CIVLINK CONSULTING

Technical Working Paper: Construction Traffic Assessment

Traffic Assessment for Modification (Mudgee Maintenance Facility) of the Central West Orana Transmission Line Project

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1 Introduction

1.1 Project Overview

EnergyCo proposes to modify the Central-West Orana Renewable Energy Zone Transmission project (the approved project). The approved project includes construction and operation of new electricity transmission infrastructure, new energy hubs and switching stations and ancillary works, to connect new renewable energy generation and storage projects within the Central-West Orana REZ to the NSW transmission network. The approved project is located within the Warrumbungle, Mid-Western Regional, Dubbo Regional and Upper Hunter local government areas (LGAs) and generally extends north to south from Cassilis to Wollar and east to west from Cassilis to Goolma. The approved project was declared as Critical State Significant Infrastructure (CSSI) under section 5.13 of the EP&A Act and was approved by the Minister for Planning and Public Spaces under Part 5, Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) on 26 June 2024. The project was approved by the Australian Government Minister for the Environment and Water under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) on 8 August 2024.

EnergyCo is proposing to modify the approved project to establish an additional Operations Facility in close proximity to Mudgee at 1 Marsh Avenue, Caerleon, Lot 2/DP/1277513.

1.2 Project description

The approved project as described in the publicly exhibited EIS and amendment report included the following features:

- a new switching station (the New Wollar Switching Station), located at Wollar to connect the approved project to the existing 500 kilovolts (kV) transmission network
- around 90 kilometres of twin double circuit 500 kV transmission lines and associated infrastructure to connect the two energy hubs to the existing NSW transmission network via the New Wollar Switching Station
- Energy hubs at Merotherie and Elong Elong to connect renewable energy generation projects within the CentralWest Orana REZ to the 500 kV network infrastructure
- around 150 kilometres of single circuit, double circuit and twin double circuit 330 kV transmission lines, to connect renewable energy generation projects within the Central-West Orana REZ to the two energy hubs
- fourteen switching stations along the 330 kV network infrastructure to transfer the energy generated from the renewable energy generation projects within the Central-West Orana REZ onto the approved project's 330 kV network infrastructure
- underground fibre optic communication cables along the 330 kV and 500 kV transmission lines between the energy hubs and switching stations
- construction of microwave repeater sites at locations along the alignment, as well as off the alignment at Botobolar, to provide a communications link between the approved project and the existing electricity transmission and distribution network
- a maintenance facility within the Merotherie Energy Hub to support the operational requirements of the approved project
- establishment of new, and upgrade of existing access tracks for transmission lines, energy hubs, switching stations and other ancillary works areas within the construction area (such as temporary waterway crossings, laydown and staging areas, earthwork material sites with crushing, grinding and screening plants, concrete batching plants, brake/winch sites, site offices and workforce accommodation camps)
- property adjustment works to facilitate access to the transmission lines and switching stations. These works include the relocation of existing infrastructure on properties that are impacted by the approved project
- utility adjustments required for the construction of the transmission network infrastructure, along with other adjustments to existing communications, water and wastewater utilities. This would include adjustments to existing Transgrid and Essential Energy transmission infrastructure.

Figure 1 shows the approved project in its regional context and provides an overview of the key features of the approved project.

A more detailed description of the approved project and how the potential impacts would be managed and mitigated is found in the Appendix A of the Amendment Report.

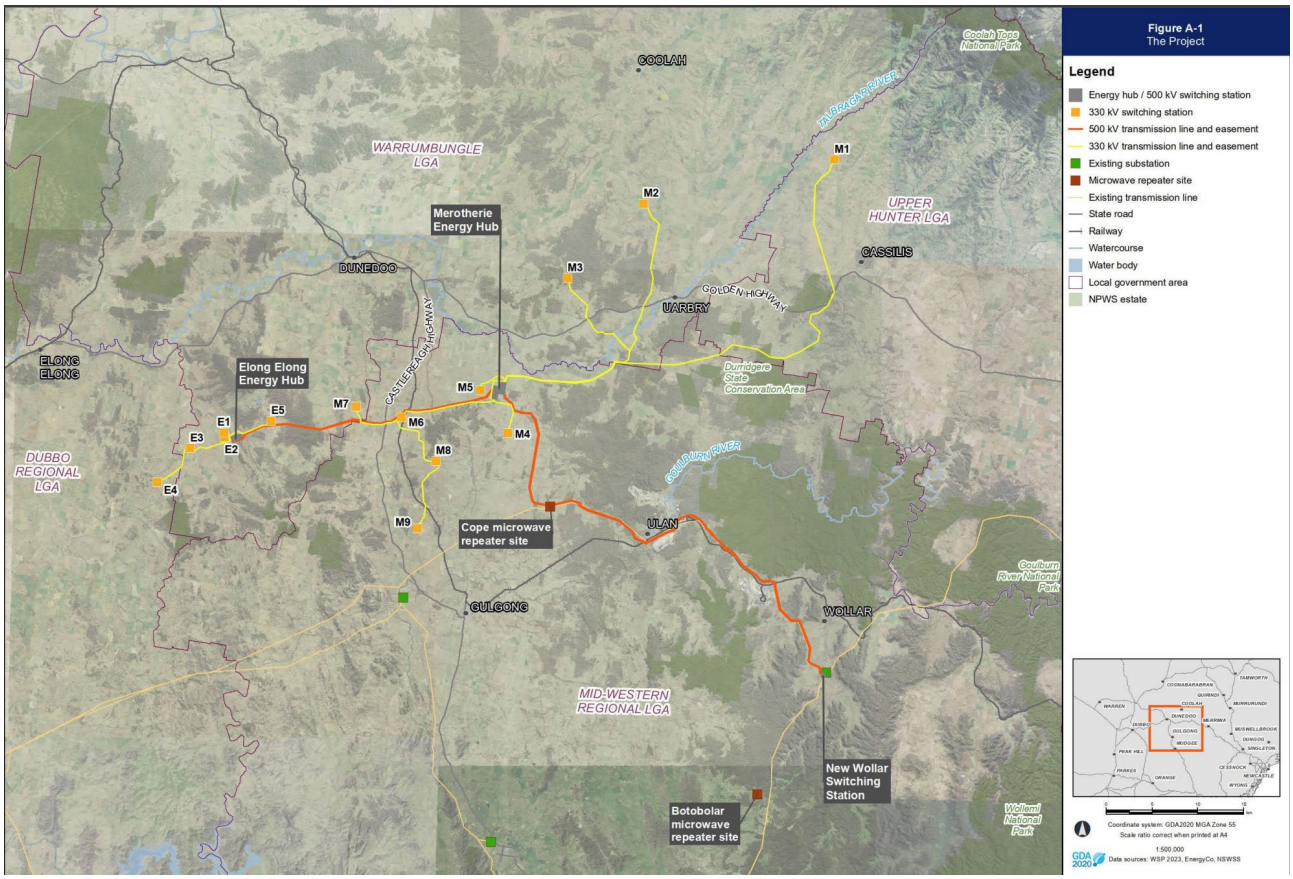


Figure 1 – The approved Project in its regional context (Source: Central-West Orana Renewable Energy Zone Transmission project Appendix A: Updated project description)

1.3 Overview of the proposed modification

The proposed change involves establishing an additional operational maintenance facility, located outside of Mudgee at 1 Marsh Avenue, Caerleon, Lot 2/DP/1277513.

The proposed site for the new maintenance facility is located within a cleared subdivision zoned for industrial land use. Access to the facility would be via the existing road network from Hill End Road onto Marsh Avenue.

The EIS included a maintenance facility that would be located at the Merotherie Energy Hub to support the operational requirements of the Project. This site was chosen for its proximity to the Methotherie Energy Hub and transmission lines.

The EIS also included an operational area at Elong Elong Energy Hub which would include a containerised workshop and storage that would be used for maintenance works and breakdown activities as described in Appendix A of the Amendment Report. The maintenance facility at Merotherie and the operations area at Elong Elong will continue to be required for the operation of the Project.

The EIS and Amendment Report proposed that maintenance staff and personnel would be based at the Merotherie maintenance facility. Under the proposed change, Mudgee would become the main base for the maintenance staff and personnel.

Similarly to the approved Merotherie maintenance facility, the Mudgee maintenance facility would support the operation and maintenance of the transmission lines, switching stations and energy hubs during operation of the Project.

The Maintenance Facility at Mudgee would generally include the features detailed in Table 1.

Table 1 – Summary of resources within the proposed Mudgee maintenance facility

Resource Name	Description
Office and Amenities	ACEREZ Maintenance & Lifecycle (M&L) Contractor head office and meeting rooms, including: ■ Commercial Office space ■ Incident Management Team (IMT) room ■ ACEREZ community front of house / reception area ■ Training Room ■ First Aid Room ■ Critical Equipment storage & workshop ■ Staff Amenities
Main Store	A dedicated building incorporating: ■ An access-controlled indoor warehousing and logistics facility ■ Indoor storage for spares, equipment and consumables ■ A central logistics hub for critical components and equipment required for RNI activities ■ External Parts laydown area
Main Workshop Facilities	A dedicated facility located within the same structure as the Main Store, incorporating provision for a general workshop area for M&L maintenance personnel providing facility for various maintenance tasks
Sensitive Electronic Storeroom	A dedicated facility incorporating a climate-controlled storage room for storage of sensitive electronic equipment, with provision for a workbench with DC supply capable of bench testing and powering electronic equipment when necessary.

1.4 Traffic assessment scope

This assessment considers the construction and operational traffic impacts which would relate to the construction and operation of the Mudgee Maintenance Facility.

There would be new construction stage traffic impacts associated with the following construction activities:

- Earthworks,
- Establishment of hardstand and building slabs,
- Installation of services,
- Construction of maintenance facility structures,
- Landscaping and finishing.

Other heavy vehicle movements will also be required for materials delivery during construction.

There would be new operational stage traffic impacts as it is proposed to access the operational maintenance facility 24 hours a day 7 days a week. The operational assessment considers the typical light and heavy vehicle access to the facility.

2 Methodology

2.1 Assessment Criteria

2.1.1 Intersection turn treatment warrant assessment

Key intersections have been analysed using Austroads' *intersection turn treatment warrant assessment*. The methodology, as described in the Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management assess the need for priority-controlled intersections to provide basic (BA), auxiliary (AU) lane or channelised (CH) lanes.

The turn treatment is assessed by analysing the traffic volume demands on the minor and major roads and assessing against the graph shown in Figure 2.

Curves 1 and 2 shown in the diagram are applicable for two-lane two-way roads to depict the boundary between the different treatments (basic and short/regular auxiliary or channelised lanes). For roads with four or more lanes, curve 1 becomes the boundary between a basic and regular auxiliary or channelised lane.

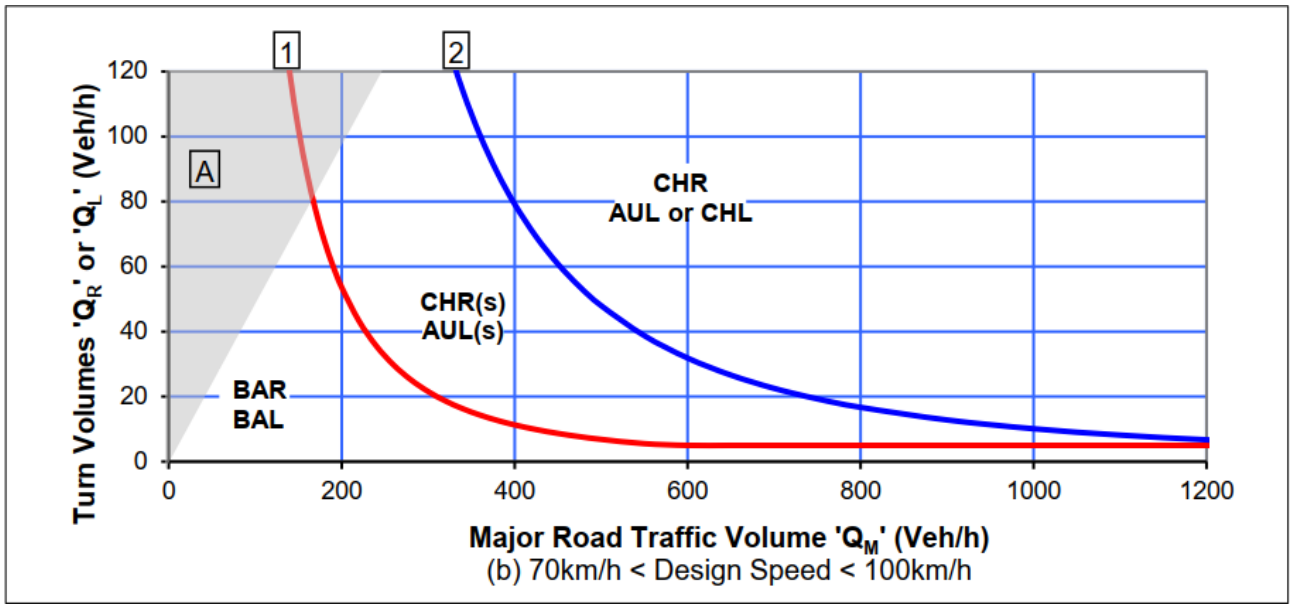


Figure 2 Warrants for turn treatment on major roads at unsignalized intersections (Source: Austroads Guide to Traffic Management Part 6, Figure 3.25)

The turn treatment assessment applies to turning movements from the major road only. The calculation of Q_M is depicted in Table 3 below.

