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Traffic and Transport Impact Assessment

BYLONG COAL PROJECT
Environmental Impact Statement

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

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Bylong Coal Project Traffic and Transport Impact Assessment

16 July 2015

PARSONS BRINCKERHOFF

Document information
Client: Hansen Bailey Title: Bylong Coal Project Traffic and Transport Impact Assessment Document No: 2196777A-ITP-RPT-3778-RevD Date: 16 July 2015

Rev	Date	Details
	02/02/2015	Draft Report
A	09/02/2015	Revised Draft Report
B	19/02/2015	Final Report
C	04/03/2015	Final Report
D	16/07/2015	Final Report

Author, Reviewer and Approver details			
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Glossary

A	Authorisation
AADT	Average Annual Daily Traffic
ARTC	Australian Rail Track Corporation
AS	Australian Standard
CHPP	Coal Handling and Preparation Plant
DoS	Degree of Saturation
EIS	Environmental Impact Statement
EP&A	Environmental Planning and Assessment
HV	Heavy Vehicle
km	kilometres
Km/h	Kilometres per hour
LGA	Local Government Area
LoS	Level of Service
LV	Light Vehicle
m	metres
MIA	Mine infrastructure area
Mtpa	Million tonnes per annum
MWRC	Mid-Western Regional Council
OEA	Overburden Emplacement Area
PWCS	Port Waratah Coal Service
Q_L	Volume of left turn in vehicles at an unsignalised intersection
Q_M	Volume of through vehicles at an unsignalised intersection
Q_R	Volume of right turn in vehicles at an unsignalised intersection
Q_{T1}	Volume of through vehicles adjacent to the right turn in at an unsignalised intersection
Q_{T2}	Volume of through vehicles adjacent to the left turn in at an unsignalised intersection

RAV	Restricted Access Vehicle
ROM	Run of Mine
RMS	Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SIA	Social Impact Assessment
SISD	Safe Intersection Sight Distance
t	tonnes
TfNSW	Transport for NSW
TMP	Traffic Management Plan
vph	Vehicles per hour
vpd	Vehicles per day
WAF	Workers Accommodation Facility

1. Introduction

Parsons Brinckerhoff has been commissioned by Hansen Bailey to prepare a Traffic and Transport Impact Assessment to be included as part of an Environmental Impact Statement (EIS) for the Bylong Coal Project (the Project).

1.1 Background

In December 2010 KEPCO Bylong Australia Pty Ltd (KEPCO) acquired Authorisations (A) 287 and 342. Since this time, extensive exploration and mine planning work has been undertaken to determine the most environmentally sound, socially responsible and economically viable mine plan to recover the known coal resources within the two Authorisations.

In August 2014 KEPCO commissioned WorleyParsons Services Pty Ltd (WorleyParsons) to manage the Project exploration activities, mine feasibility study planning, environmental approvals and ongoing environmental monitoring for the Project.

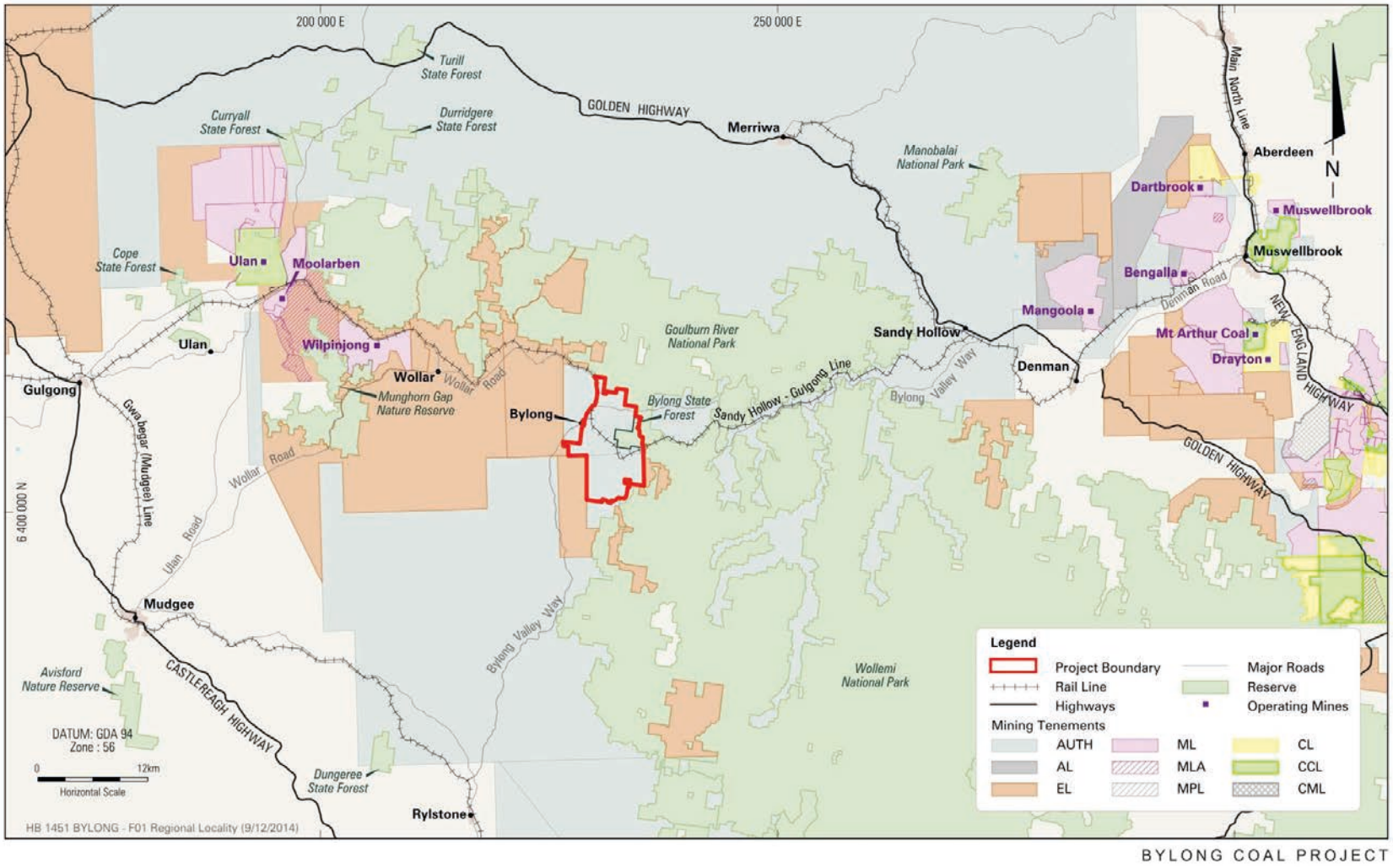
The Project is located wholly within A287 and A342 which are located within the Mid-Western Regional Council (MWRC) Local Government Area (LGA). The closest regional centre is Mudgee, located approximately 55 km south-west of the Project Boundary. The Project is approximately 230 km by rail from the Port of Newcastle. Figure 1.1 illustrates the locality of the Project within New South Wales (NSW). Figure 1.2 shows the regional locality of the Project in relation to the neighbouring town centres, mining authorities, major transport routes and reserves.

KEPCO is seeking State Significant Development Consent under Division 4.1 of Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the development and operation of the Project. The State Significant Development Application will be supported by an Environmental Impact Statement (EIS) which is being prepared by Hansen Bailey.

Hansen Bailey Bylong Coal Project Traffic and Transport Impact Assessment

Source: Hansen Bailey (2015)

Figure 1.1 Locality plan



Source: Hansen Bailey (2015)

Figure 1.2 Regional locality plan

1.2 Project overview

The Project life is anticipated to be approximately 25 years, comprising a two year construction period and a 23 year operational period, with underground mining operations commencing in Year 7. Various rehabilitation and decommissioning activities will be undertaken during both the course of, and following the 25 years of the Project. It is noted that further minable coal resources exist within both A287 and A342.

The Project is to be developed on land within the Project Boundary as illustrated on Figure 3.1. Key features of the Project are conceptually shown on Figure 3.1 and include:

- The initial development of two open cut mining areas with associated haul roads and Overburden Emplacement Areas (OEAs), utilising a mining fleet of excavators and trucks and supporting ancillary equipment;
- The two open cut mining areas will be developed and operated 24 hours a day, 7 days a week over an approximate 10 year period and will ultimately provide for the storage of coal processing reject materials from the longer term underground mining activities;
- Construction and operation of administration, workshop, bathhouse, explosives magazine and other open cut mining related facilities;
- Construction and operation of an underground coal mine operating 24 hours a day, 7 days a week for a 20 year period, commencing mining in around year 7 of the Project;
- A combined maximum extraction rate of up to 6.5 Million tonnes per annum (Mtpa) Run of Mine (ROM) coal;
- A workforce of up to approximately 800 during the initial construction phase and a peak of 470 full-time equivalent operations employees at full production;
- Underground mining operations utilising longwall mining techniques with primary access provided via drifts constructed adjacent to the rail loop and Coal Handling and Preparation Plant (CHPP);
- The construction and operation of facilities to support underground mining operations including personnel and material access to the underground mining area, ventilation shafts, workshop, offices and employee amenities, fuel and gas management facilities;
- Construction and operation of a CHPP with a designed throughput of approximately 6 Mtpa of ROM coal, with capacity for peak fluctuations beyond this;
- The dewatering of fine reject materials through belt press filters within the CHPP and the co-disposal of dewatered fine and coarse reject materials within OEAs and final open cut voids (avoiding the need for a tailings dam);
- Construction and operation of a rail loop and associated rail load out facility and connection to the Sandy Hollow to Gulgong Railway Line to facilitate the transport of product coal;
- The construction and operation of surface and groundwater management and water reticulation infrastructure including diversion drains, dams (clean, dirty and raw water), pipelines and pumping stations;
- The installation of communications and electricity reticulation infrastructure;
- Construction and operation of a Workforce Accommodation Facility (WAF) and associated access road from Bylong Valley Way;
- The upgrade of Upper Bylong Road and the construction and operation of a Mine Access Road to provide access to the site facilities;
- Relocation of sections of some existing public roads to enable alternate access routes for private landholders surrounding the Project; and

- Infilling of mining voids, progressive rehabilitation of disturbed areas, decommissioning of Project infrastructure and rehabilitation of the land progressively following mining operations.

