP Access
Assessment Years:	2030

Aerial / Map of Turn Warrant Locations:

Turn Warrant Assessment

Stantec

Scenario:	BSP Operations, 2030		
Design Speed:	>100km/h		
AM Peak Hour:		PM Peak Hour:	
Road Type:	Two-lane two-way		
Splitter Island:	No		

Inputs:

Left In AM

	Input	Units
Q_M:	Q_{T2}	
Q_M:	55	*Veh/hr*
Q_L:	6	*Veh/hr*

Right In AM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	112	*Veh/hr*
Q_R:	6	*Veh/hr*

Left In PM

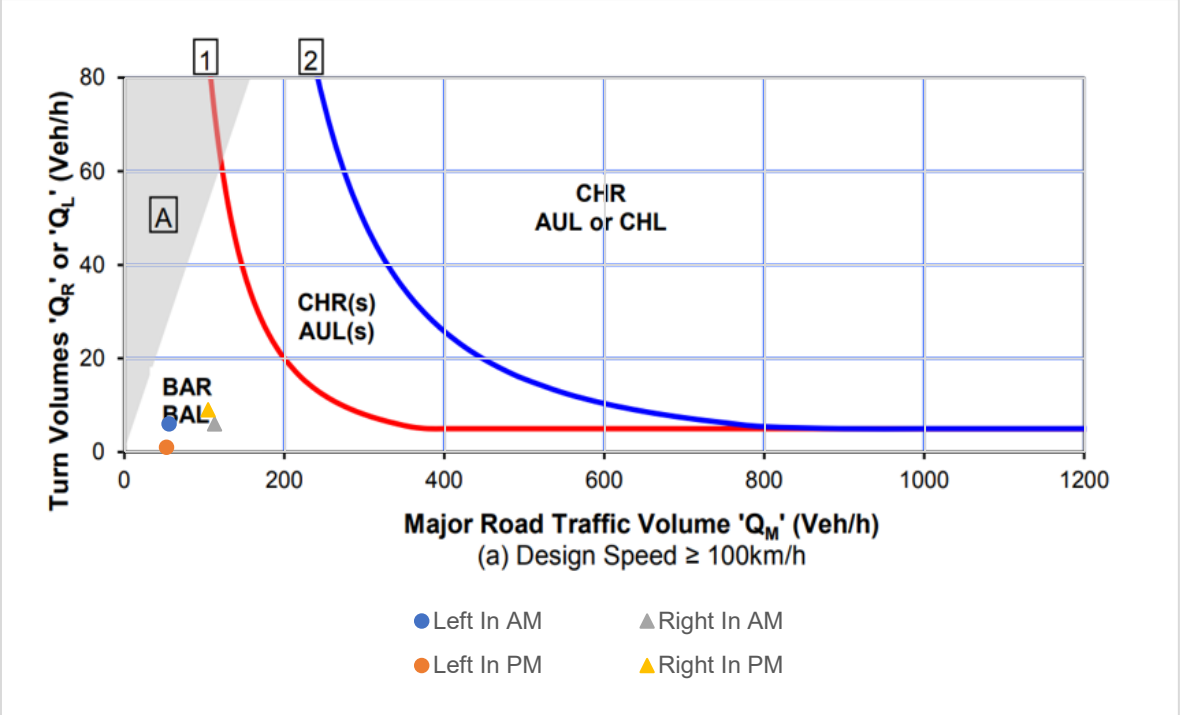
	Input	Units
Q_M:	Q_{T2}	
Q_M:	52	*Veh/hr*
Q_L:	1	*Veh/hr*

Right In PM

	Input	Units
Q_M:	$Q_{T1} + Q_{T2} + Q_L$	
Q_M:	104	*Veh/hr*
Q_R:	9	*Veh/hr*

Results:

Moura Baralaba Road / Proposed BSP Access



Left Turn Treatment	BAL
Right Turn Treatment	BAR

Note: The minimum right-turn treatment for multilane roads is a CHR(s)

w

Stantec

Connect with us

stantec.com/australia