Table 2 – Calculation of the major road traffic volume QM (Source: TMR (2016a) via Austroads Guide to Traffic Management Part 6, Figure 3.26)

Calculation of the major road traffic volume Q_M	Road Type	Turn Type	Splitter Island	Q_M (vehicles/hour)
	Two-lane two-way	Right	No	$=Q_{T1} + Q_{T2} + Q_L$
			Yes	$=Q_{T1} + Q_{T2}$
		Left	Yes or No	$= Q_{T2}$
	Four-lane	Right	No	$=0.5*Q_{T1} + Q_{T2} + Q_L$

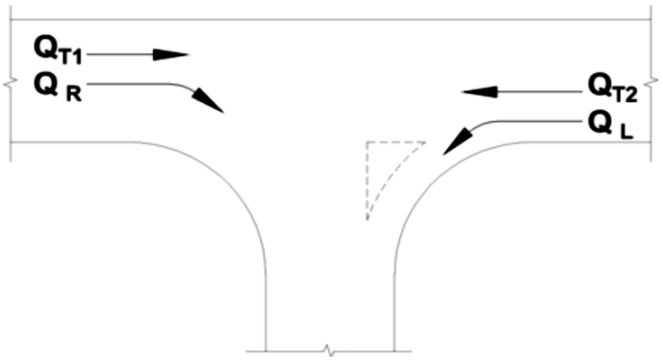
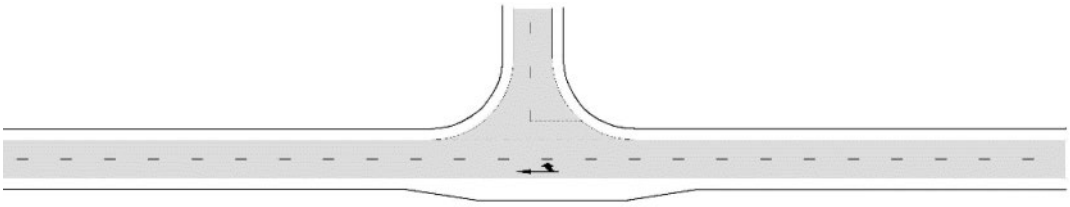
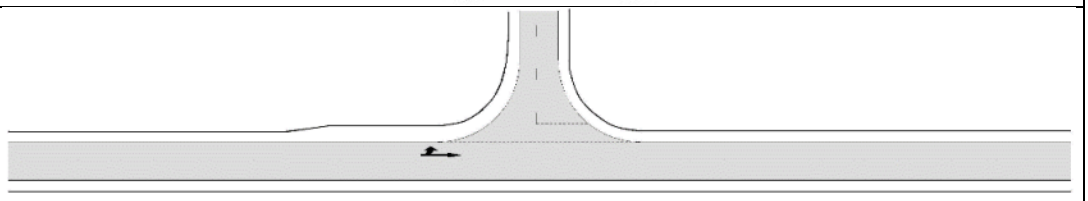
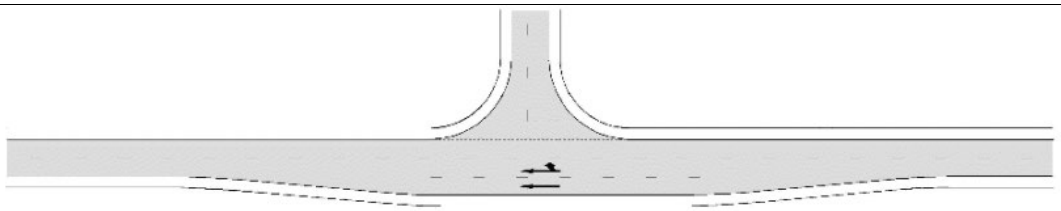
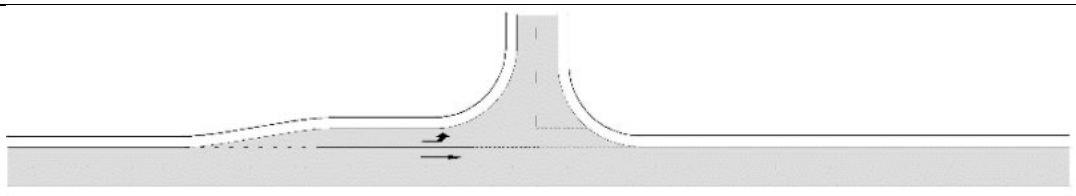
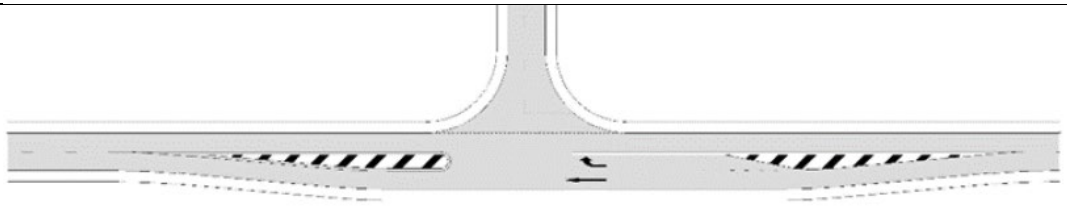
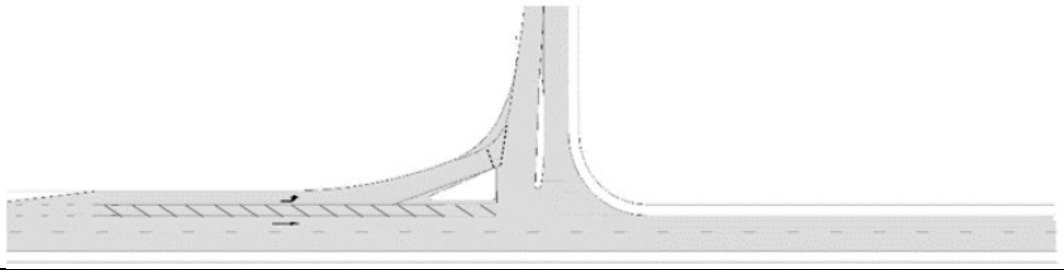
	two-way		Yes	$=0.5*Q_{T1} + Q_{T2}$
		Left	Yes or No	$=0.5*Q_{T2}$

Table 3 – Intersection type – rural roads (Source: Austroads Guide to Traffic Management Part 6, Figure 3.1, 3.5 and 3.7)

Treatment	Figure
Basic right turn (BAR)	
Basic left turn (BAL)	
Auxiliary right turn (AUR)	
Auxiliary left turn (AUL)	
Channelised right turn (CHR)	

Treatment	Figure
Channelised left turn (CHL)	

2.1.2 Mid-block road network performance

The Mudgee maintenance facility that is the subject of this modification has been modelled in SIDRA Intersection 9.1. The selection of model was based on what is expected to be the most appropriate for the proposed change, and availability of appropriate network models.

The average delay of each of the key intersections assessed as part of the modelling analysis has been categorised based on the Level of Service (LoS) criteria outlined in Table 2, below and in the Guide to Traffic Generating Developments Version 2.2 (RTA, 2002).

LoS adopted in the mid-block assessment is the ration of volume to capacity of the roads used on the construction vehicle routes.

The description of the level of service are listed in Table 5 below.

Table 4 – Level of Service Criteria (source: Austroads Guide to Traffic Management Part 3, Section 6.2.2)

LoS	Description
A	LoS A describes primarily free-flow operation. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at the boundary intersections is minimal. The travel speed exceeds 80% of the BFFS.
B	LoS B describes reasonably unimpeded operation. The ability to manoeuvre within the traffic stream is only slightly restricted and control delay at the boundary intersections is not significant. The travel speed is between 67% and 85% of the BFFS
C	LoS C describes stable operation. The ability to manoeuvre and change lanes at mid- segment locations may be more restricted than at LOS B. Longer queues at the boundary intersections may contribute to lower travel speeds. The travel speed is between 50% and 67% of the BFFS.
D	LoS D indicates a less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed. This operation may be due to adverse signal progression, high volume, or inappropriate signal timing at the boundary intersections. The travel speed is between 40% and 50% of the BFFS
E	LoS E is characterised by unstable operation and significant delay. Such operations may be due to some combination of adverse progression, high volume, and inappropriate signal timing at the boundary intersections. The travel speed is between 30% and 40% of the BFFS.
F	LoS F is characterised by flow at extremely low speed. Congestion is likely occurring at the boundary intersections, as indicated by high delay and extensive queuing. The travel speed is 30% or less of the BFFS.

To remain consistent with the Technical Paper 13 – Traffic and transport, the following measures of level of service, taken from the Austroads Guide to Traffic Management Part 3: Transport Study and Analysis methods, based on road functional classification have been adopted, and the impact classifications have been applied.

- Low impact: no change in LoS
- Medium impact: one level change in LoS
- High impact: two or more levels change in LoS

Table 5 – Level of Service Criteria (source: Austroads Guide to Traffic Management Part 3, Section 6.2.2)

LoS	Highway		Main Road		Regional / Local	
	v/c	Lane capacity	v/c	Lane capacity	v/c	Lane capacity
A	0.3	540	0.26	360	0.24	240
B	0.47	850	0.41	570	0.38	380
C	0.68	1220	0.59	830	0.54	540
D	0.89	1600	0.81	1130	0.78	780
E	1.00	1800	1.00	1400	1.00	1000
F	>1.00	>1800	>1.00	>1400	>1.00	>1000

2.2 Study Area

The study area for this Traffic Impact Assessment has been identified as the transport network that may be impacted by construction movements to and from the proposed Mudgee Maintenance Facility, or by the operation of the facility.

To retain consistency with the Traffic Impact Assessment prepared for the EIS and Amendment Report, the study area is identified as those roads and associated transport facilities (e.g. parking, active transport, heavy vehicle, public transport networks) which provide access to the construction site, back to the nearest highway (Castlereagh Highway). Beyond this point, the construction traffic is expected to diminish as it is distributed across the broader network to multiple origins and represents no measurable impact.

As the Modification is proposed to be constructed utilising local contractors the volume of traffic to and from construction compounds and accommodation facilities associated with the approved project would be negligible. Approved construction traffic routes would be utilised where traffic does originate or conclude at these sites. Traffic from the Mudgee maintenance facility to the other maintenance facilities and the transmission lines are not assessed during operation owing to the negligible expected vehicle numbers, infrequent nature of trips and expansive area that maintenance staff could be travelling to.

The traffic and transport study area is limited to the township of Mudgee and Caerleon within the Mid-Western Regional Council area. Owing to the short distance between the proposed facility and the nearest highway the location of this assessment spans between the intersection of Marsh Street and Hill End Road and the intersection of Hill End Road with Castlereagh Highway. The proposed traffic routes for construction and operation are shown in Figure 3.

Figure 3 – Site Location (Source: Google Map, Modified by Civlink)

2.3 Zoning

The proposed site is located within the Mid-Western Regional Council Area on cleared subdivision zoned E4 – General Industrial. Hill End Road is Zoned RU1 – Primary Production, and Castlereagh Highway is Zoned SP2 – Classified Road.

Figure 4 shows the land use zoning surrounding the proposed Mudgee Maintenance Facility.

Figure 4 – Land Zoning – Mudgee Maintenance Facility

2.4 Site Plan

Figure 5 shows the indicative layout for the Mudgee Maintenance Facility (note this is subject to minor further design refinements).

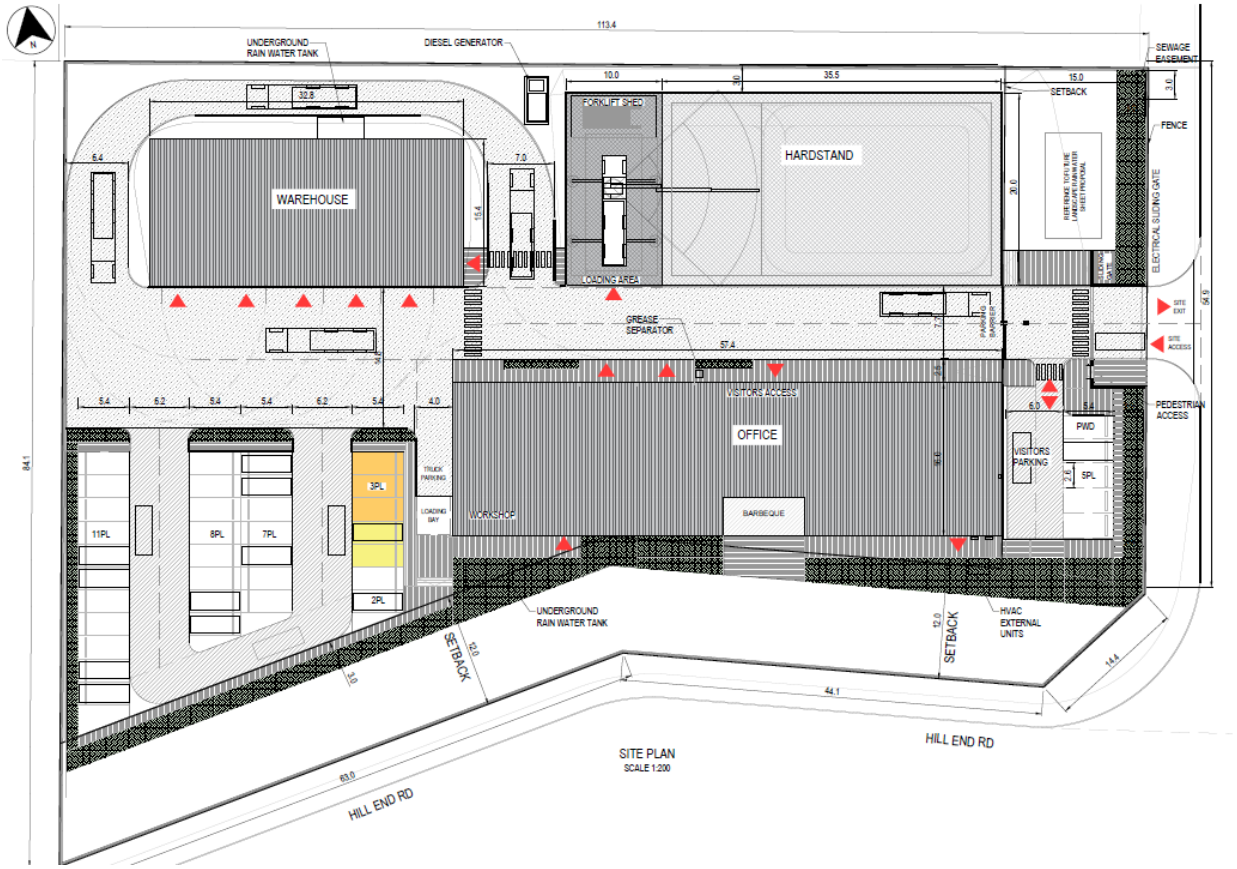


Figure 5 – Indicative layout of the Mudgee Maintenance Facility

2.5 Existing conditions assessment

2.5.1 Transportation network

The existing conditions assessment involves a desktop review of the existing construction traffic routes, including road classification, lane configuration, speed limit, pavement type, pedestrian and cyclist facilities, crash history, public transport and traffic operating performance.