1.3 Assessment area

The area for this assessment is shown in Figure 1.3 and includes Bylong Valley Way, Upper Bylong Road, Lee Creek Road, Budden Gap Road, Woolleys Road, Wallys Road and Wollar Road. The key intersections within the assessment area include Bylong Valley Way/Upper Bylong Road and Bylong Valley Way and Wollar Road. A qualitative assessment on traffic volumes and intersection performance for roads further afield that connect the Project site with Mudgee including Wollar Road, Ulan Road and Lue Road has also been undertaken. The assessment area did not go as far as the State road network which includes the Golden Highway and the Castlereagh Highway which are approximately 60 km and 80 km from the Project itself.

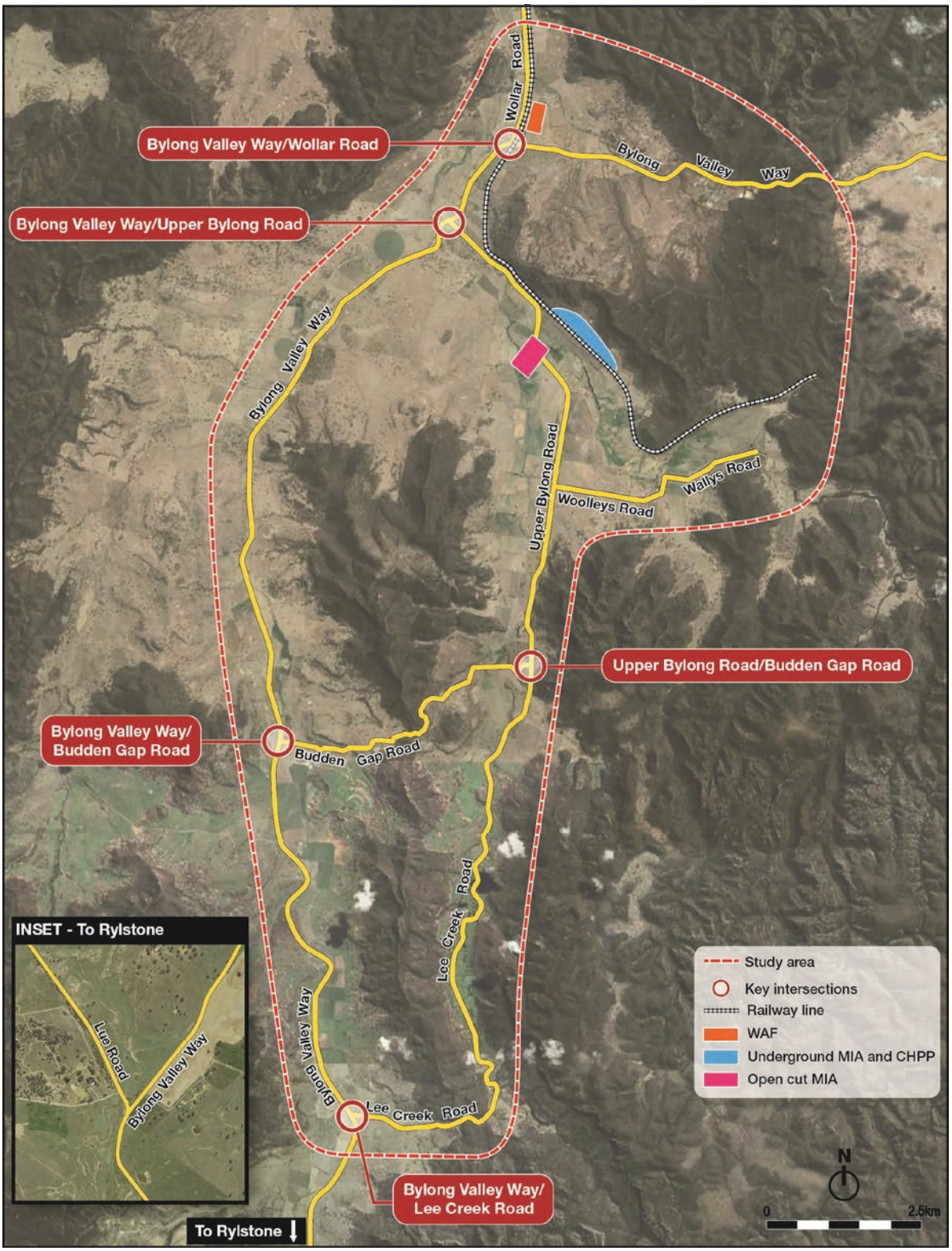


Figure 1.3 Assessment area

1.4 Study scope

The scope of this study is as follows:

- Review and assess existing road and traffic conditions in the assessment area;
- Determine the traffic generation and distribution of the Project traffic during construction and operation;
- Forecast traffic generation and distribution during Project decommissioning;
- Review and assess future road and traffic conditions (with the inclusion of project traffic) including intersection performance at key intersections within the assessment area;
- Identify any potential traffic or road safety issues along the likely project haulage routes and at access points;
- Identify any impacts to all road users;
- Identify any impacts to the local community including property access;
- Identify and review traffic diversions as a result of road closures;
- Review and identify any cumulative traffic impacts from adjacent developments, and
- Identify relevant mitigation measures to minimise or remove likely impacts.

Table 1.1 below list the various Secretary's Environmental Assessment Requirements (SEARs) and Agency Requirements and where each of these requirements is addressed in the report.

Table 1.1 SEAR and Agency requirements

Requirement	Regulator	Where addressed
An assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the local and State road and rail network.	Department of Planning & Environment	Section 5
During the preparation of the EIS, you must consult with relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners.		Section 1.8
Traffic Generation and Roads	Transport for NSW including Roads and Maritime Services and RailCorp	
▪ Hours of operation including days of construction and operation for each stage of the project and how the proposed operations will interact with other road users.		Section 3.2 and 3.3
▪ Accurate traffic forecasts (road and rail) generated by the project including; Road transport volumes and types broken down into origin and destination, travel routes and peak hours for the construction, operation and decommissioning of the project.		Section 4
▪ Any oversize and over-mass vehicles and loads expected for the construction, operation or decommissioning of the project should be identified, including the shortest and least trafficked route having been given priority for the movement of construction materials and machinery to minimise the risk and impact to other motorists.		Section 4.12
▪ Provide details of projected transport operations including volumes of traffic and tonnage to be transported. Volumes should also include mine input related traffic generation (e.g. fuel deliveries, potable water deliveries, maintenance, service; etc.) and impacts of mine related traffic generation on public roads.		Section 4
▪ The traffic study should address internal traffic movements and parking facilities and any mitigating measures required to address expected traffic generation.		Section 3.7 and 6

Requirement	Regulator	Where addressed
■ Indicate temporary and permanent staff numbers (including employees and contractors).		Section 4
■ Temporary and permanent staff numbers (including employees and contractors) and staff parking arrangements during construction, operation and decommissioning of the project. Mode, volumes, origin-destination of mining staff transportation to and from the site, details of measures proposed to minimise staff commuter traffic on the local and classified road network and measures to improve commuter safety should also be included.		Section 3.7, 4 and 6.1
■ The impact of generated traffic and measures employed to ensure efficiency and safety on the public road network during construction, operation and decommissioning of the project.		Section 5 and 6
■ The assessment of traffic impacts should include the contribution of mining inputs, having regard to the transportation of dangerous goods (explosives, fuel and chemicals) to be utilised during the construction and operational phases of the project. A risk assessment should be undertaken to identify management measures that will be implemented to ensure that dangerous goods are transported safely.		Section 4.13
■ Local climate conditions that may affect road safety for vehicles used during construction and operation of the project (e.g. dust, fog, wet weather, etc.).		Section 6.5
■ Proposed access treatments should be identified and be in accordance with Austroads *Guide to Road Design 2010* and Roads and Maritime Supplements including safe intersection sight distance.		Section 3.5 and 5.2
■ Details of required infrastructure works to support any increased demand on the road network as a result of this project.		Section 3.5 and 3.6
Regional Rail Network		
■ Detailed assessment of the proposed project on the capacity, efficiency and safety of the rail networks. The assessment should consider the cumulative impacts on the current network users and the strategic objectives of the rail networks.		Section 2.10 and 4.10
■ A description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of rail networks over the life of the project.		Section 3.6
■ Further details required in regard expected train frequency, including information on the number of coal trains per day that the proposal is likely to generate.		Section 4.10 and 4.11
■ Demonstrate the impact of these additional coal train operations on rail infrastructure capacity ensuring that the coal trains will not adversely impact on the regional passenger train operations in the Hunter Valley and to the New England Region of NSW.		Section 2.10 and 4.10
Consultation Transport for NSW, further recommends consultation with Roads and Maritime Services (Western Region) and the Australian Rail Track Corporation (ARTC), in preparation of documentation for the Environmental Impact Statement.		Section 1.8

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Requirement	Regulator	Where addressed
Transport Infrastructure Council requests that details are provided on the proposed road upgrades that the applicant intends on undertaking. This will include intersection treatments, railway crossing, lane widths and surfacing details in accordance with the relevant Austroads Guidelines. The applicant will need to address the impact on local roads during the construction phase as well as during full production and shall include a Road Dilapidation Report and a complete audit of the road formation and/or pavement condition. Roads that are anticipated to be affected by the proposal are: ■ Bylong Valley Way ■ Upper Bylong Road ■ Wollar Road ■ Lue Road. However, as the background documentation does not stipulate the likely domicile of the workforce (apart from the WAF) any analysis if road networks should have due regard to traffic generated by both the workforce and goods suppliers as determined by the Social Impact Assessment. Council request that a detailed analysis be undertaken of the potential short and long term impacts on Bylong Valley Way that will be caused by mine subsidence. In addition, the proponent should in conjunction with Council develop an appropriate method for long term management and maintenance of Bylong Valley Way to address both safety of users and the condition of the road.	Midwest Regional Council	Section 3.5, 3.6 and 5.2 Section 5 and 7 Section 4 Section 6.11 Section 6.4
Local Access It is understood that the project will require the closure or relocation of a number of local roads. The SEARs should undertake a detailed analysis on the impact of road closures on local road users including the assessment of the capacity of the new proposed road to ensure equal or improved levels of service to local residents. Of particular concern is the proposed use of Budden Gap Road which is an unmaintained Council Road and subject to flooding which would sever access. The SEARs should include a requirement that the assessment of alternate access involve community and Council consultation.		Section 3.5.1 and 6.12
Temporary Workers Accommodation(WAF) The proponent shall address Part 6.2 of Council's Development Control Plan 2013 – Amendment 1 (DCP 2013) in relation to the proposed WAF which includes the following issues: ■ Details of traffic and parking arrangements.		Section 3.7

1.5 Surrounding developments

A review of several developments surrounding the proposed Project were undertaken to determine any cumulative traffic impacts on Bylong Valley Way, Upper Bylong Road and Wollar Road. The findings from the several documents reviewed and planning websites are described below.