Traffic data was collected to understand the existing conditions and traffic demand and patterns to assess the impact of the project.

2.5.2 Data Collection

Intersection turning surveys were undertaken in February 2025 for the following site:

- Castlereagh Highway and Hill End Road

The turn count surveys were conducted on Friday 7 February and Thursday 13 February 2025 from 6am to 10am and 3pm to 7pm, and on Saturday 8 February from 10am to 2pm. These periods coincide with typical roadway peak periods, however it is likely that construction workers of the project would travel to and from site outside of the roadway peak periods.

Midblock counts for Castlereagh Highway, north-west of Putta Bucca Road in Mudgee were included in the Technical Paper 13 – Traffic and Transport.

2.5.3 Crash Analysis

Crash data was collected from the Transport for NSW's open data platform to understand any existing safety issues on the road network adjacent to the proposed site and on the construction routes.

2.6 Construction traffic assessment

The construction traffic assessment includes a quantitative assessment of the key roads impacted by the construction of the proposed facility.

2.6.1 Determination of construction routes

This assessment considers the construction routes to the nearest Highway likely to be used during construction within the study area.

All traffic is expected to enter and exit towards the Castlereagh Highway as Hill End Road to the West does not connect with another main road or highway.

2.6.2 Estimation of project traffic generation

Daily construction vehicle movements based on construction workforce, construction activities and staging, and have been estimated based on the figures outlined in Technical Paper 13 – Traffic and Transport, which typically involves the following activities:

- Delivery of materials to / from external sites (e.g. ports, quarry, water source) to the construction area.
- Workers travelling between local workforce places of residence and the construction area.

2.7 Operational traffic assessment

The operation of the project would involve maintenance work that would be undertaken throughout the year.

Construction of the MMF would be finished in late 2027 or early 2028 (indicative) prior to completion of construction of the Approved Project (i.e. the transmission lines and energy hubs) (noting that that actual construction timeframe would be about 6-9 months). The occupation and use of the maintenance facility would occur prior to the operation of the CWO REZ Transmission Project as a whole. Generally, prior to Project construction completion the maintenance facility will be used for training of the maintenance workforce.

Owing to the location of the proposed facility away from the project alignment and close to a major highway, as well as the fact that the construction of the maintenance facility is expected to utilise local contractors; cumulative impacts during the operation of the Mudgee facility while major Construction of the transmission lines is still occurring has not been specifically assessed.

During operation, the traffic movements generated by maintenance activities is expected to be low in volume. The operational traffic assessment aims to assess the impacts to road capacity, condition, safety, efficiency, active transport, public transport and property access.

3 Existing Environment

3.1 Road Network

3.1.1 Hill End Road

Hill End Road is a rural road located in the suburb of Caerleon in the Mid-West Regional Council local government area. Hill End Road is approximately 88 kilometres in length and connects from Castlereagh Highway, Caerleon in the north to Sofala Road, Sofala in the south. Hill End Road is sealed and consists of one lane in each direction. A review of the aerial imagery from Nearmap indicates that a 50km/h speed limit was introduced between June 2024 and February 2025, see Figure 6.

Figure 6 – Aerial Imagery from 27 June 2024, left and 24 February 2025, right (Source: Nearmap, accessed 9 March 2025)

Figure 7 shows the condition of Hill End Road at Castlereagh Highway intersection as shown in Streetview from May 2025.

Figure 7 – Hill End Road facing east at Castlereagh Highway intersection (Source: Google Streetview – Accessed 9 March 2025)

3.1.2 Castlereagh Highway

Castlereagh Highway is a State Highway that connects between Carnarvon Highway near St George in Queensland in the north to the Great Western Highway near Lithgow in the south. Within the Project area, Castlereagh Highway connects several towns including Mudgee, Gulgong and Dunedoo. In the vicinity of the Hill End Road intersection, Castlereagh Highway has a sealed surface and has one through lane in each direction, a 130m long channelised right turn and a 110m long auxiliary left turn with sealed shoulders and operates under a 100km/hr rural speed limit. Figure 8 and

Figure 9 provide existing street view context images of the existing intersection.

Figure 8 – Castlereagh Highway facing north at Hill End Road intersection (Source: Google Streetview – Accessed 9 March 2025)

Figure 9 – Castlereagh Highway facing south at Hill End Road intersection (Source: Google Streetview – Accessed 9 March 2025)

3.1.3 Traffic Volumes and Conditions

The following traffic surveys were obtained from the EIS *Technical Paper 13 – Traffic and Transport*.

24-hour midblock counts were conducted between 16 and 23 October 2022 using automatic traffic counters to capture data including volume, speed and vehicle classifications. See Table 6 for an extract of the midblock traffic volumes for Castlereagh Highway to the north west of Putta Bucca Road, in Mudgee, approximately 2km south of the Hill End Road intersection and to the north of the Mudgee township, and

Table 7 for an extract of the mid-block road network performance based on the volume / capacity ratio and level of service from this location, as noted in the EIS Technical Paper 13.

Table 6 – Midblock Traffic Volumes – Castlereagh Highway (Source – EIS Technical Paper 13 - Traffic And Transport)

Survey ID	Location	Road Classification	ADT	Weekday daily volume			Peak hour volume (veh/hour)			
				AWT	Vehicle Classification		AM Peak		PM Peak	
					Light Vehicles	Heavy Vehicles	NB	SB	NB	SB
H09	Castlereagh Highway (north-west of Putta Bucca Road), Mudgee	Highway	6,608	7,185	6341(88.3%)	840(11.7%)	205	446	320	283

Table 7 – Midblock Volume / Capacity Ratio and Level of Service – Castlereagh Highway (Source – EIS Technical Paper 13 - Traffic And Transport)

Survey ID	Location	Road Classification	Lane Capacity (vph / lane)	Peak hour volume (veh/hour)				Volume / Capacity Ratio and LoS			
				AM Peak		PM Peak		AM Peak		AM Peak	
				NB	SB	NB	SB	NB	SB	NB	SB
H09	Castlereagh Highway (north-west of Putta Bucca Road), Mudgee	Highway	1,800	205	446	320	283	0.11 (LoS A)	0.25 (LoS A)	0.18 (LoS A)	0.16 (LoS A)

Additional intersection turning counts were conducted at the intersection of Castlereagh Highway and Hill End Road in February 2025, see Figure 10and Appendix B.

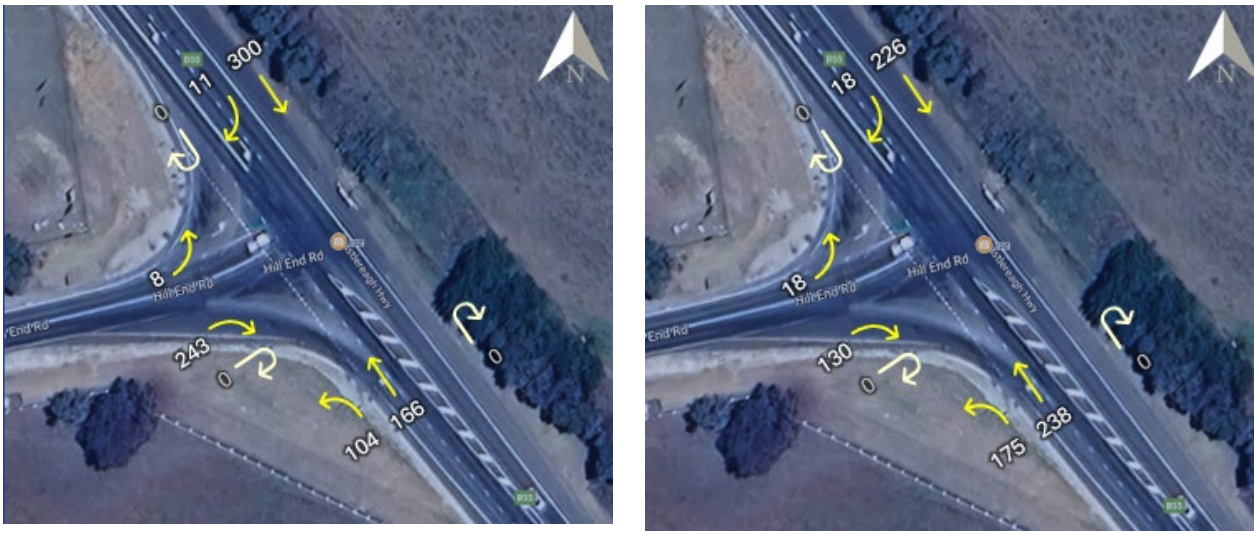


Figure 10 – Castlereagh Highway / Hill End Road AM Peak (left) and PM Peak (right) intersection turning counts (Source: Colliers, Thursday 13 February 2025)

These were used to estimate the midblock volume / capacity ratio for Hill End Road using the same methodology as the EIS Technical Paper 13, see Figure 11 and Table 8.

Figure 11 – Castlereagh Highway / Hill End Road AM Peak (left) and PM Peak (right) intersection approach and departure volumes (Source: Colliers, Thursday 13 February 2025)

Table 8 – Midblock Volume / Capacity Ratio and Level of Service estimated from intersection counts – Hill End Road

Survey ID	Location	Road Classification	Lane Capacity (vph / lane)	Peak hour volume (veh/hour)				Volume / Capacity Ratio and LoS			
				AM Peak		PM Peak		AM Peak		AM Peak	
				WB	EB	WB	EB	WB	EB	WB	EB
24SYD0186	Hill End Road west of Castlereagh Highway	Regional	1,000	115	251	193	148	0.11 (LoS A)	0.25 (LoS A)	0.19 (LoS A)	0.15 (LoS A)

3.2 Crash History

Castlereagh Highway, recorded six crashes between Hill End Road and Wilbetree Road in the five year period ending 2023. These occurred in 2019, 2020, 2022, 2023. One crash at the intersection of Castlereagh Highway and Hill End Road resulted in a fatality in 2023, while there were seven casualties classified as Moderate Injury and two casualties classified as Seriously injured.

Hill End Road recorded two crashes between Marsh Avenue and Castlereagh Highway, in 2020 and 2022, with one casualty classified as Minor / Other injured and one casualty classified as Seriously injured. Figure 12 shows the crash history near the site, from the TfNSW Interactive Crash Statistics.

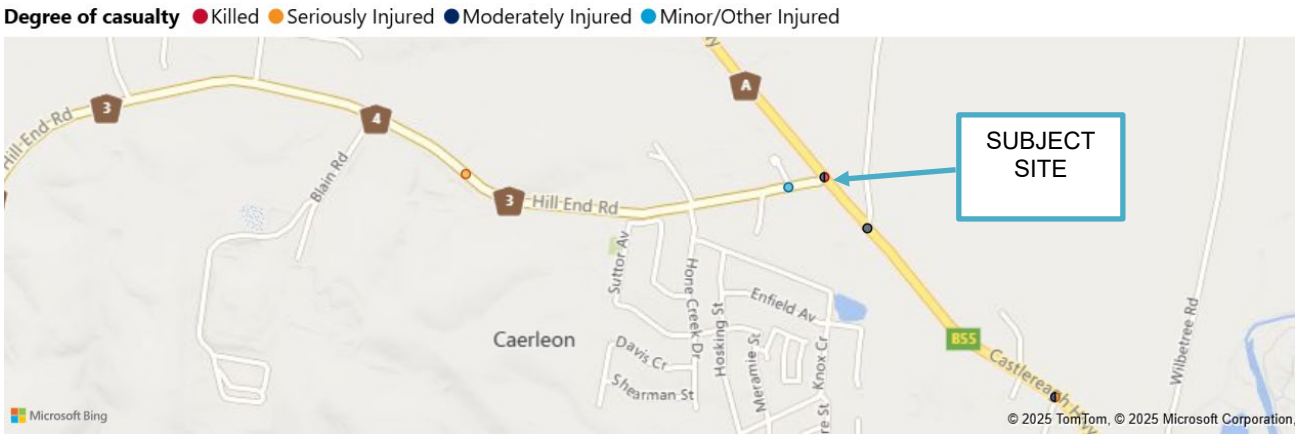


Figure 12 – Crash History (Source TfNSW Interactive Crash Statistics, Accessed 9 March 2025)

3.3 Existing intersection performance

A modelling analysis has been conducted using SIDRA Intersection 9.1 to understand the current operation of the Hill End Road / Castlereagh Highway intersection. Table 9 shows the existing aerial imagery and SIDRA model layout of the intersection

Table 9 – Existing Aerial Imagery and SIDRA Model Layout

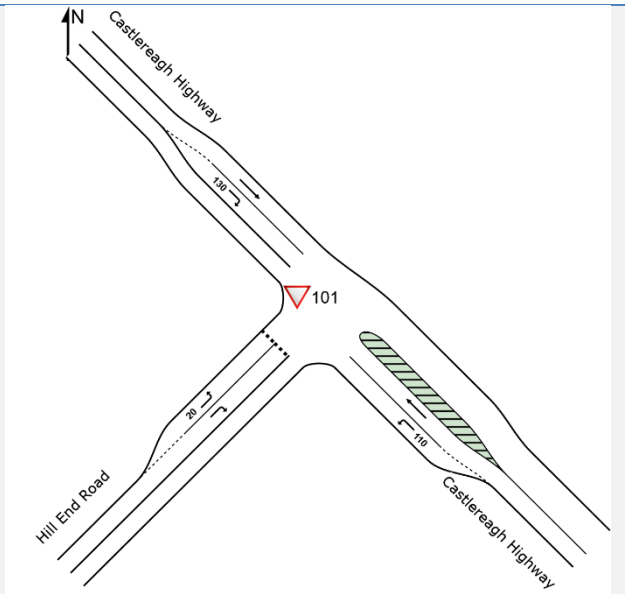
Existing Aerial Imagery	SIDRA Model Layout
Hill End Road / Castlereagh Highway	
 Source: Nearmap (Accessed 8 March 2025)	 Source: SIDRA Intersection 9.1

Table 10 summarises the results of the SIDRA modelling of the intersections under 2024 base case traffic demands.

Table 10 – Existing Intersection Performance

Approach	Movement	AM Peak				PM Peak			
		Deg. Satn	Ave. Delay	Level of	95% Back of Queue	Deg. Satn	Ave. Delay	Level of	95% Back of Queue
		v/c	sec	Service	m	v/c	sec	Service	m
SouthEast – Castlereagh Highway	Left	0.062	5.6	LOS A	0.0	0.100	5.6	LOS A	0.0
	Through	0.097	0.0	LOS A	0.0	0.132	0.0	LOS A	0.0
NorthWest - Castlereagh Highway	Through	0.172	0.0	LOS A	0.0	0.127	0.0	LOS A	0.0
	Right	0.013	7.4	LOS A	0.4	0.021	7.4	LOS A	0.5
SouthWest – Hill End Road	Left	0.008	6.2	LOS A	0.2	0.019	6.7	LOS A	0.5
	Right	0.552	16.5	LOS B	25.5	0.303	13.4	LOS A	9.7
All Vehicles		**0.552**	**5.7**	**NA**	**25.5**	**0.303**	**3.7**	**NA**	**9.7**

Based on the existing demands, the intersection currently operates well within practical capacity, with minimal delays and queueing. All movements operate at level of service A, except for the Hill End Road right turn which operates at a LoS B in the morning peak, with an average delay of 16.5s and a 95%ile back of queue of approximately 25m.

Detailed SIDRA outputs are included in Appendix B.

3.4 Pedestrian

There are no formal pedestrian facilities on Hill End Road or Castlereagh Highway. However, it was noted by Mid-Western Regional Council that pedestrians cross Hill End Road at the intersection of Hone Creek Road to access an informal school bus pick up point.

Mid-Western Regional Council noted that acknowledgment of the informal pedestrian access be considered and awareness training included in the Driver Code of Conduct for the construction and operation of the proposed Mudgee Maintenance Facility.

3.5 Cycling

There are no formal cycling facilities on Hill End Road or Castlereagh Highway. See Figure 13 for an extract from the Transport for NSW Cycleway Finder.

Figure 13 – Formal Cycling Infrastructure near the site (TfNSW Cycleway Finder, Accessed 9 March 2025)

3.6 Public Transport

There are no public transport services in the vicinity of the subject site, however the Mudgee School bus service operates on Hill End Road and Castlereagh Highway. The two closest school bus stops are:

- S320 Hill End Road near the intersection of Hone Creek Drive
- S316 Hill End Road near Old Grattai Road

These services are run by Ogdens Coaches and operates once a day from Hargraves and Pyramul to Mudgee Schools. The aforementioned stops are shown in Figure 14.

There is an existing road safety issue associated with the bus stop S320 Hill End Road near the intersection of Hone Creek Drive. Mid-Western Regional Council has informed the project that school children often cross Hill End Road unsupervised during school bus pick up and drop off as described in Section 3.4

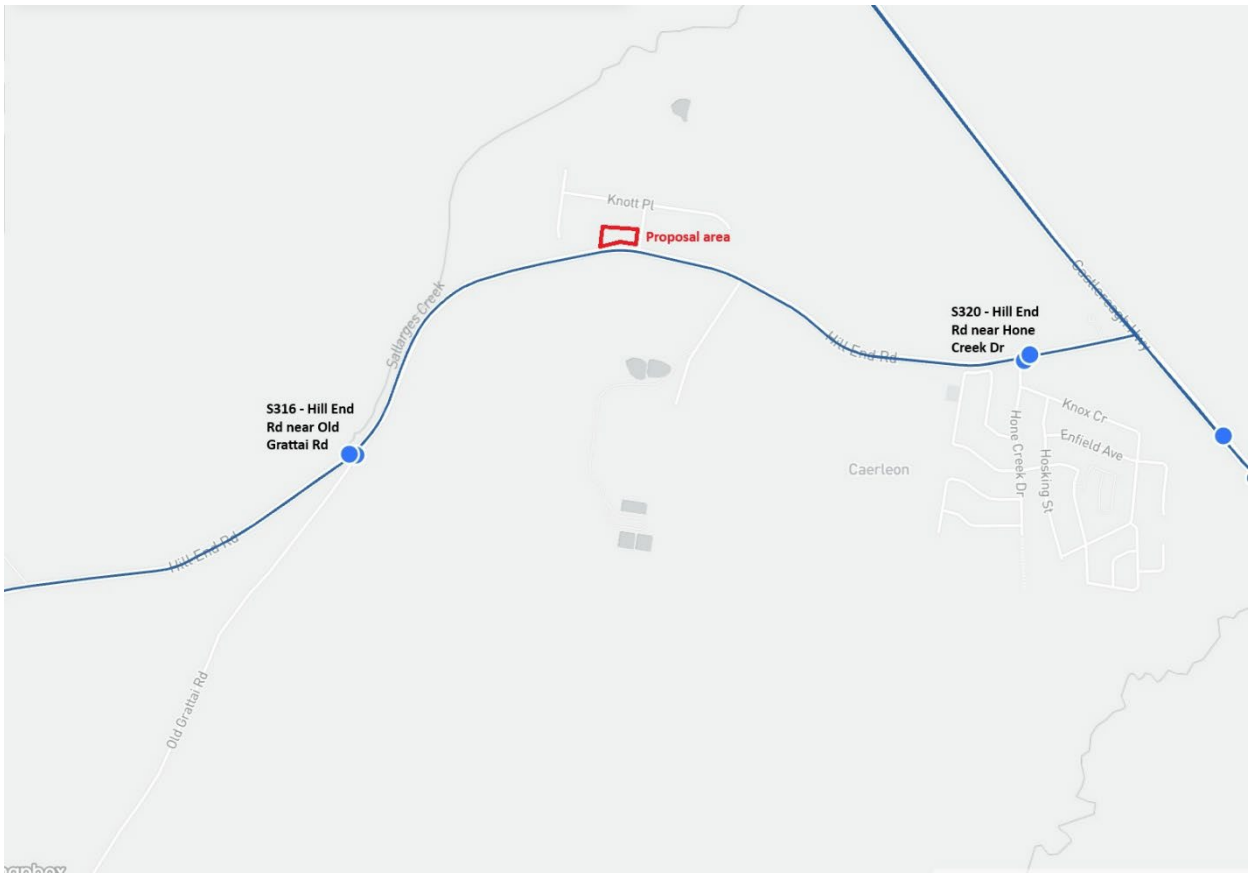


Figure 14 – Public Transport Services (Source: TfNSW Trip Planner)

4 Construction impact assessment

During construction, the proposed modified project would affect the surrounding road network in a way which may differ from the Approved Project by:

- Additional traffic associated with the new Mudgee Maintenance Facility.

Construction impacts relating to the proposed modified project are outlined in Section 5.1 to Section 5.2 below.

4.1 Travel forecasts

Trip Generation and Distribution

The proposed Mudgee Maintenance Facility is anticipated to generate an average of 10 to 20 heavy vehicles and 20 light vehicles per day. During peak construction, the site would generate a maximum of 40 heavy vehicles and 50 light vehicles per day.

For the purposes of this assessment, the maximum trips have been adopted, assuming 50 light vehicle trips in each peak period, with 80% inbound and 20% outbound in the morning peak, and 20% inbound and 80% outbound in the afternoon peak. Heavy vehicle trips are assumed to be 50% inbound and 50% outbound, with the 40 two-way trips spaced throughout the day, however for the purpose of this assessment, it is assumed there are 40 trips in each peak hour.

Table 11 – Construction Phase Traffic Generation (provided by EnergyCo)

Period	Inbound			Outbound			Two-way		
	LV	HV	Total	LV	HV	Total	LV	HV	Total
AM Peak	40	20	60	10	20	30	50	40	90
PM Peak	10	20	30	40	20	60	50	40	90
Daily	**50**	**40**	**90**	**50**	**40**	**90**	**100**	**80**	**180**

The majority of traffic is assumed to travel to and from the south towards Mudgee, with 90% to and from the south and 10% to and from the north on Castlereagh Highway. All traffic on Hill End Road is assumed to travel to and from Castlereagh Highway, see

Figure 15 for the expected distribution at the Castlereagh Highway / Hill End Road intersection, including additional through traffic on Castlereagh Highway from the cumulative assessment.

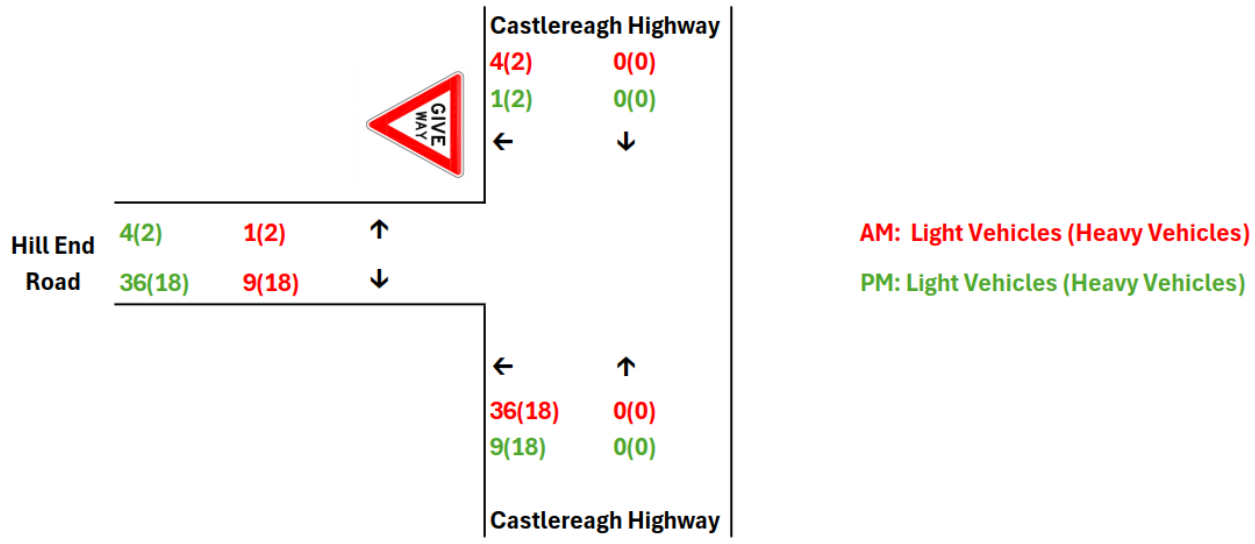


Figure 15 – Construction Phase Trip Distribution at Hill End Road / Castlereagh Highway Intersection

4.2 Construction Phase Intersection Performance

A modelling analysis has been conducted using SIDRA Intersection 9.1 to understand the operation of the Hill End Road / Castlereagh Highway intersection during the construction phase. A 2% annual growth rate has been applied to the existing traffic volumes at the intersection to estimate the baseline traffic volumes in 2027. The Site traffic generated from the Mudgee Maintenance Facility construction shown in Section 4.1 has been added, while the cumulative traffic volumes will be addressed in Section 6.