1.5.1 Bylong Quarry

The Bylong Quarry and Batching Plant expansion (approved in February 2014) will create an additional 94 heavy vehicles and 20 light vehicles on the adjacent road network on a daily basis. This additional volume of traffic generated has been included in the future year traffic assessments.

1.5.2 Wilpinjong Mine

The Wilpinjong Mine is located approximately 14 km north west of the Project. Wilpinjong will be at peak operation at present and therefore traffic generated by this mine is already accounted for in the existing background traffic counts undertaken.

Wilpinjong Coal is currently in the process of preparing an Application for the extension of mining operations, which was proposed in August 2013. Given the distance from the Project, the anticipated increases in staffing numbers and the already negligible traffic that travels to/from the Bylong area from the Wilpinjong mine, it is unlikely that cumulative impacts will exist.

1.5.3 Moolarben Mine

The Moolarben Mine is located approximately 24 km north west of the Project. The Moolarben Mine was constructed in 2009/2010 and is in operation at present and therefore traffic generated by this mine is already accounted for in the existing background traffic counts undertaken.

The Stage 2 future expansion of this mine has recently been approved in February 2015. On review of the *Moolarben Coal Project Stage 2 Traffic Impact Assessment* prepared by SKM in November 2008, three employee traffic distributions were analysed. All these scenarios had staff travelling from either Mudgee or Gulgong or a combination of both to the Moolarben Mine site. No staffing traffic or construction traffic was distributed to Wollar Road or Bylong Valley Way and therefore it is unlikely that any cumulative impacts will exist based on the Stage 2 expansion.

1.5.4 Ulan Mine

The Ulan Mine is located approximately 34 km to the north west of the Project. Ulan is at peak operation (2015) and traffic generation will start to decline in future years to the end of the project life. Traffic generated by this mine is already accounted for in the existing background traffic counts undertaken.

The proportion of traffic from the above three mines towards Bylong Valley Way (and Bylong town) is minimal as the majority of mine traffic head towards Ulan, Mudgee and Gulgong. The upgrade of Wollar Road to a sealed road may change the distribution of traffic to and from these sites; however it is not anticipated that there will be a large increase in traffic volumes to the Bylong Valley Way and Wollar Road intersection.

Based on this information, the traffic generated by these three mines is already accounted for in the recently undertaken traffic counts.

1.6 Traffic surveys

Intersection traffic surveys were undertaken by TTM Consulting on Wednesday 9 April 2014 between 5.00 am and 8.00 pm in fine and dry weather conditions at the following intersections:

- Bylong Valley Way and Upper Bylong Road, Bylong
- Bylong Valley Way and Wollar Road, Bylong.

Parsons Brinckerhoff has also referenced traffic surveys conducted for the Bylong Quarry project. Weekly traffic count data was collected over a 24 hour 7 day period in October 2011 on both Bylong Valley Way and Wollar Road.

1.7 Site inspection

A site inspection was undertaken by the Parsons Brinckerhoff staff on Thursday 10 April 2014 in fine and dry weather conditions. The purpose of the site inspection was to view the existing road network, intersection layouts, traffic conditions, access locations, road conditions, road restrictions, level railway crossings and general road safety. The inspection included travel on Bylong Valley Way, Upper Bylong Road, Lee Creek Road and Wollar Road.

1.8 Consultation

The following stakeholders were consulted by the Project team and Parsons Brinckerhoff in preparation of the Environmental Impact Assessment (EIS) and this Traffic and Transport Impact Assessment:

- Mid-Western Regional Council (MWRC)
- Roads and Maritime Services (RMS) including phone conversations with Andrew McIntyre from the Traffic and Road Safety section of RMS Western Region
- Australian Rail Track Corporation (ARTC).

1.9 Structure of the report

This report has the following structure:

- Section 2 describes the existing conditions of the road network in the assessment area
- Section 3 described the Project in detail
- Section 4 discusses the future conditions
- Section 5 details the traffic impacts on all road and rail users
- Section 6 discusses the mitigation measures recommended
- Section 7 provides discussion on road dilapidation
- Section 8 provides discussion on the subsidence impact assessment, particularly in relation to Bylong Valley Way
- Section 9 describes the measures to be considered during the construction traffic phase
- Section 10 provides a conclusion to the study
- Section 11 lists the study references.

2. Existing conditions

The existing road network, intersection layouts, pedestrians and cyclists, public transport services and crash history within the assessment area are discussed further below.

2.1 Road network

Key roads that have been identified as part of this study are described as follows:

Bylong Valley Way – is a two lane two-way sealed road with an approximate width of 7 m (refer to Figures 2.1 to 2.3). Bylong Valley Way links Bylong to the Golden Highway to the north and the Castlereagh Highway to the south. Bylong Valley Way is the main access into the Bylong Valley. Within the assessment area, it intersects with Wollar Road, Upper Bylong Road, Budden Gap Road and Lee Creek Road. The posted speed limit is generally 100 km/h, 80 km/h outside of villages/towns and 50 km/h within Bylong, Rylstone and Kandos. A level railway crossing is located on Bylong Valley Way just to the east of the Wollar Road intersection. At present this level crossing is passively controlled with signs and flashing lights similar to other level crossings within rural settings. The Annual Average Daily Traffic (AADT) on Bylong Valley Way based on October 2011 counts was 398 vehicles in Bylong, and 418 vehicles with 13% heavy vehicles between Bylong and Sandy Hollow.

Figure 2.1 Bylong Valley Way looking south towards Bylong Village

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Figure 2.2 Bylong Valley Way and Wollar Road intersection looking north-east

Figure 2.3 Bylong Valley Way Level Railway Crossing east of Wollar Road looking west

Wollar Road – is a two lane two-way road which is unsealed for approximately 17 km from the Bylong Valley Way intersection, where it becomes sealed towards Ulan and Wollar (refer to Figure 2.4). It is approximately 8 m wide and connects Bylong Valley Way north of Bylong to Wollar and other communities to the north and west of the assessment area where it intersects Ulan Road. There are two locations where Wollar Road is sealed for short sections. There is no posted speed limit on this road, so a general speed limit of 100 km/h will apply on both sealed and unsealed sections of this road. The Annual Average Daily Traffic (AADT) on Wollar Road based on 2011 counts was 161 vehicles with 20% heavy vehicles between Bylong and Wollar, and 455 vehicles with 7% heavy vehicles between Wollar and Mudgee.

Figure 2.4 Wollar Road looking north from the Bylong Valley Way intersection

Upper Bylong Road – is a local road which connects Bylong Valley Way to properties on the eastern side of the Growee Ranges which traverse through the middle of the Bylong Valley, and becomes Lee Creek Road to the south following the intersection with Budden Gap Road (refer to Figures 2.5 to 2.8). Upper Bylong Road is sealed for approximately 7.7 km from its intersection with Bylong Valley Way and has been built to around 5 m wide on both the sealed and unsealed sections. The unsealed road is used primarily for property access, passing through private property paddocks. The posted speed limit is generally 100 km/h, 40 km/h at Bylong Upper Public School and 10 km/h through cattle grazing area. Upper Bylong Road provides connection between private properties and the Bylong Valley Way with other access roads such as Lee Creek Road available.

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Figure 2.5 Upper Bylong Road looking east from the Bylong Valley Way intersection

Figure 2.6 Upper Bylong Road looking east adjacent to the railway line (train in background left)

Figure 2.7 Upper Bylong Road and Bylong Valley Way intersection looking north

Figure 2.8 Upper Bylong Road and Woolleys Road intersection looking south

Woolleys Road – is a local road which connects Upper Bylong Road to some remaining private properties to the east of Project. Woolleys Road is an unsealed road around 4 to 5 m wide.

Wallys Road – is a local road which connects Woolleys Road to some remaining private properties to the east of Project. Wallys Road is an unsealed road around 4 m wide.

Lee Creek Road – is an unsealed road connecting Upper Bylong Road to the north with Bylong Valley Way to the south (refer to Figure 2.9). The width of the road varies; however is around 4 m wide. This is a Council road with a posted speed limit of 100 km/h however there are several locations where this speed limit is not appropriate, with several crossings through privately owned paddocks and cattle grazing areas.

Figure 2.9 Lee Creek Road looking south

Budden Gap Road – is an unsealed and generally unused local road, approximately 4 m in width and aligned in a general east-west direction. It is currently gated through private properties and it is used intermittently however provides a connection between Upper Bylong Road and the Bylong Valley Way.

Lue Road – is a two lane two-way sealed road with an approximate width of 7 m. Lue Road links Mudgee with the Bylong Valley Way. Travel between Bylong and Mudgee via this route is in excess of 90 km and over one hour in travel time.

Ulan Road – is a two lane two-way sealed road with an approximate width of 8 m. Ulan Road connects Mudgee with Ulan and Ulan with the Golden Highway.