Table 12 shows the proposed geometry of the intersection based on existing aerial imagery. The intersection currently has a 130m long channelised right turn (CHRs) and an 110m auxiliary left turn (AUL) which is consistent with the intersection warrants in the EIS Technical Paper 13, Table 5-10.

Table 12 – Construction Phase Geometry and SIDRA Model Layout

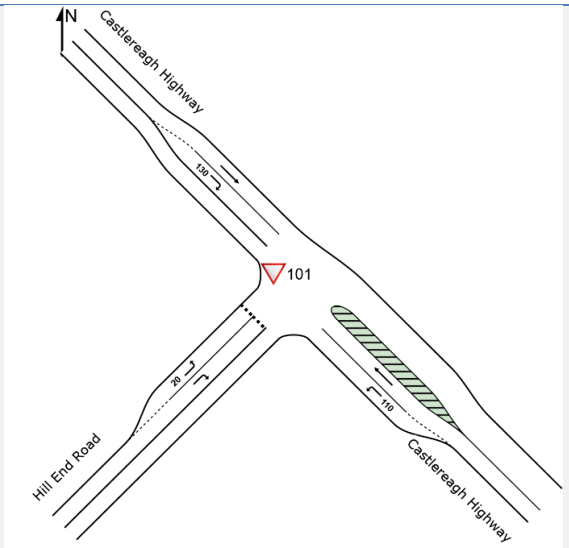
Existing Aerial Imagery	SIDRA Model Layout
Hill End Road / Castlereagh Highway	
 Source: Nearmap (Accessed 8 March 2025)	 Source: SIDRA Intersection 9.1

Table 13 summarises the results of the SIDRA modelling of the intersections under 2027 Construction phase traffic demands. The intersection is expected to remain operating at LOS A for most movements during the construction phase, with only minor increases to delays and queues.

The right turn from Hill End Road to Castlereagh Highway is currently operating at LoS B during the morning peak period and would continue to operate at LoS B, while increasing from LoS A to LoS B in the afternoon peak period.

Based on one level of service change, this can be classified as a medium impact, however the intersection and the right turn movement will still operate within acceptable limits with only minor increases in delays.

Table 13 – Construction Phase Intersection Performance

Approach	Movement	AM Peak				PM Peak			
		Deg. Satn	Ave. Delay	Level of	95% Back of Queue	Deg. Satn	Ave. Delay	Level of	95% Back of Queue
		v/c	sec	Service	m	v/c	sec	Service	m
SouthEast – Castlereagh Highway	Left	0.103	5.8	LOS A	0.0	0.127	5.7	LOS A	0.0
	Through	0.110	0.0	LOS A	0.0	0.137	0.0	LOS A	0.0
NorthWest - Castlereagh Highway	Through	0.179	0.0	LOS A	0.0	0.132	0.0	LOS A	0.0
	Right	0.023	8.1	LOS A	0.7	0.029	8.2	LOS A	0.8
SouthWest – Hill End Road	Left	0.012	6.6	LOS A	0.3	0.028	6.9	LOS A	0.7
	Right	0.757	25.5	LOS B	48.0	0.525	18.9	LOS B	22.6
All Vehicles		**0.757**	**8.7**	**NA**	**48.0**	**0.525**	**5.5**	**NA**	**22.6**

4.3 Turn Warrants

The warrants for turning bays at an intersection based on peak hour through and turning movements are noted in the *Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings*.

The existing peak hour turning movements at the existing Castlereagh Highway and Hill End Road intersection were assessed against the warrants, which considered the AM and PM peak hours, see Figure 16.

The assessment indicated that the right turn would require a minimum of a CHR(s) treatment and the left turn would require a minimum of an AUL(s) treatment, which is what is currently on site, indicating that no further upgrades are required.

Table 14 – Intersection Turn Warrant for Construction Traffic Scenario

Movement	Peak Hour	Q_M (vehicles/hour)	Turning traffic volume	Turn Treatment required
Left turn from major road	AM	166	104	AUL(s)
	PM	226	202	AUL(s)
Right turn from major road	AM	624	17	CHR(s)
	PM	666	21	CHR(s)

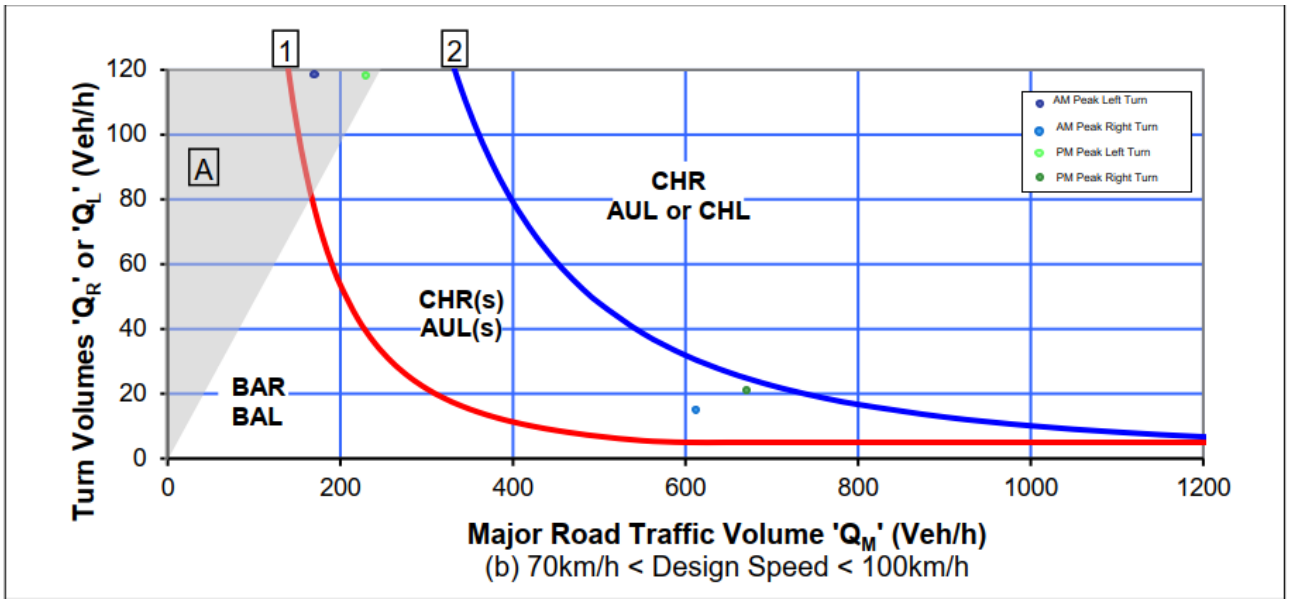


Figure 16 – Warrants for Castlereagh Highway / Hill End Road – including construction volumes

4.4 Other Impacts

4.4.1 Local road and parking

There are no impacts to local roads and parking anticipated from the construction of the Mudgee Maintenance Facility.

The facility has been designed to accommodate parking on site, see Figure 5 for the indicative layout of the parking.

4.4.2 Impacts on public transport.

There are no anticipated impacts to public transport from the construction of the Mudgee Maintenance Facility. As the intersection assessment indicates there will be minimal increases to traffic associated with the construction of the maintenance facility it is unlikely the service will be affected. No other impacts to the school bus services such as detours, or movement of stops are expected to result from the modification.

Safety associated with the school bus drop off/pick up issue discussed in Section 3.6 would be managed during construction through the implementation of mitigation measures already associated with the project. This would include the implementation of a Traffic and Transport Management Plan and a Divers Code of Conduct that would address potential safety concerns.

4.4.3 Impacts on active transport

There are no formal pedestrian or cyclist facilities on Hill End Road or Castlereagh Highway as such impacts to active transport are not anticipated from the construction of the Mudgee Maintenance Facility. No impacts to active transport such as detours, or closure of pedestrian or cycles routes will result from the modification as these do not exist in proximity to the proposal area.

There are no residential addresses adjacent to the proposed facility between the two stops identified in Section 3.5 as such the risk of school children walking past the construction site would be nil. There is a possibility of pedestrian traffic from workers within the industrial precinct however owing to the remote location of the proposed facility and the lack of formal footpaths it is highly unlikely that active transport would be the chosen a mode of transport for those travelling to and from the industrial precinct.

4.4.4 Swept paths

The largest vehicle expected to access the site during the construction phase is a 19m Semi Trailer. Swept paths are included in Appendix C and show that all movements are able to be accommodated within the existing intersection geometry.

4.4.5 Impacts on safety

As the proposed facility traffic (operational or construction) is expected to contribute less than 0.5% to the existing background traffic of the Castlereagh Highway, the contribution of either construction or operational traffic is not anticipated to cause any safety issues at the intersection or drastically exacerbate any deterioration in performance as a result of any increases in background traffic growth or cumulative construction traffic.

5 Operations Phase Assessment

5.1 Travel forecasts

Trip Generation and Distribution

The operation phase would consist of routine inspections and or maintenance of the project, with a peak operational workforce of up to 60 personnel as stated in the EIS.

For the purposes of this assessment, the maximum trips have been adopted, assuming 50 light vehicle trips in each peak period, with 80% inbound and 20% outbound in the morning peak, and 20% inbound and 80% outbound in the afternoon peak. Heavy vehicle trips are assumed to be 50% inbound and 50% outbound, with the 20 two-way trips spaced throughout the day, however for the purpose of this assessment, it is assumed there are 20 trips in each peak hour.

Table 15 summarises the traffic generation anticipated during the Operation Phase of the site.

Table 15 – Operation Phase Traffic Generation (provided by EnergyCo)

Period	Inbound			Outbound			Two-way		
	LV	HV	Total	LV	HV	Total	LV	HV	Total
AM Peak	40	10	50	10	10	20	50	20	70
PM Peak	10	10	20	40	10	50	50	20	70
Daily	**50**	**20**	**70**	**50**	**20**	**70**	**100**	**40**	**140**

The distribution would be similar to the construction phase, with 90% arriving from and departing to the south and 10% arriving from and departing to the north.

Figure 17 outlines the distribution of the operational phase traffic movements of the facility.

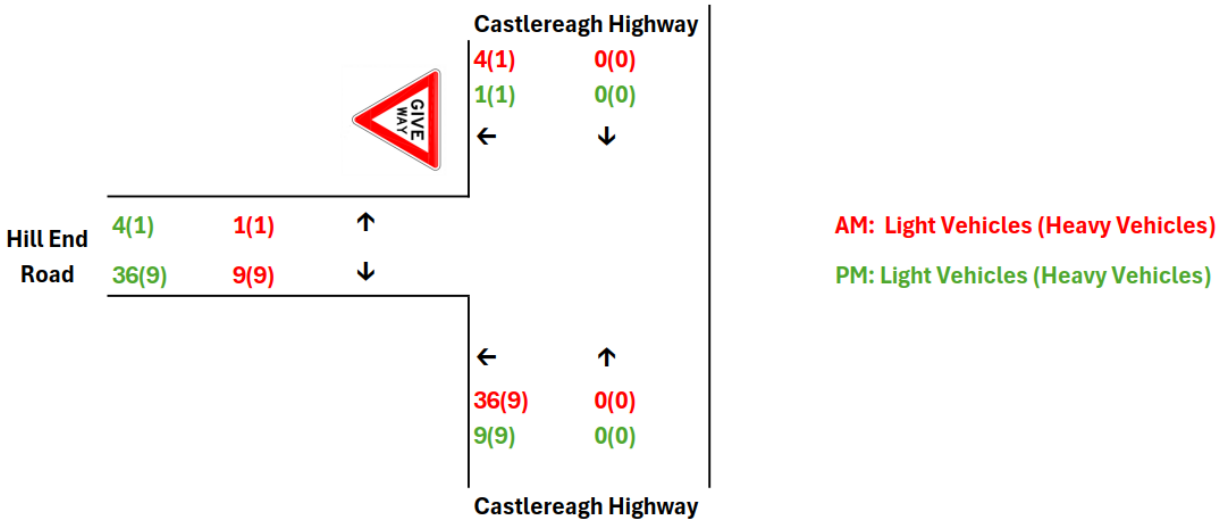


Figure 17 – Operation Phase Trip Distribution at Hill End Road / Castlereagh Highway Intersection

5.2 Operations Phase Intersection Performance

A modelling analysis has been conducted using SIDRA Intersection 9.1 to understand the Hill End Road / Castlereagh Highway intersection during the operations phase, 10 years after the completion of construction, in 2037.

A 2% annual growth rate has been applied to the existing traffic volumes at the intersection to estimate the baseline traffic volumes in 2037. A 2 % growth has been adopted as a recent corridor study for The Golden Highway by TfNSW identified a linear growth was experienced with the Golden Highway of around 2%.

Site traffic for the Mudgee Maintenance Facility has been added to the 2037 background traffic as part of the

Operations Phase. The assessment does not include the increased background traffic because of other construction projects as construction works will have been completed prior.

The geometry of the intersection is based on current aerial imagery as shown in Section 5.2 with no upgrades expected to occur.

Table 16 summarises the results of the SIDRA modelling of the intersections for the 2037 Operation Phase traffic demands.

The results of the 2037 Operations Phase suggests all movements except for the eastbound right turn from Hill End Road to Castlereagh Highway are expected to remain operating at LOS A with negligible delays and queues.