2.2 Intersections

The following key intersections in the study area include:

- Bylong Valley Way and Upper Bylong Road – this is a priority controlled T junction (rural Type Basic BA intersection) located in a 50 km/h speed zone. The width of Bylong Valley Way at this intersection is 6.5 m and Upper Bylong Road 7 m with no shoulders provided. The required Safe Intersection Sight Distance (SISD) of 97 m is achieved for the intersection with approximately 150 m sight distance achieved in both directions on the Bylong Valley Way when viewing from Upper Bylong Road.
- Bylong Valley Way and Wollar Road – this is a priority controlled T junction (rural Type BA Basic intersection) located in a 100 km/h speed zone with a level railway crossing approximately 15 m to the east of the intersection. The minimum required SISD of 248 m for this intersection is currently achieved with approximately 240 m of sight distance on the western approach and 360 m on the eastern approach of Bylong Valley Way. Although this is a 100 km/h speed zone, the majority of vehicles will be travelling at a lower speed limit on Bylong Valley Way through the intersection due to the horizontal curve on the western approach and the level railway crossing facility, and therefore a reduced sight distance could also be applied. This is an existing intersection and on review of the latest crash data provided by RMS, no crashes have been recorded at this intersection.
- Wollar Road and Ulan-Wollar Road – this is a rural Type Basic BA intersection located in a 50 km/h speed zone in the Wollar township.
- Wollar Road and Ulan Road – this is a rural Type Basic BA intersection located approximately 10 km north of Mudgee.

2.3 Intersection traffic counts

Intersection traffic counts undertaken in April 2014 show the following:

- The intersection of Bylong Valley Way and Upper Bylong Road has a weekday AM peak between 10.45 am and 11.45 am and a weekday PM peak between 2.30 pm and 3.30 pm.
- The intersection of Bylong Valley Way and Wollar Road has a weekday AM peak between 10.45 am and 11.45 am and a weekday midday/PM peak between 12.15 pm and 1.15 pm.

For the purposes of this assessment, the AM (10:45 am to 11:45 am) and PM (2:30 pm to 3:30 pm) peak hours have been used to assess peak hour traffic impacts.

Figure 2.10 and 2.11 show the 2014 morning, midday/afternoon peak hour traffic volumes at the two intersections. The traffic volumes in the figure are in vehicles per hour (vph) and include a breakdown of light vehicles (LV), heavy vehicles (HV) and buses.

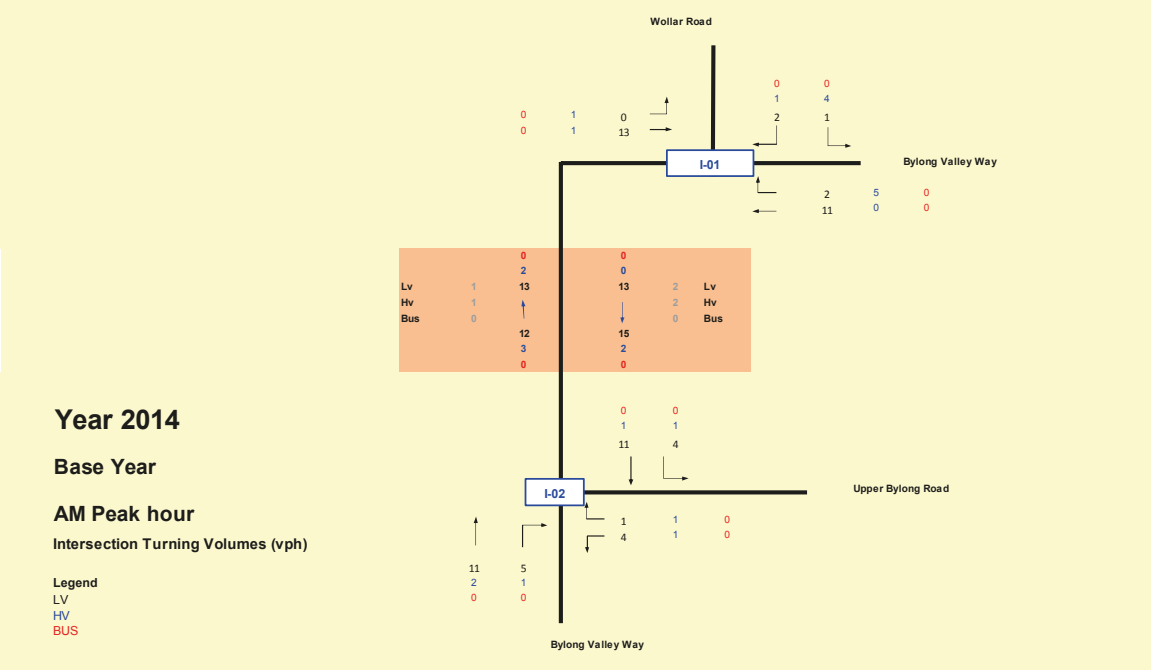


Figure 2.10 **2014 weekday AM peak hour traffic volumes at the two intersections (vph)**

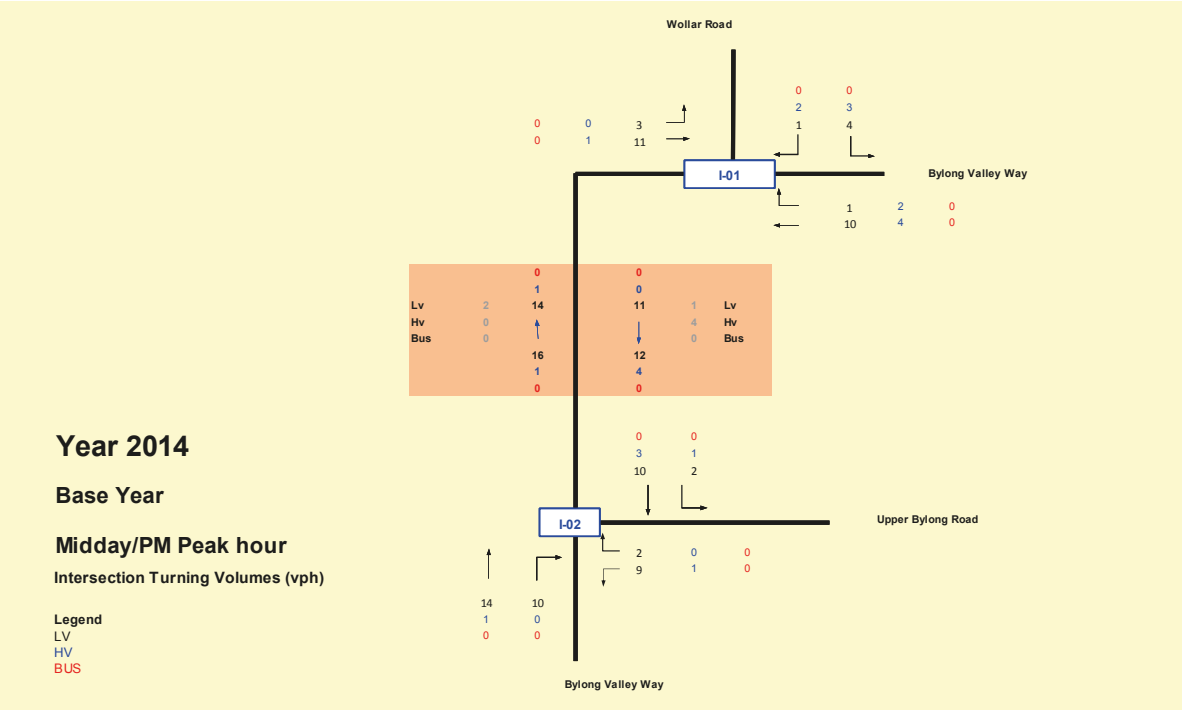


Figure 2.11 **2014 weekday Midday/PM peak hour traffic volumes at the two intersections (vph)**

2.4 Intersection performance parameters

The ability of each of the assessed intersections to cater for existing and future traffic forecasts were investigated using the SIDRA intersection modelling software package. This package provides several useful parameters to determine the level of intersection performance.

2.4.1 Level of service (LoS)

Level of Service (Los) is a basic performance parameter used to describe the operation of an intersection. Levels of service range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues). At signalised intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement (refer to Table 2.1).

Table 2.1 Level of service criteria for intersections

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Give Way and stop signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode	At capacity; requires other control mode
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: RMS Guide to Traffic Generating Developments, 2002

2.4.2 Degree of saturation (DoS)

The Degree of Saturation (DoS) is the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extensive queues and delays could be expected. For a satisfactory situation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest value.

2.4.3 Average vehicle delay

This is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. At signalised intersections, the average intersection delay is usually reported. At roundabouts and priority controlled intersections, the average delay for the most delayed movement is usually reported.

2.4.4 Queue length

Queue length is measured in metres reflecting the number of vehicles waiting at the stop line and is usually quoted as the 95th percentile back of queue, which is the value below which 95% of all observed queue lengths fall. It reflects the number of vehicles per traffic lane at the start of the green period, when traffic starts moving again after a red signal. The intersection queue length is usually taken from the movement with the longest queue length.

Typically acceptable intersection performance is defined as follows:

- LoS D or better (the worst case scenario of vehicle delay was less than or equal to 56 seconds)
- Degree of saturation (DoS) less than or equal to 0.8 at priority controlled intersection, and 0.90 at a signalised controlled intersection
- 95th percentile worst back of queue length not interfering with adjacent intersections.

2.5 Intersection performance

SIDRA Intersection 6 software was used to model and analyse the performance of the two intersections on Bylong Valley Way. The results of this analysis are shown in Table 2.2.

Table 2.2 Existing Weekday 2014 Peak Intersection Performance

Intersection	Peak hour	Degree of Saturation	Average Delay (sec)	Level of Service	95th percentile queue (m)
Bylong Valley Way and Upper Bylong Road	AM	0.013	3.7	A	0.1
	Midday	0.012	3.4	A	0.1
	PM	0.012	2.7	A	0.0
Bylong Valley Way and Wollar Road	AM	0.012	2.1	A	0.1
	Midday	0.014	2.2	A	0.1
	PM	0.015	2.4	A	0.1

The results shown in Table 2.2, show that all of intersections currently operate at good levels of service (LoS A) during all peak hours. The intersection analysis confirmed that due to the small volume of traffic currently using the Bylong Valley Way; queues will reach a maximum of two vehicles in general, where delay is typically very minor.

2.6 Crash data review

A review of crash data for the latest five year period (2008–2013) as provided by the RMS was undertaken. Full crash data reporting is provided in Appendix A.

In general, the majority of crashes were non-intersection (13/15 accidents), only 1 involved a fatality (5 km south of Bylong Town on Bylong Valley Way), and the majority involved curved roads and/or occurred during normal (fine) conditions. Nine crashes involved speed and/or fatigue which mostly led to drivers losing control and running off the roadway.