The eastbound right turn from Hill End Road to Castlereagh Highway appears to become oversaturated during the AM Peak during the Operations Phase, however this is due to the background traffic increases (as both the construction and operations phases in 2027 have similar traffic movements and don't identify any significant deterioration in performance).

The right turn movement is only slightly oversaturated, with average delays of approximately 110s and a 95%ile queue of approximately 193m. It is also noted that the modelled AM Peak period is from 8:15-9:15am, however the work force will not typically move into and out of the site during peak periods owing to the transitional nature of the work.

It is likely that as the industrial subdivision near the maintenance facility site is developed, the additional traffic demands on the right turn towards Mudgee will become too high for the existing priority-controlled intersection and upgrades may need to be considered as part of the development of the area.

The proposed operation phase traffic generation is minor compared to the background traffic growth. Detailed SIDRA Outputs are attached in Appendix A.

Table 16 – Operational Phase Intersection Performance 2037

Approach	Movement	AM Peak				PM Peak			
		Deg. Satn	Ave. Delay	Level of	95% Back of Queue	Deg. Satn	Ave. Delay	Level of	95% Back of Queue
		v/c	sec	Service	m	v/c	sec	Service	m
SouthEast – Castlereagh Highway	Left	0.108	5.7	LOS A	0.0	0.141	5.6	LOS A	0.0
	Through	0.123	0.0	LOS A	0.0	0.167	0.0	LOS A	0.0
NorthWest - Castlereagh Highway	Through	0.218	0.1	LOS A	0.0	0.161	0.0	LOS A	0.0
	Right	0.026	8.4	LOS A	0.8	0.035	8.6	LOS A	0.9
SouthWest – Hill End Road	Left	0.013	6.6	LOS A	0.3	0.032	7.2	LOS A	0.8
	Right	1.064	109.8	LOS F*	193.2	0.691	26.5	LOS B	32.9
All Vehicles		**1.063**	**33.0**	**NA**	**193.2**	**0.691**	**6.7**	**NA**	**32.9**

*** Note: this deterioration is due to the background traffic increases along the Castlereagh Hwy (as the construction phase in 2027 has similar traffic movements to operations phase and doesn't identify any significant deterioration in performance).**

The Operational Phase Intersection Performance results are outlined above, in Table 16.

The LOS F suggests deterioration in performance of the right-turn movement departing Hill End Road. This will see excessive queues and delays for right-turning traffic, however this is not attributed to the operational phase traffic, as the operational phase traffic would contribute less than 0.5% of the background through traffic on the Castlereagh Highway. The arrangement without the operational traffic from the MMF is expected to provide similar results at the intersection.

6 Cumulative Impacts

6.1 Cumulative Construction Traffic

A review of the potential cumulative impacts during the construction and operation of the project was completed as part of the EIS and has been updated for this Technical Paper.

These projects are addressed in a higher level of detail primarily due to:

- their proximity to the project and use of the same primary access route, the Castlereagh Highway, for both light and heavy vehicles
- status in the NSW SSD assessment process (i.e. an EIS has been exhibited)
- estimated construction timing (as identified in the publicly exhibited EISs, respectively).

The projects identified as having potential cumulative traffic and transport impacts which utilise Castlereagh Highway or Hill End Road as Access Roads is summarised in Table 17 and shown in Figure 18.

The traffic volumes on Castlereagh Highway, to the south of each of the project's access point is summarised inTable 18, based on the individual EIS traffic distribution diagrams. Each of these projects are located at least 30km to the north of Hill End Road, and are all to the north of the town of Gulgong. For this reason, the cumulative traffic on Castlereagh Highway has been taken as 50% of the total peak hourly traffic.

Table 17 – Relevant Future Projects with the Potential for Cumulative Impacts

ID from EIS	Project	Access Roads Used by Project	Planning Status
5	Birriwa Solar Farm	Castlereagh Highway	Recommendation- construction commencing in late 2026 or early 2027
6	Tallawang Solar Farm-	Castlereagh Highway	Assessment- construction expected commencing 2025 or 2026
	Beryl Battery Energy Storage System	Castlereagh Highway	Response to submissions- Target construction start Q3/Q4 2025
	Bellambi Heights Battery Energy Storage System	Castlereagh Highway	Approved- Target construction start Q2 2025

Table 18 – Relevant Future Projects with the Potential for Cumulative Impacts

Project	Vehicle Type	Peak Hourly Traffic on Castlereagh Highway			
		AM Peak		PM Peak	
		Northbound	Southbound	Northbound	Southbound
Birriwa Solar Farm	Light Vehicles	234	0	0	234
	Heavy Vehicles	16	3	3	16
Tallawang Solar Farm	Light Vehicles	55	20	20	55
	Heavy Vehicles	23	23	23	23
Beryl Battery Energy Storage System	Light Vehicles	8	0	0	8
	Heavy Vehicles	2	2	2	2
Bellambi Heights Battery Energy Storage System	Light Vehicles	10	0	0	10
	Heavy Vehicles	2	2	2	2
Total	Light Vehicles	307	20	20	307
	Heavy Vehicles	43	30	30	43
50% of Total	**Light Vehicles**	153	10	10	153
	Heavy Vehicles	21	15	15	21

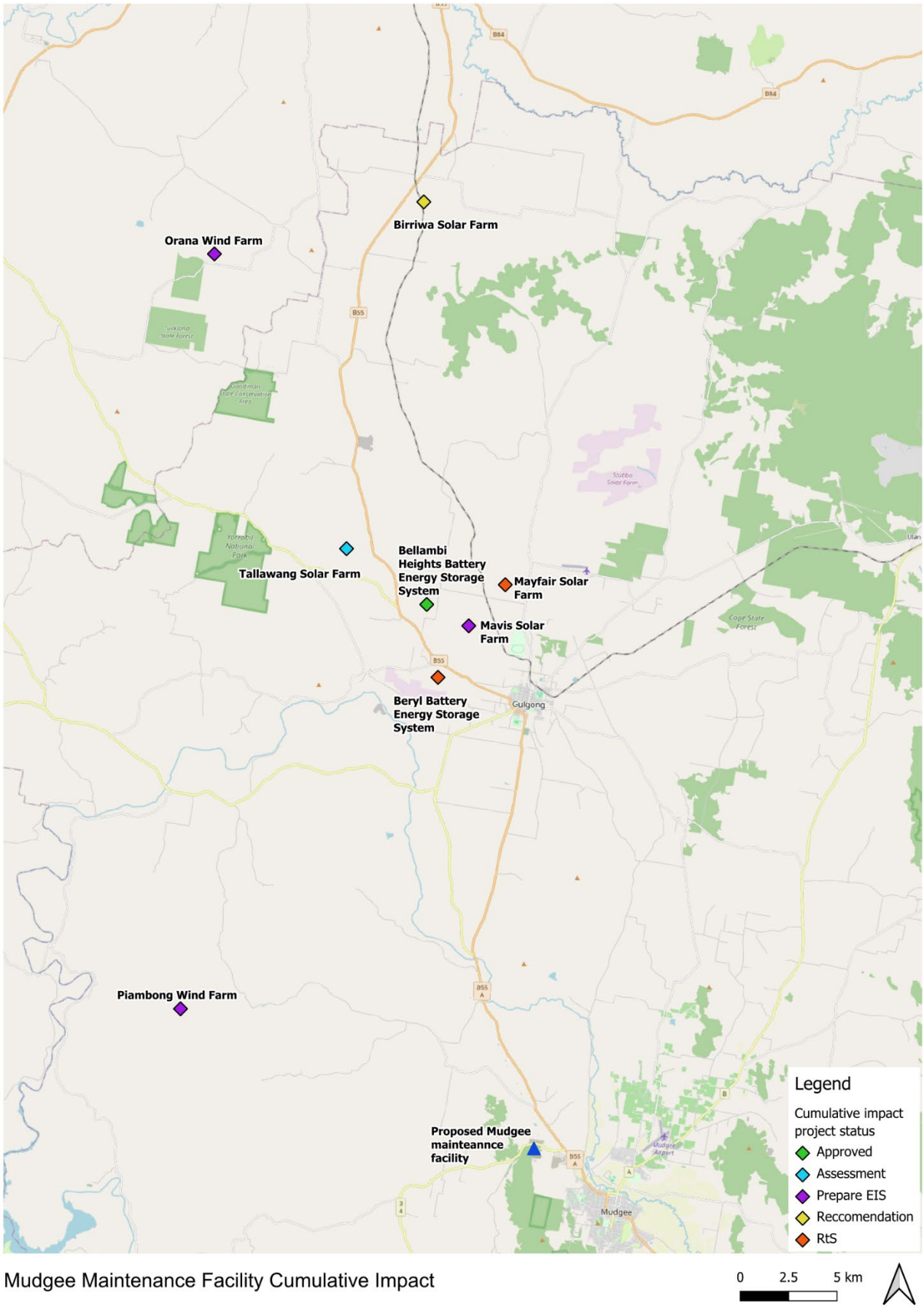


Figure 18 – Relevant Future Projects Location

Figure 19 and Table 19 summarises the expected cumulative traffic volumes that would be added to the Hill End Road and Castlereagh Highway from the projects listed in Table 17 above.

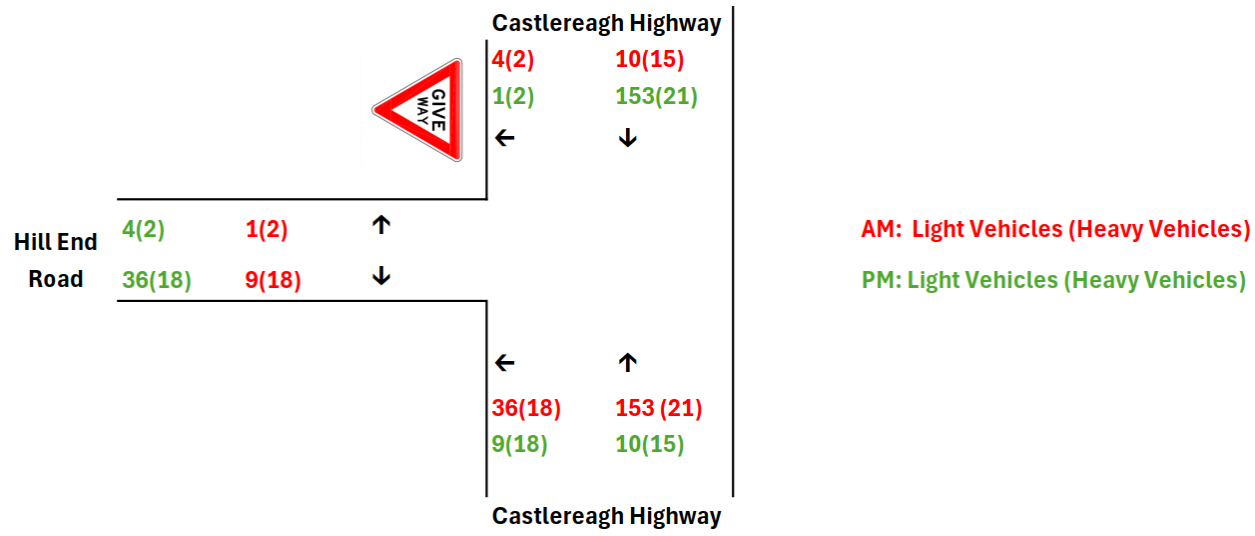


Figure 19 – Construction Phase Cumulative Trip Distribution at Hill End Road / Castlereagh Highway Intersection

Table 19 – Cumulative Impacts Estimated Traffic Volumes During Construction phase

Route	Road Classification	Relevant Future Projects Utilising Route	Additional Peak Hour Vehicle Movements Generated by Relevant Future Projects			
			AM Peak Hour		PM Peak Hour	
			NB/WB	SB/EB	NB/WB	SB/EB
Castlereagh Highway (north-west of Putta Bucca Road), Mudgee	Highway	Birriwa Solar Farm Tallawang Solar Farm Beryl Battery Energy Storage System Bellambi Heights Battery Energy Storage System	174	25	25	174
Hill End Road, west of Castlereagh Highway	Regional Road	None	0	0	0	0
Total			**174**	**25**	**25**	**174**

The Central-West Orana REZ Transmission Project (approved project) is not anticipated to contribute significant vehicle movements to the intersection of Hill End Road and Castlereagh Highway as their camps, and primary construction routes are located to the north of this, with materials and deliveries expected to originate primarily from the east, via the Golden Highway.

The traffic generated by the operation phase of these projects was expected to be minor, predominantly light vehicles, with all vehicles arriving during the morning peak and departing in the afternoon peak.

Table 20 – Construction phase Intersection Performance with Cumulative project traffic 2027

Approach	Movement	AM Peak				PM Peak			
		Deg. Satn	Ave. Delay	Level of	95% Back of Queue	Deg. Satn	Ave. Delay	Level of	95% Back of Queue
		v/c	sec	Service	m	v/c	sec	Service	m
	Left	0.103	5.8	LOS A	0.0	0.127	5.7	LOS A	0.0

SouthEast – Castlereagh Highway	Through	0.202	0.1	LOS A	0.0	0.156	0.0	LOS A	0.0
NorthWest - Castlereagh Highway	Through	0.197	0.1	LOS A	0.0	0.234	0.1	LOS A	0.0
	Right	0.031	1.0	LOS A	0.9	0.030	8.5	LOS A	0.8
SouthWest – Hill End Road	Left	0.015	7.9	LOS A	0.4	0.029	7.1	LOS A	0.8
	Right	1.143	175.6	LOS F	242.1	0.835	44.1	LOS D	46.5
All Vehicles		**1.143**	**43.6**	**NA**	**242.1**	**0.835**	**8.8**	**NA**	**46.5**

The results of the 2027 Construction Phase, including the cumulative traffic volumes suggests all movements except for the eastbound right turn from Hill End Road to Castlereagh Highway are expected to remain operating at LOS A with negligible delays and queues.

The eastbound right turn from Hill End Road to Castlereagh Highway appears to become oversaturated during the AM Peak, decreasing to LOS F, and decreasing to LOS D during the PM Peak. It is also noted that the modelled AM Peak period is from 8:15-9:15am, and the PM Peak from 3:30-4:30pm however the work force will not typically move into and out of the site during peak periods owing to the transitional nature of the work, so the impacts are expected to be reduced.

The LOS F suggests deterioration in performance of the right-turn movement departing Hill End Road. This will see excessive queues and delays for right-turning traffic, however this is not attributed to the construction traffic, as the construction traffic would contribute less than 0.5% of the background through traffic on the Castlereagh Highway.

6.1.1 Operation

Operation and maintenance activities of the relevant future projects have the potential to increase the number of vehicle movements on the road network in combination with this project. Of the relevant future projects, only 10 related development projects are located within the study area and would utilise roads used by this project during operation. Each of these projects would generate up to between 20 and 100 light vehicle movements per day. This is expected to result in an overall minor impact on traffic and transport, considering the existing capacity and efficiency of the local road network. Heavy vehicles would only be required for infrequent repairs and maintenance and are expected to have a negligible impact.

6.1.2 Industrial Subdivision

The industrial subdivision at Marsh Avenue, Knott Place and Lillie Close consists of approximately 175,000 square metres of future industrial development.

The RTA Guide to Traffic Generating Developments lists the daily and peak hour traffic generation rates for industrial developments as 5 daily trips per 100 square meters gross floor area (GFA) or between 0.8 – 1 trips per 100 square meters gross floor area (GFA) in the peak hour. Directional splits would be approximately 80% inbound and 20% outbound in the morning peak hour and 20% inbound and 80% outbound in the afternoon peak.

Based on a conservative 40% development area, the subdivision has the potential to generate up to 3500 trips per day, or up to 700 trips per hour in the peak hours.

7 Environmental management measures

Compliance with the Minister's Conditions of Approval and the Updated Environmental Management Measures relating to construction traffic and transport impacts described in this Report will be maintained. No further environmental management measures are considered necessary beyond those summarised in Part D of the Response to Submissions Report.

No amendments to the Conditions of the Project Approval as they relate to operational traffic would be required.

8 Conclusions

The impacts on traffic and transport as a result the proposed modified Project would not vary greatly from the Approved Project.

The proposed additional traffic during the development and operational phases of the proposed modification are expected to have minimal impact on the operation of the Hill End Road / Castlereagh Highway Intersection. The existing traffic volumes on the road network are low, and the intersection is easily able to accommodate the relatively low volumes of traffic from the Mudgee Maintenance Facility (proposed modification), as well as the other proposed nearby projects.

Based on the Operations Phase intersection volumes, the right turn from Hill End Road to Castlereagh Highway may deteriorate due to increased traffic from adjacent developments, however the proposed operational phase traffic volumes are minor in comparison to these other increases. **This deterioration is not attributed to the construction or operational phase traffic, as the construction and operational phase traffic would contribute less than 0.5% of the background through traffic on the Castlereagh Highway.**

Safety associated with the school bus drop off/pick up issue discussed in Section 3.6 would be managed during construction and operation through the implementation of mitigation measures already associated with the project. This would include the implementation of a Traffic and Transport Management Plan and a Divers Code of Conduct that would address potential safety concerns.

In conclusion, the overall impacts from the construction traffic and transport changes associated with the proposed modified Project are generally considered to be minor in nature. It is expected that no additional mitigation measures relating to traffic and transport would be required as a result of the modification.

Appendix A – SIDRA Results

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Existing - Thursday AM Peak (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 08:15 - 09:15
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	109	7.7	109	7.7	0.062	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	52.6
5	T1	All MCs	175	12.0	175	12.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach			284	10.4	284	10.4	0.097	2.2	NA	0.0	0.0	0.00	0.22	0.00	56.9
NorthWest: Castlereagh Highway															
11	T1	All MCs	316	9.3	316	9.3	0.172	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	12	27.3	12	27.3	0.013	7.4	LOS A	0.0	0.4	0.39	0.59	0.39	50.5
Approach			327	10.0	327	10.0	0.172	0.3	NA	0.0	0.4	0.01	0.02	0.01	59.5
SouthWest: Hill End Road															
1	L2	All MCs	8	0.0	8	0.0	0.008	6.2	LOS A	0.0	0.2	0.27	0.55	0.27	52.1
3	R2	All MCs	256	5.3	256	5.3	0.552	16.5	LOS B	3.5	25.5	0.74	1.04	1.22	45.6
Approach			264	5.2	264	5.2	0.552	16.2	LOS B	3.5	25.5	0.72	1.02	1.19	45.8
All Vehicles			876	8.7	876	8.7	0.552	5.7	NA	3.5	25.5	0.22	0.39	0.36	53.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Existing - Thursday PM Peak (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 15:30 - 16:30
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	184	1.1	184	1.1	0.100	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
5	T1	All MCs	251	4.2	251	4.2	0.132	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			435	2.9	435	2.9	0.132	2.4	NA	0.0	0.0	0.00	0.24	0.00	56.7
NorthWest: Castlereagh Highway															
11	T1	All MCs	238	6.6	238	6.6	0.127	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	19	0.0	19	0.0	0.021	7.4	LOS A	0.1	0.5	0.45	0.63	0.45	51.4
Approach			257	6.1	257	6.1	0.127	0.6	NA	0.1	0.5	0.03	0.05	0.03	59.2
SouthWest: Hill End Road															
1	L2	All MCs	19	5.6	19	5.6	0.019	6.7	LOS A	0.1	0.5	0.33	0.58	0.33	51.7
3	R2	All MCs	137	5.4	137	5.4	0.303	13.4	LOS A	1.3	9.7	0.65	0.89	0.77	47.5
Approach			156	5.4	156	5.4	0.303	12.6	LOS A	1.3	9.7	0.61	0.85	0.72	48.0
All Vehicles			847	4.3	847	4.3	0.303	3.7	NA	1.3	9.7	0.12	0.30	0.14	55.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: CIVLINK | Licence: NETWORK / 1PC | Processed: Sunday, 25 May 2025 10:39:34 AM
Project: C:\Users\angel\OneDrive\Documents\Civlink\25_03_02_Mudgee\03_Update\Central-West Orana REZ - Mudgee Maintenance Facility_V3.sip9

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - 2027 - Thursday AM Peak (Site Folder: 2027 Base Volumes - 2pc growth rate)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 08:15 - 09:15
2% annual growth rate between 2025 - 2027
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	114	7.7	114	7.7	0.065	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	52.6
5	T1	All MCs	182	12.0	182	12.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach			296	10.4	296	10.4	0.101	2.2	NA	0.0	0.0	0.00	0.22	0.00	56.9
NorthWest: Castlereagh Highway															
11	T1	All MCs	329	9.3	329	9.3	0.179	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	12	27.2	12	27.2	0.014	7.5	LOS A	0.1	0.4	0.40	0.59	0.40	50.4
Approach			341	10.0	341	10.0	0.179	0.3	NA	0.1	0.4	0.01	0.02	0.01	59.5
SouthWest: Hill End Road															
1	L2	All MCs	9	0.0	9	0.0	0.008	6.2	LOS A	0.0	0.2	0.27	0.55	0.27	52.1
3	R2	All MCs	266	5.3	266	5.3	0.597	18.0	LOS B	3.9	28.9	0.77	1.08	1.36	44.8
Approach			275	5.2	275	5.2	0.597	17.6	LOS B	3.9	28.9	0.75	1.07	1.32	45.0
All Vehicles			911	8.6	911	8.6	0.597	6.1	NA	3.9	28.9	0.23	0.40	0.40	53.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: CIVLINK | Licence: NETWORK / 1PC | Processed: Sunday, 25 May 2025 9:42:39 AM
Project: C:\Users\angel\OneDrive\Documents\Civlink\25_03_02_Mudgee\03_Update\Central-West Orana REZ - Mudgee Maintenance Facility_V3.sip9

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - 2027 - Thursday PM Peak (Site Folder: 2027 Base Volumes - 2pc growth rate)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 15:30 - 16:30
2% annual growth rate between 2025 - 2027
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	192	1.2	192	1.2	0.104	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	52.8
5	T1	All MCs	261	4.2	261	4.2	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			452	2.9	452	2.9	0.137	2.4	NA	0.0	0.0	0.00	0.24	0.00	56.7
NorthWest: Castlereagh Highway															
11	T1	All MCs	247	6.6	247	6.6	0.132	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	20	0.0	20	0.0	0.022	7.5	LOS A	0.1	0.6	0.46	0.64	0.46	51.3
Approach			267	6.1	267	6.1	0.132	0.6	NA	0.1	0.6	0.03	0.05	0.03	59.2
SouthWest: Hill End Road															
1	L2	All MCs	20	5.3	20	5.3	0.020	6.7	LOS A	0.1	0.5	0.34	0.58	0.34	51.7
3	R2	All MCs	142	5.4	142	5.4	0.328	14.2	LOS A	1.5	10.8	0.68	0.91	0.83	47.0
Approach			162	5.4	162	5.4	0.328	13.3	LOS A	1.5	10.8	0.63	0.87	0.77	47.5
All Vehicles			882	4.3	882	4.3	0.328	3.8	NA	1.5	10.8	0.13	0.30	0.15	55.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: CIVLINK | Licence: NETWORK / 1PC | Processed: Sunday, 25 May 2025 9:42:48 AM
Project: C:\Users\angel\OneDrive\Documents\Civlink\25_03_02_Mudgee\03_Update\Central-West Orana REZ - Mudgee Maintenance Facility_V3.sip9

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Construction Phase 2027 - Thursday AM Peak (Site Folder: Construction Phase - no cumulative)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 08:15 - 09:15
2% Growth Rate applied to 2027 volumes
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	171	16.2	171	16.2	0.103	5.8	LOS A	0.0	0.0	0.00	0.57	0.00	52.2
5	T1	All MCs	182	12.0	182	12.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach			353	14.1	353	14.1	0.103	2.8	NA	0.0	0.0	0.00	0.28	0.00	55.9
NorthWest: Castlereagh Highway															
11	T1	All MCs	329	9.3	329	9.3	0.179	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	18	29.3	18	29.3	0.023	8.1	LOS A	0.1	0.7	0.44	0.63	0.44	50.0
Approach			347	10.4	347	10.4	0.179	0.5	NA	0.1	0.7	0.02	0.03	0.02	59.3
SouthWest: Hill End Road															
1	L2	All MCs	12	17.7	12	17.7	0.012	6.6	LOS A	0.0	0.3	0.29	0.55	0.29	51.3
3	R2	All MCs	295	11.3	295	11.3	0.757	25.5	LOS B	6.3	48.0	0.86	1.31	2.03	41.0
Approach			306	11.5	306	11.5	0.757	24.7	LOS B	6.3	48.0	0.84	1.28	1.96	41.3
All Vehicles			1006	12.0	1006	12.0	0.757	8.7	NA	6.3	48.0	0.26	0.50	0.61	51.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Construction Phase 2027 - Thursday PM Peak (Site Folder: Construction Phase - no cumulative)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - PM Peak 15:30 - 16:30
2% pa Growth Rate between 2025-2027
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	220	9.6	220	9.6	0.127	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.5
5	T1	All MCs	261	4.2	261	4.2	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			481	6.7	481	6.7	0.137	2.6	NA	0.0	0.0	0.00	0.26	0.00	56.3
NorthWest: Castlereagh Highway															
11	T1	All MCs	247	6.6	247	6.6	0.132	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	23	9.2	23	9.2	0.029	8.2	LOS A	0.1	0.8	0.49	0.67	0.49	50.5
Approach			270	6.9	270	6.9	0.132	0.7	NA	0.1	0.8	0.04	0.06	0.04	59.0
SouthWest: Hill End Road															
1	L2	All MCs	26	12.1	26	12.1	0.028	6.9	LOS A	0.1	0.7	0.34	0.59	0.34	51.4
3	R2	All MCs	199	13.4	199	13.4	0.525	18.9	LOS B	2.9	22.6	0.77	1.04	1.23	44.1
Approach			225	13.2	225	13.2	0.525	17.6	LOS B	2.9	22.6	0.72	0.99	1.13	44.9
All Vehicles			976	8.2	976	8.2	0.525	5.5	NA	2.9	22.6	0.18	0.37	0.27	53.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: CIVLINK | Licence: NETWORK / 1PC | Processed: Sunday, 25 May 2025 9:49:32 AM
Project: C:\Users\angel\OneDrive\Documents\Civlink\25_03_02_Mudgee\03_Update\Central-West Orana REZ - Mudgee Maintenance Facility_V3.sip9