Bylong Valley Way

There were a total of 13 reported incidents along Bylong Valley Way from Lee Creek Road to the intersection of Bylong Valley Way and Wollar Road.

Analysis of the accident data:

- Of the 13 accidents, 1 (8%) involved a fatality, and 6 (46%) involved 8 people who were injured, with 9 total casualties.
- The most common type of accident with five (39%) within this category were those due to hitting an object, off road on a curve. Two (16%) accidents occurred when the driver was out of control on a curve.
- Ten (77%) accidents occurred during the day and 3 (23%) at night. Of the daytime incidents, nine will have been in suitable day light with one in the early hours of the morning.
- Eight (61%) accidents occurred in fine weather conditions, three (24%) in rainy conditions and one (8%) in overcast conditions.
- 69% of accidents took place on weekdays.

Upper Bylong Road

There were a total of two reported incidents along Upper Bylong Road from Budden Gap Road to the intersection of Upper Bylong Road and Bylong Valley Way.

Analysis of the accident data:

- There were no fatalities resulting from the two crashes. Both crashes involved injuries resulting in four casualties.
- One crash occurred due to hitting an object off road on a curve and the other (1) occurred whilst performing a U-turn.
- One crash was a multivehicle accident involving a car and lorry (heavy vehicle crash).
- One accident occurred in close proximity to the intersection of Bylong Valley Way and Upper Bylong Road whilst undertaking a U-turn manoeuvre.
- Of the two crashes, one of each occurred during the day and night.
- Both accidents took place on weekdays in fine weather conditions.

2.7 Buses

Existing bus services to the Bylong area are school bus services only. There are no regional or local bus services currently in operation in the area.

2.7.1 School bus services

School buses were operating to Bylong Upper Public School. Bylong Upper Public School has been placed in recess in 2015 due to the decreasing number of enrolments over a number of years.

2.8 Pedestrian and cyclist activity

There is limited or negligible pedestrian and cycle activity or facility along roads within the assessment area.

2.9 Restricted access vehicles

The following roads are restricted to 19 m B-double vehicles (50 tonne limit):

- Bylong Valley Way between Castlereagh Highway and the Muswellbrook Shire LGA boundary – Approved under escort only. Travel outside of school bus operation times.
- Upper Bylong Road between Bylong Valley Way and the Unsealed Section – 80 km/h B-double speed limit on sealed section. Travel outside of school bus operation times.
- Wollar Road between Bylong Valley Way and Ulan Road – 80 km/h B-double speed limit. Travel outside of school bus operation times.

A bridge load limit of 39 tonnes gross exists on timber bridges in the area.

2.10 Rail network

The Australian Rail Track Corporation's (ARTC) *2014 – 2023 Hunter Valley Corridor Capacity Strategy* has been has been referenced to describe the existing rail network, rail operation, mine operations and rail capacity.

The existing rail line in the Bylong area which will be utilised by the Project is the Sandy Hollow to Gulgong Railway Line. This rail line runs between Ulan and Muswellbrook, is a single track and has several passing loops along its 170 km length.

The Sandy Hollow to Gulgong Railway line is part of the ARTC's Hunter Valley Coal transport network and rail is therefore the logical choice for transport of all coal from the mine to market. The mine is located approximately 230 km from Port Waratah Coal Service (PWCS) Kooragang Coal Terminal, the main coal export facility in the Port of Newcastle.

This line is mainly utilised by coal trains, one or two country ore and grain trains per day and occasionally by interstate freight trains that are bypassing Sydney during possessions.

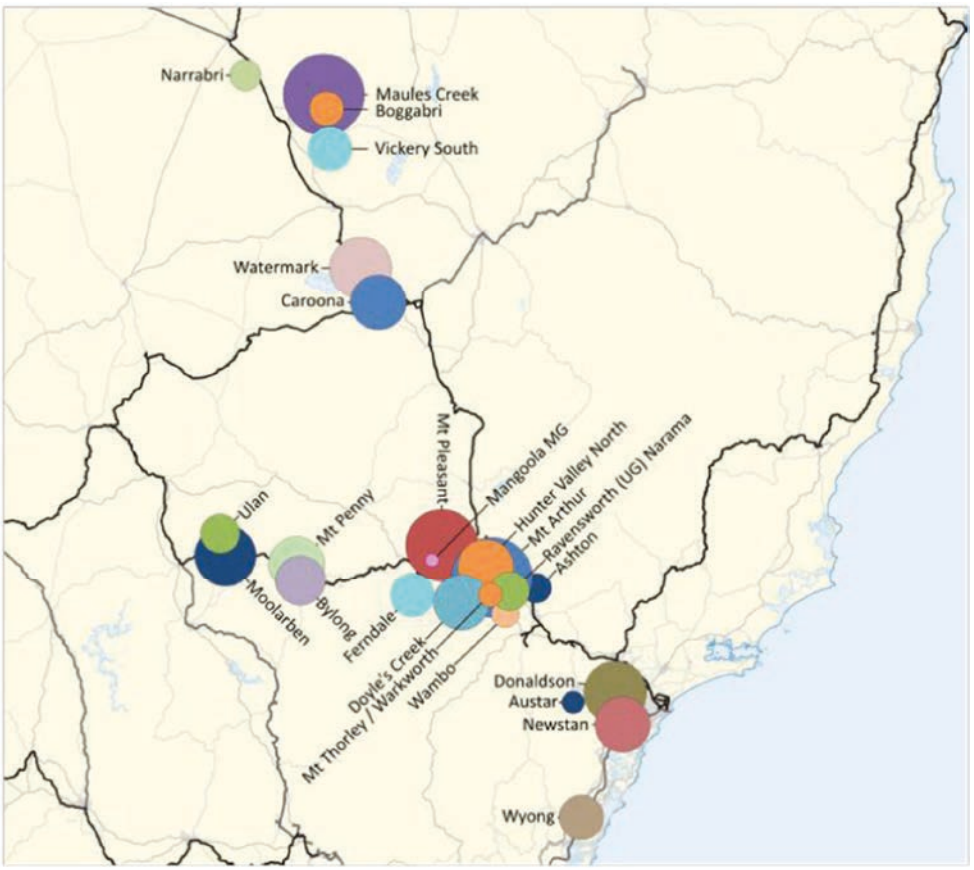
2.10.1 Capacity and volume forecasts by mine

Capacity constraints currently exist due to ventilation in the Bylong tunnel, with train spacing and track maintenance limited by the 'purge times' for air in the tunnel. Minimum operating frequency of 20 minutes between trains is required to address this ventilation issue.

At this time there is adequate capacity for all contracted volume.

The following Figure 2.12 shows the volume forecasts by mine in the Sydney – Gunnedah Basin, with growth in volumes indicated by circle width. The Mount Penny Mine which is shown to the west of the Bylong Mine in the figure below has now been cancelled. The Wilpinjong Mine appears to be excluded from Figure 2.12.

Hansen Bailey Bylong Coal Project Traffic and Transport Impact Assessment

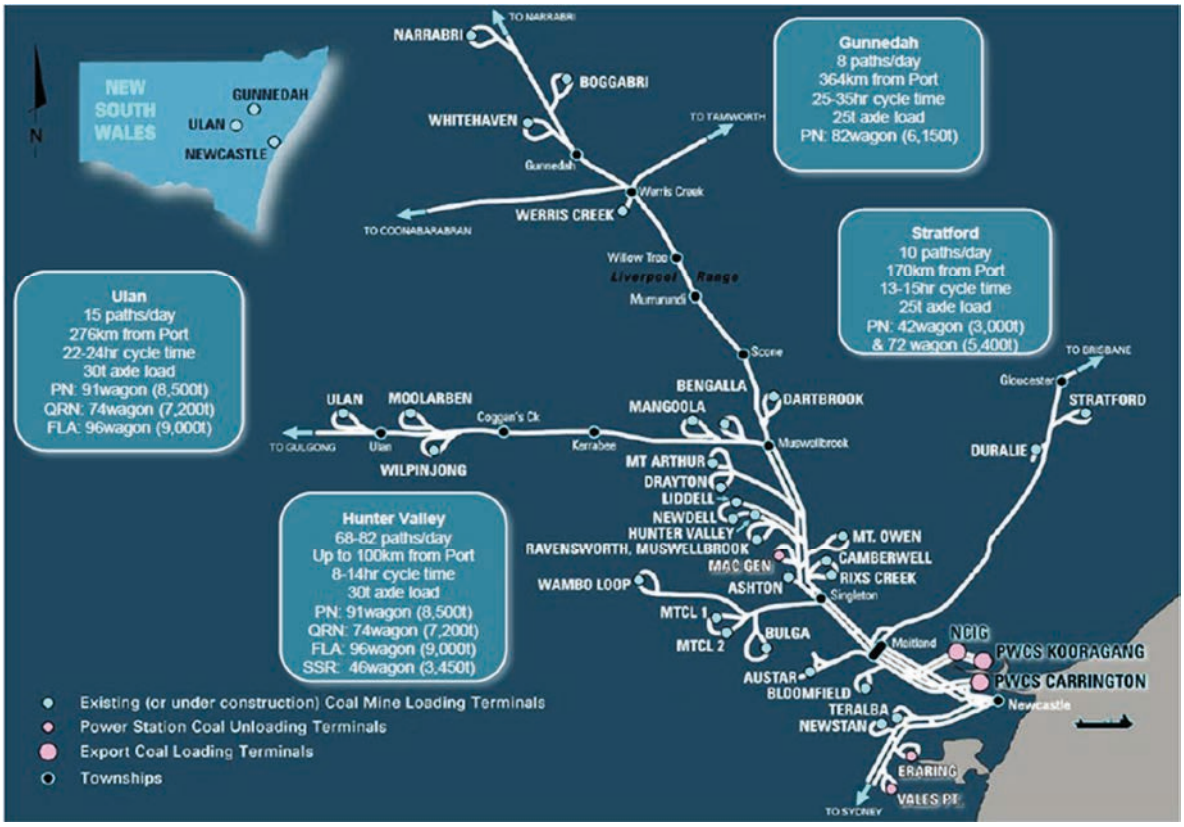


Source: ARTC 2014-2023 HV Corridor capacity strategy. Note the Mount Penny mine has now been cancelled.

Note: Growth in mine volumes is indicated by circle width between 2014 and 2024

Figure 2.12 Existing and prospective coal mines

Figure 2.13 indicates the existing coal chain network, mines and port locations. It also provides a basic overview of the capacity that is flowing from the Gunnedah, Western and Hunter Valley coal fields.



Source: HVCCC 2012 overview presentation

Figure 2.13 Existing coal chain network and infrastructure

In order to keep capacity ahead of demand specifically for the Hunter region, a number of projects have directly improved capacity between Ulan and Muswellbrook and to the Port of Newcastle. To date, ARTC has generally met the coal industries' expectation for delivering its investment program in line with producer's forecasts.

Upon review of the current contracted tonnages from the *2014–2023 Hunter Valley Corridor Capacity Strategy* (ARTC 2014), taking into account works currently completed, there still appears to be ample rail capacity on the Ulan section based on the project production rates provided. When comparing saleable rail capacity for prospective volumes and works to be undertaken as part of the ARTC strategy, it is demonstrating that prospective volumes are in line with recommended projects for keeping rail capacity ahead of demand.

2.10.2 Train size

The ARTC's aspirational train consist of 96 x 120 t (gross) wagons and three locomotives with a total net payload of 9,200 t of coal and overall length of 1,610 m. It should be noted that the current maximum train used on the Ulan line is 91 x 120 t (gross) wagons with a total net payload of around 8,800 t and maximum overall length of 1,543 m. ARTC's 2014–2023 Hunter Valley Corridor Capacity Strategy acknowledges that the aspirational 1,610 m train length is not required for current contracted volumes and will require extension of two existing passing loops on the Sandy Hollow to Gulgong Railway line. It is unlikely that this train length will be instituted within the Project development period, and accordingly the design of the Bylong coal project balloon loop is based on ARTC's published guideline length of 1,543 m, with sufficient room to hold an empty train prior to the loader, and a full train after the loader, off the main line.

In addition, it is noted that KEPCO was in discussions with ARTC in December 2014 regarding a possible increase in train vehicle length to 100 cars and a gross payload of 9750t for the operation of the mine site.

2.11 Schools

Bylong Upper Public School is currently located on Upper Bylong Road approximately 5.4 km from the intersection of Bylong Valley Way (to the north). A 40 km/h school zone currently operates at this location. The NSW Department of Education and Communities has placed the school in 'recess' for the 2015 school year as a result of decreasing enrolments over a number of years. KEPCO is awaiting a decision from NSW Department of Education and Communities in relation to the longer term viability of the school and whether the school will be closed or require relocation.

2.12 Existing road safety deficiencies

The following road safety deficiencies were identified during the site inspection:

- Narrow road width on Upper Bylong Road adjacent to the rail line (retainment wall) and the Bylong River on the opposite side.
- Narrow and load restricted bridges on Wollar Road.
- Several unsealed sections of road on Upper Bylong Road, Wollar Road and Lee Creek Road.
- Lack of signage and line marking at the intersection of Bylong Valley Way with Wollar Road and Upper Bylong Road.
- Low level concrete bridge crossing of Bylong River on Upper Bylong Road.
- General narrow road widths with no shoulder provision.
- Insufficient delineation due to the deficiencies in signage, line markings, edge lines and guideposts and reflectors.
- Road edge drop offs and damaged edge of pavement.
- Poor quality of road pavement including several patched sections on Bylong Valley Way and Upper Bylong Road.
- Poor quality of pavement adjacent to the level railway crossing on Bylong Valley Way including pot holes and gravel tracking.
- Roadside hazards including large trees and culverts within the clear zone.
- Narrow road width under the rail bridge on Bylong Valley Way approximately 16 km east of the Wollar Road intersection.
- Steep sections of road on Bylong Valley Way between Bylong and Sandy Hollow.
- Minimal queue storage area for vehicles on roadway between the rail line and Upper Bylong Road (where the proposed underground mine access is to be located).
- Unfenced livestock on Lee Creek Road, Woolleys Road, Wallys Road and Budden Gap Road.

The key existing road safety deficiencies from the above list are shown in Figure 2.14 on the following page. It is suggested that a formal road safety audit on the existing road conditions be undertaken to identify the existing road deficiencies in greater detail to enable prioritisation of safety deficiencies and the potential measures or treatments to remove or ameliorate these deficiencies.

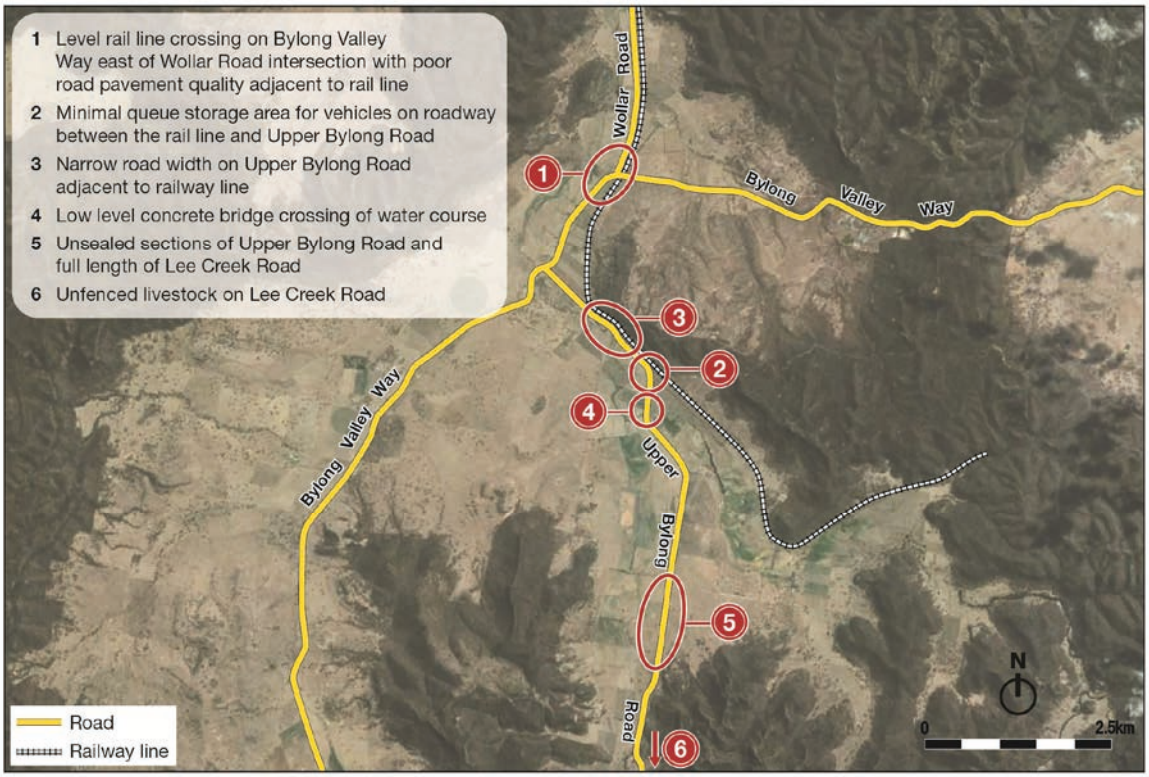


Figure 2.14 Existing road safety deficiencies

2.13 Local weather conditions

Bylong Valley Way is steep and mountainous in several locations and given its high elevation may be more susceptible to fog, heavy rain and icy conditions than lower lying roads.

Lower lying roads within in the assessment area will be prone to localised flooding especially at low lying bridges or causeways.

Sun glare is also experienced during sun rise and sun set. Travelling from Mudgee to Bylong in the morning you have sun in your eyes and vice versa in the afternoon.

3. Project description

This section describes the Project including its facilities, years of construction and operation, on-site parking provision and proposed access and internal roads. The conceptual Project layout is shown in Figure 3.1.