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Construction Phase 2027 incl Cumulative - Thursday AM Peak (Site Folder: Construction Phase - including cumulative)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 08:15 - 09:15
2% Growth Rate applied to 2027 volumes
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	171	16.2	171	16.2	0.103	5.8	LOS A	0.0	0.0	0.00	0.57	0.00	52.2
5	T1	All MCs	365	12.1	365	12.1	0.202	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			536	13.4	536	13.4	0.202	1.9	NA	0.0	0.0	0.00	0.18	0.00	57.2
NorthWest: Castlereagh Highway															
11	T1	All MCs	355	13.1	355	13.1	0.197	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	18	29.3	18	29.3	0.031	10.0	LOS A	0.1	0.9	0.55	0.72	0.55	48.7
Approach			373	13.9	373	13.9	0.197	0.5	NA	0.1	0.9	0.03	0.04	0.03	59.2
SouthWest: Hill End Road															
1	L2	All MCs	12	17.7	12	17.7	0.015	7.9	LOS A	0.1	0.4	0.43	0.62	0.43	50.6
3	R2	All MCs	295	11.3	295	11.3	1.143	175.6	LOS F	31.5	242.1	1.00	3.11	8.45	15.3
Approach			306	11.5	306	11.5	1.143	169.1	LOS F	31.5	242.1	0.98	3.02	8.14	15.7
All Vehicles			1215	13.1	1215	13.1	1.143	43.6	NA	31.5	242.1	0.25	0.85	2.06	34.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: CIVLINK | Licence: NETWORK / 1PC | Processed: Sunday, 25 May 2025 9:53:46 AM
Project: C:\Users\angel\OneDrive\Documents\Civlink\25_03_02_Mudgee\03_Update\Central-West Orana REZ - Mudgee Maintenance Facility_V3.sip9

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Construction Phase 2027 incl Cumulative - Thursday PM Peak (Site Folder: Construction Phase - including cumulative)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - PM Peak 15:30 - 16:30
2% pa Growth Rate between 2025-2027
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	220	9.6	220	9.6	0.127	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.5
5	T1	All MCs	287	9.3	287	9.3	0.156	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			507	9.4	507	9.4	0.156	2.5	NA	0.0	0.0	0.00	0.25	0.00	56.4
NorthWest: Castlereagh Highway															
11	T1	All MCs	431	8.9	431	8.9	0.234	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	23	9.2	23	9.2	0.030	8.5	LOS A	0.1	0.8	0.51	0.68	0.51	50.3
Approach			453	9.0	453	9.0	0.234	0.5	NA	0.1	0.8	0.03	0.03	0.03	59.3
SouthWest: Hill End Road															
1	L2	All MCs	26	12.1	26	12.1	0.029	7.1	LOS A	0.1	0.8	0.37	0.60	0.37	51.3
3	R2	All MCs	199	13.4	199	13.4	0.835	44.1	LOS D	6.0	46.5	0.95	1.43	2.54	33.9
Approach			225	13.2	225	13.2	0.835	39.9	LOS C	6.0	46.5	0.88	1.33	2.29	35.3
All Vehicles			1186	10.0	1186	10.0	0.835	8.8	NA	6.0	46.5	0.18	0.37	0.44	51.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Operations Phase 2037 - Thursday AM Peak (Site Folder: Operations Phase - no cumulative)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 08:15 - 09:15
2% pa Growth Rate between 2025-2037
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	186	10.8	186	10.8	0.108	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.4
5	T1	All MCs	222	12.1	222	12.1	0.123	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			408	11.5	408	11.5	0.123	2.6	NA	0.0	0.0	0.00	0.26	0.00	56.2
NorthWest: Castlereagh Highway															
11	T1	All MCs	401	9.3	401	9.3	0.218	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	20	25.4	20	25.4	0.026	8.4	LOS A	0.1	0.8	0.47	0.65	0.47	49.9
Approach			420	10.1	420	10.1	0.218	0.5	NA	0.1	0.8	0.02	0.03	0.02	59.3
SouthWest: Hill End Road															
1	L2	All MCs	13	8.3	13	8.3	0.013	6.6	LOS A	0.0	0.3	0.31	0.56	0.31	51.6
3	R2	All MCs	343	7.8	343	7.8	1.064	109.8	LOS F	25.9	193.2	1.00	2.70	6.81	21.1
Approach			356	7.8	356	7.8	1.064	106.1	LOS F	25.9	193.2	0.98	2.62	6.58	21.6
All Vehicles			1184	9.9	1184	9.9	1.064	33.0	NA	25.9	193.2	0.30	0.89	1.99	38.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: CIVLINK | Licence: NETWORK / 1PC | Processed: Sunday, 25 May 2025 9:50:23 AM
Project: C:\Users\angel\OneDrive\Documents\Civlink\25_03_02_Mudgee\03_Update\Central-West Orana REZ - Mudgee Maintenance Facility_V3.sip9

MOVEMENT SUMMARY

Site: 101 [Hill End Road / Castlereagh Highway - Operations Phase 2037 - Thursday PM Peak (Site Folder: Operations Phase - no cumulative)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Short Term Count Thursday 13 Feb 2025 - AM Peak 15:30 - 16:30
2% pa Growth Rate between 2025-2037
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Castlereagh Highway															
4	L2	All MCs	253	4.8	253	4.8	0.141	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	52.6
5	T1	All MCs	318	4.2	318	4.2	0.167	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			570	4.5	570	4.5	0.167	2.5	NA	0.0	0.0	0.00	0.25	0.00	56.5
NorthWest: Castlereagh Highway															
11	T1	All MCs	302	6.6	302	6.6	0.161	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	All MCs	26	4.0	26	4.0	0.035	8.6	LOS A	0.1	0.9	0.52	0.70	0.52	50.4
Approach			328	6.4	328	6.4	0.161	0.7	NA	0.1	0.9	0.04	0.06	0.04	59.0
SouthWest: Hill End Road															
1	L2	All MCs	29	7.9	29	7.9	0.032	7.2	LOS A	0.1	0.8	0.38	0.61	0.38	51.4
3	R2	All MCs	221	8.5	221	8.5	0.691	26.5	LOS B	4.4	32.9	0.87	1.20	1.76	40.5
Approach			250	8.5	250	8.5	0.691	24.3	LOS B	4.4	32.9	0.82	1.13	1.60	41.6
All Vehicles			1148	5.9	1148	5.9	0.691	6.7	NA	4.4	32.9	0.19	0.39	0.36	53.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
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Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Organisation: CIVLINK | Licence: NETWORK / 1PC | Processed: Sunday, 25 May 2025 9:51:05 AM
Project: C:\Users\angel\OneDrive\Documents\Civlink\25_03_02_Mudgee\03_Update\Central-West Orana REZ - Mudgee Maintenance Facility_V3.sip9

Appendix B – Traffic Count Data

Colliers

Accelerating success.

Intersection Count - Project Details

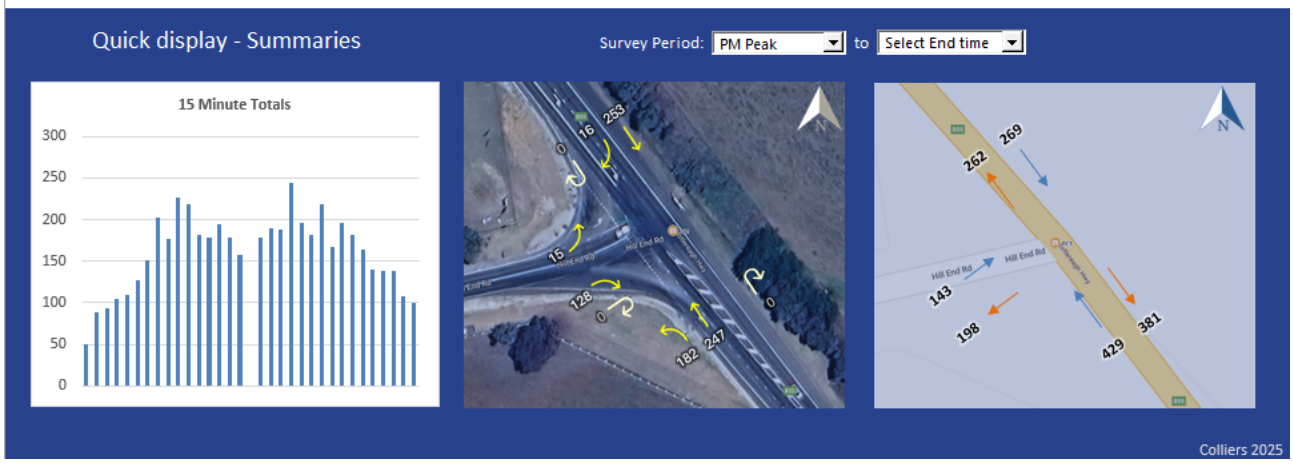
Reference: **24SYD0186**
Location: **Castlereagh Hwy & Hill End Rd**
Suburb: **Mudgee**
Date: **Friday, 7 February 2025**
Duration: **0600-1000 & 1500-1900**
Weather: **Fine**
AM Peak: **07:45-08:45**
PM Peak: **15:45-16:45**
Notes:

Colliers

Accelerating success.

Intersection Count - Project Details

Reference: **24SYD0186**
Location: **Castlereagh Hwy & Hill End Rd**
Suburb: **Mudgee**
Date: **Friday, 7 February 2025**
Duration: **0600-1000 & 1500-1900**
Weather: **Fine**
AM Peak: **07:45-08:45**
PM Peak: **15:45-16:45**
Notes:



Colliers Accelerating success.

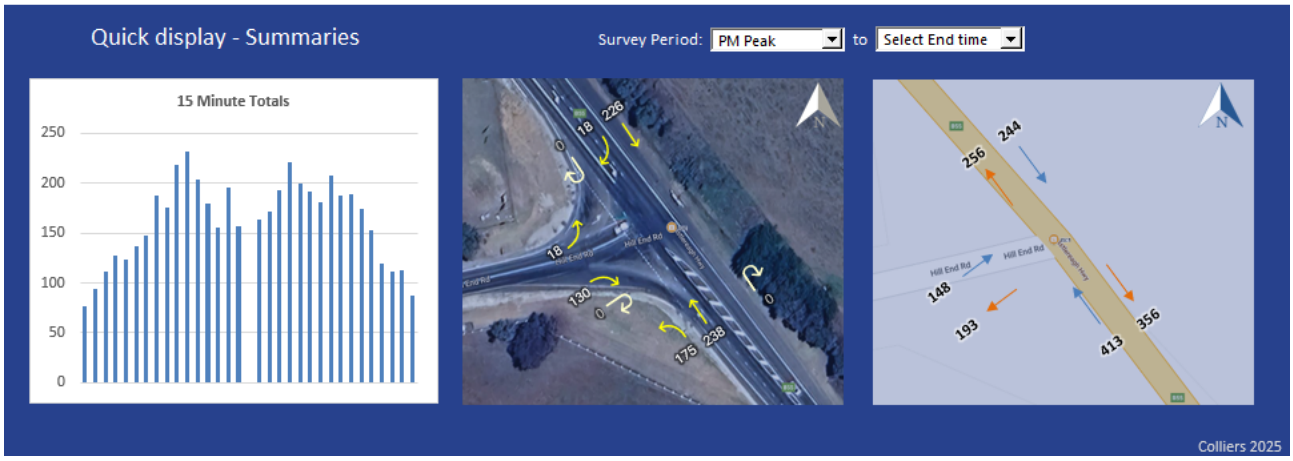
Intersection Count - Project Details

Reference: **24SYD0186**
Location: **Castlereagh Hwy & Hill End Rd**
Suburb: **Mudgee**
Date: **Thursday, 13 February 2025**
Duration: **0600-1000 & 1500-1900**
Weather: **Fine**
AM Peak: **08:15-09:15**
PM Peak: **15:30-16:30**
Notes:

Colliers Accelerating success.

Intersection Count - Project Details

Reference: **24SYD0186**
Location: **Castlereagh Hwy & Hill End Rd**
Suburb: **Mudgee**
Date: **Thursday, 13 February 2025**
Duration: **0600-1000 & 1500-1900**
Weather: **Fine**
AM Peak: **08:15-09:15**
PM Peak: **15:30-16:30**
Notes:



Colliers

Accelerating success.

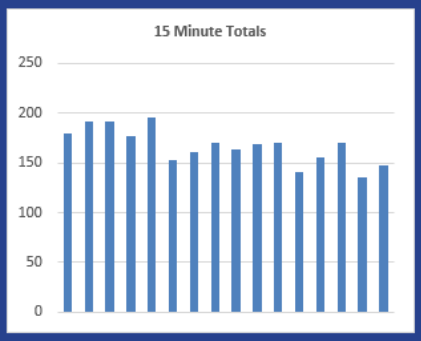
Intersection Count - Project Details

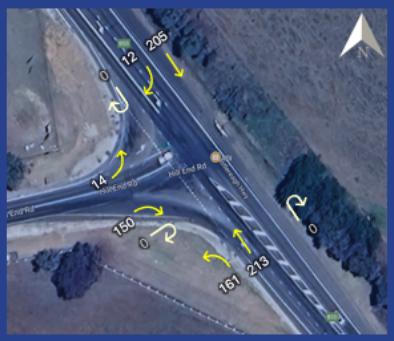
Reference: **24SYD0186**
Location: **Castlereagh Hwy & Hill End Rd**
Suburb: **Mudgee**
Date: **Saturday, 8 February 2025**
Duration: **1000-1400**
Weather: **Fine**
Peak Hr: **10:15-11:15**

Notes:

Quick display - Summaries

Survey Period: Peak Hr to Select End time





Colliers 2025

Appendix C – Swept Paths