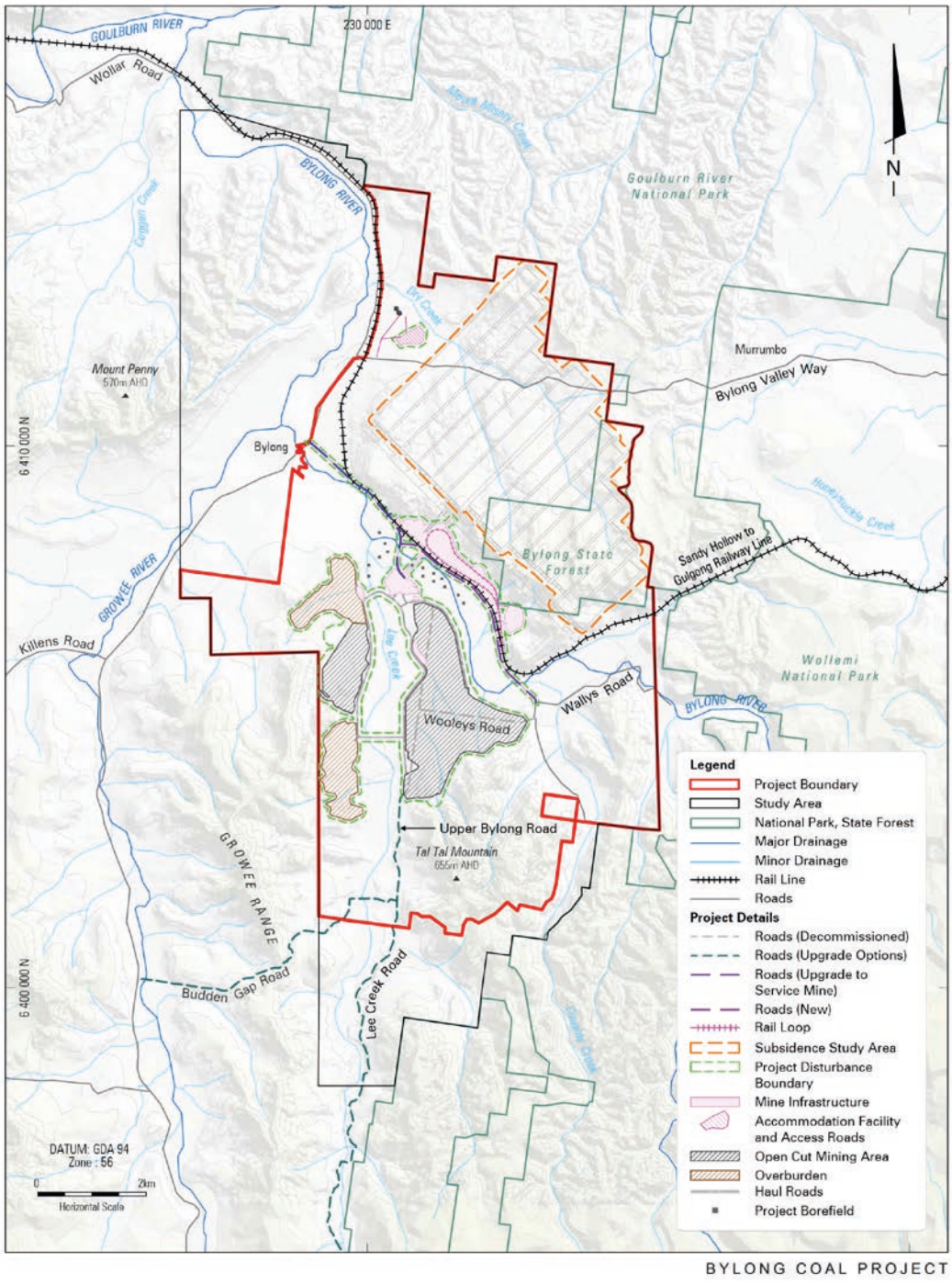


Figure 3.1 Conceptual project layout

3.1 Project facilities

The Project will require the construction of various items of surface infrastructure to enable the operation of the mine. The main facilities generally include two mine infrastructure areas (MIA's) (utilising existing and new infrastructure), a rail loop, CHPP and other associated facilities along with a WAF.

Mine sites

There will be two MIAs constructed for the Project including an Open Cut MIA and the Underground MIA.

The Open Cut MIA is proposed to contain internal mine access roads, light vehicle parking, associated power reticulation and communication infrastructure, administration and bathhouse facilities; fuel and lubrication station and refuel facility, water management infrastructure and other ancillary equipment and plant. The Open Cut MIA and associated infrastructure will be decommissioned and removed on a progressive basis following the completion of open cut mining operations. A portion of the hard stand area for the Open Cut MIA will be retained for use as a laydown area.

The Underground MIA will contain (at least) internal mine access road, light vehicle parking, power reticulation infrastructure, mine office, administration and bathhouse facilities, sewerage treatment systems; communication facilities, mine workshop, store and laydown facilities, water management infrastructure, mining area and portals, a ventilation plant and other ancillary equipment and plant.

The CHPP will be constructed with a throughput of approximately 6 Mtpa of ROM coal. The CHPP and associated facilities are proposed to be centrally located. ROM coal from the underground mine will be delivered by way of conveyor drift to a ROM coal stockpile at the CHPP. The open cut mine will deliver ROM coal by haul trucks to a ROM pad located approximately 1 km south-west of the CHPP. Open cut coal will be primarily crushed and conveyed directly to the CHPP.

Accommodation facility

A Workers Accommodation Facility (WAF) facility is proposed to minimise impacts of accommodation demands as a result of the short-term peak in employees required during the construction activities of both the open cut and underground mine facilities. The WAF will accommodate construction workers and a small proportion of operations staff for approximately 6 years until the end of construction associated with the underground mine in order to prevent an oversupply/undersupply effect on local accommodation industries in Mudgee and other surrounding towns. Mudgee has accommodation provisions to accommodate the workforce post WAF based on plans for the potential upgrade and sealing of Wollar Road.

This facility will accommodate up to 585 construction workers in the first year and 650 construction workers in the second year of construction, and between 15 and 100 workers between year 3 and year 6 (end of underground construction).

It is also anticipated that a small proportion of the open-cut workforce may use the WAF for transitional accommodation purposes.

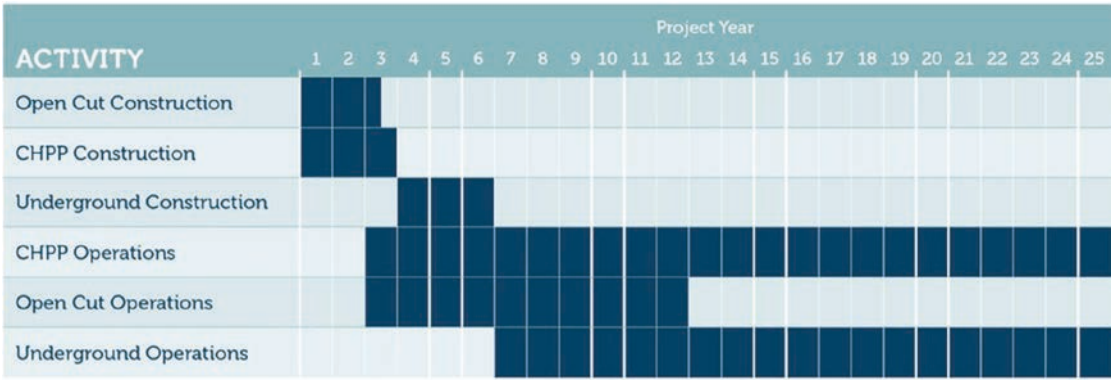
Rail loop

The Project will require the construction of a rail loop that connects to the Sandy Hollow – Gulgong Railway Line. The Sandy Hollow to Gulgong Railway Line connects with the Main Northern Railway Line at Muswellbrook, where it continues to the Port of Newcastle.

3.2 Project staging

The Project is anticipated for a period of 25 years, including the construction and operational activities. The Project involves initial construction followed by the operation of an open cut mine, with construction followed by the operation of an underground mine, and site decommissioning at the end of the 25 years.

The staging of the construction and operation of the mines is shown in Figure 3.2.



Source: Hansen Bailey (2015) Bylong Coal Project – Social Impact Assessment

Figure 3.2 Project staging

The traffic-related details of each stage of the Project are discussed in sections 3.2.1 to 3.2.5.

3.2.1 Stage 1: Construction Years 1–2

Construction of the open cut mine will begin in year 1 of the Project, and be completed within two years, which will allow the open cut mine to commence. This phase of construction will consist of traffic-related activities including:

- Construction and upgrades of relevant roads and intersections;
- Closure of roads including sections of Upper Bylong Road and Woolleys Road;
- Construction of associated haul roads;
- Construction of the essential site structures, i.e. the WAF, a temporary MIA, Open Cut MIA and the CHPP;
- Use of hydraulic excavators, haul trucks, other heavy construction vehicles (e.g. flatbed articulated trucks), pile drivers and supporting equipment, and
- A peak workforce of approximately 800 associated with site activity.

3.2.2 Stage 2: Construction Years 3–6

Operation of the open cut mine will begin at the completion of construction activities at the end of Year 2 of the Project. The open cut mining activities are anticipated to be completed by around the end of year 10. Traffic-related operation of the open cut mine will include:

- Internal haulage of materials using haul trucks;
- Utilisation of a fleet of excavators, dozers and/or graders and other supporting equipment;
- Maintenance of haul roads;

- Rail operations to transport product coal from site;
- Heavy truck movements associated with the operation of the CHPP;
- Open cut mine workforce varying between approximately 160 in year 3 of the Project and 280 in year 6 of the Project. and
- CHPP workforce of approximately 30 staff.

Construction of the underground mine will begin in year 4 of the Project, and is estimated to be completed by the end of year 6, after which the underground mining operations will commence. This phase of construction will consist of traffic-related activities, including:

- Excavation and construction associated with the underground mine;
- Construction of mine access roadways;
- Construction vehicles including excavators, haul trucks and a continuous miner, and
- A highly specialised and short term construction workforce of approximately 15 in year 4, 210 in year 5 and 175 in year 6 of the Project.

3.2.3 Stage 3: Dual operations

An open cut mine workforce of approximately 320 in years 7 to 9 of the Project and 120 in year 10 of the Project (final year of operation) is anticipated.

There will be an underground mine workforce of approximately 50 in year 7 and 130 in years 8 to 9 prior to peak of operations during stage 4.

There will be regular traffic activity association with the operation of both mine sites, including:

- Onsite haulage of materials and use of specialised vehicle fleet as mentioned in section 3.2.2 associated with both mine sites.
- Regular heavy vehicle access to the site
- Other commercial deliveries and visitors

3.2.4 Stage 4: Underground mine operation

The underground mine will have a workforce of approximately 270 in years 17 to 25 of the Project.

There will be regular traffic activity association with the operation of the underground mine, including:

- Regular heavy vehicle access to the site.
- Other commercial deliveries and visitors.

3.2.5 Stage 5: Decommissioning

It is expected that the site will be decommissioned following the completion of all mining operations at the end of the Project life. This will involve the capping of mining voids, rehabilitation of disturbed areas, and decommissioning of Project infrastructure.

3.3 Project operation

The mine will be in operational for a period of 23 years including a:

- 10 year period of operation for the open cut mine (commencement following construction year 2 and continuing to around year 10). The open cut mine will operate 24 hours a day, 7 days a week.
- 19 year period operation for underground mine (underground mining commencing in year 7 and continue to for the remainder of the Project mine life). The underground mine will operate 24 hours a day, 7 days a week.

3.4 Project site access

3.4.1 Mine site

Access to the Project will generally be via the existing Upper Bylong Road from Bylong Valley Way. Access to the Open Cut MIA will be via Upper Bylong Road. The Underground MIA will be accessed via an access road (private road) to be constructed over the Sandy Hollow – Gulgong Railway Line from the Upper Bylong Road. The existing level railway crossing infrastructure will be incorporated into the new Underground MIA access road with only one level railway crossing point at this location.

3.4.2 Accommodation facility

Access to the WAF will be via an upgraded T junction (rural Type Basic BA intersection) off Bylong Valley Way into an existing access to a residence located on the Bylong Station property. Two access tracks will be constructed from the current access along existing fence lines to the WAF with the throat of the intersection widened to accommodate turning vehicle movements. The minimum required SISD of 248 m for this driveway intersection (T junction) is currently provided in both directions to and from Bylong Valley Way.

3.5 Proposed road and intersection upgrades

Road and intersection upgrades are envisaged to occur during the initial construction of the Project, potentially prior to construction activities in consultation and to the approval of MWRC as the roads authority.

3.5.1 Upper Bylong Road and adjoining roads

Upper Bylong Road will be widened from Bylong Valley Way to the mine sites to accommodate a two lane two-way road with 3.5 m wide travel lanes and 1.5 shoulders with a total road formation of 10 m.

The open cut MIA will be accessed directly from Upper Bylong Road. Refer to Figure 3.1.

The southern reaches of Upper Bylong Road after the Open Cut MIA will be formerly closed and decommissioned to facilitate mining operations with the Eastern Open Cut. It is proposed that a realignment of the Upper Bylong Road will occur along the southern side of the Sandy Hollow – Gulgong Railway Line to connect with an existing public road to the east, providing continued access for private landholders to the east of the Project via Wallys Road.

Woolleys Road will be closed by the Project. Access to the realigned Upper Bylong Road to those properties in the east will be via Wallys Road.

Wallys Road will be linked up to the realigned Upper Bylong Road providing access to properties to the east of the Project.

For the southern portion of Upper Bylong Road, two options are being considered in relation to providing access for neighbouring landholders. Upper Bylong Road continues to the south as Lee Creek Road, which connects with Bylong Valley Way further to the south of the Project. Budden Gap Road intersects Lee Creek Road in the southern part of the Project Boundary and is more direct but elevated access track to Bylong Valley Way. The decision on the option to proceed with has not been determined, however will be determined in consultation with the MWRC and the community. The required road upgrades will be undertaken following the approval of the MWRC as the relevant roads authority for these roads.

3.5.2 New access road (private road) to the underground mine

A newly built access road (private road) is to be constructed over the Sandy Hollow – Gulgong Railway Line to access the underground mine site incorporating the existing level railway crossing facility. This newly built access road will form a priority controlled T junction (rural Type Channelised CH intersection) with Upper Bylong Road with dedicated left and right turn lanes on Upper Bylong Road and will allow a 300 m length on the southern side between the level railway crossing and Upper Bylong Road. A T junction will be formed with this new access road for entry to the underground mine. Once built the road access to the existing level railway crossing will be closed.

3.5.3 Internal roads

Various other internal access roads will be constructed to provide routes to access various mining infrastructure, including CHPP, underground mine drifts, ventilation facilities and mine water management system.

3.5.4 Wollar Road

Discussions with the MWRC have confirmed that the 17 km section of Wollar Road between Bylong Valley Way and the Wollar village that is currently unsealed will be upgraded and sealed to enable the Project employees to travel to Mudgee as a suitable place of residence. The upgrade of Wollar Road will be supported by $14 million which has been allocated to the upgrade under the Resources for Region Grant, as of 2 March 2015. Mudgee also has the infrastructure to support the workforce post Year 6 and to the completion of the Project. This assessment has assumed that this road will be sealed by the end of Year 1 of the Project. The upgrade of Wollar Road is integrally linked to the requirement for the WAF for the various stages of the Project.

The upgrade will include upgrade of the road to include two 3.25 m travel lanes, 1 m sealed shoulders and 0.5 m unsealed shoulders, road sealing, bridge widening and cutting re-alignment, a new culvert, guard rails, as well as the upgrade of the level railway crossing and intersection of Wollar Road at Bylong Valley Way. This intersection is proposed to be channelised to safely meet the requirements for the estimated future daily traffic.

The upgrade of Wollar Road will also induce both Project related traffic and other traffic towards Bylong. Whether this be passing traffic (those heading towards either Ulan, Sandy Hollow or Rylstone and onwards to Hunter Valley destinations) or Project traffic. MWRC has forecast that once Wollar Road is sealed and the Project in operation, it will attract 500–1,000 vehicles per day. This is a 250% to 600% increase on existing daily traffic volumes on Wollar Road. This is a large increase percentage wise given the existing low daily traffic volumes on Wollar Road.

3.5.5 Workers accommodation facility

The existing driveway access to the proposed WAF facility will be upgraded to accommodate increased vehicle volumes and turning movements by being widened at the throat of the intersection with Bylong Valley Way.

3.6 Proposed rail related upgrades

The following rail related upgrades are proposed as part of the Project.

3.6.1 Bylong Valley Way Level Railway Crossing

The existing level railway crossing on Bylong Valley Way will be upgraded as part of the Bylong Valley Way and Wollar Road intersection works proposed by MWRC. As the landholder in the vicinity of the intersection, KEPCO is supportive of MWRC realigning the Wollar Road and Bylong Valley Way intersection further west of the existing level railway crossing location.

3.6.2 Bylong Mine Access Level Railway Crossing

A new access road will be built connecting the underground mine with Upper Bylong Road incorporating the existing level railway crossing facility.

3.6.3 Bylong Rail Loop

The Bylong tunnel is currently a constraint on mainline operation near to the proposed Bylong mine, as it is located on a steep grade which causes loaded trains heading east to lose speed. From the proposed bifurcation to the Bylong mine loop, the mainline is in a single bi-directional configuration; therefore slow trains heading east cause delays in both directions.

The proposed Bylong Rail Loop will be constructed into the topography, generally at a higher elevation than the main line. This enables stationary trains on the rail loop to the use the potential energy available to commence towards the mainline and reach speeds similar to other trains utilising this section of the Sandy Hollow-Gulgong Railway Line.

In the empty direction, a train arriving at Bylong mine loop will occupy the section for about 40 seconds longer than a train running from Murrumbo to Bylong. This is due to the low speed limit of 25 km/h within the mine loop. The difference in occupation time is considered negligible.

The proposed bifurcation location of the Bylong mine loop spur on the mainline was carefully chosen. The recent Bylong passing loop, and western extension, was avoided to eliminate impacts on the operational efficiency of the passing loop. The bifurcation was located just east of the passing loop; however this location was within the length proposed by ARTC for the Bylong East passing loop upgrade.

The concept design for the Bylong East passing loop upgrade effectively extended the existing Bylong passing loop up to the Bylong tunnel with a flatter grade. This upgrade will therefore increase the efficiency by increasing train approach speeds toward the tunnel, reducing the occupation times on the section, particularly within the single track tunnel itself.

The Bylong mine loop spur (single track section, before bifurcation to the mine loading loop) was designed in vertical and horizontal alignment to intersect with the concept design of the Bylong East passing loop. Provided the concept design for the passing loop is carried forward in similar arrangement, this will enable future connection of the Bylong mine spur directly into the Bylong East passing loop, thereby gaining the efficiencies for trains departing from the Bylong mine loop.

3.7 Internal road layout and parking provision

The open cut MIA will provide the following:

- a two lane two-way internal road network
- an external clean car park containing approximately 50 car spaces plus two disabled spaces
- an external bus set down area
- an internal dirty car park containing approximately 20 car spaces and light vehicle wash area
- additional five car parking spaces adjacent to the workshop area
- a vehicle laybys on both sides of the road on approach to the boom gate entry.

The underground MIA will provide the following:

- a two lane two-way internal road network
- an external staff and visitor car park containing approximately 61 car spaces plus two disable spaces
- an external bus set down area
- additional five car parking spaces for CHPP light vehicle parking adjacent to the administration building
- two spaces for ambulance parking adjacent to the administration building
- three spaces adjacent to the internal store
- a helipad and emergency vehicle shed.

The WAF will provide the following:

- a two lane two-way internal road network
- car parking to accommodate employees and staff staying at the WAF and visitors and delivery/service vehicles to the WAF in accordance with MWRC's *Development Control Plan* (DCP).
  Note: It is possible that the WAF staff car parking could remain for the life of the project, as required, to offset private vehicle parking within the mine site, and would reduce the volume of vehicles directly accessing the mine site. This has not been assessed as part of this project as it is a possible improvement to planned operations, and has been discussed in section 6 (Mitigation Measures)
- six spaces for bus parking (standard 12.5 m bus spaces).

4. Future conditions

The future road network conditions, intersection operation and proposed road upgrades and road closures are discussed further below for the construction and operational stage of the Project. Three sensitivity options have been analysed consistent with the Social Impact Assessment (SIA) competed for the Project (Hansen Bailey, 2015) to test the sensitivity of the road network to varied workforce accommodation assumptions.

4.1 Future year scenarios assessed

Traffic volumes associated with the Project relate to employees' vehicles, visitors and heavy vehicle movements and vary between the construction phase and the mining operations phase.

The Preferred Operation scenario is for the WAF to operate up to the end of underground construction activities in approximately Year 6 of the Project with Wollar Road being upgraded by the end of Project Year (PY) 1 in 2016.

The future year scenarios consider the peak construction activity year (2017/PY 2), the peak of dual mine operations (2024/PY 9) and peak of underground mine operation only (2028/PY 13).

To determine the impact of the mine's construction and operation, a set of 'no-Project' scenarios have been analysed to determine what the comparable case would be if the Project did not proceed. The 'no-Project' scenarios take into consideration both the background traffic growth and the operation of future identified developments.

A conservative estimate of 2% per year traffic growth could be adopted for traffic within the Bylong Valley, which is considered a typical trend for main roads in rural areas.

Traffic volumes in these areas may fluctuate dramatically due to changes in local land uses such as the construction or decommissioning of mines and quarries, or where road maintenance and upgrade occur.

Employee travel (light vehicles) to and from the WAF for local and non-local hires at the start and end of the Project is unlikely to occur during the Project's peak traffic periods (at the start or end of each shift). The same can be said for rostered days off when staff are likely to travel home or elsewhere. These vehicle movements will be sporadic in nature dependant on each individual travel movement and their place of residence.

As discussed in section 1.5, neighbourhood developments have been assessed and included in the future year cumulative traffic scenarios.

The following scenarios were analysed:

- Scenario 1a: no-Project (PY 2 2017) with background traffic growth and the inclusion of other surrounding developments.
- Scenario 1b: peak construction phase (PY 2 2017) with background traffic growth and the inclusion of other surrounding developments.
- Scenario 2a no-Project (PY 9 2024) with background traffic growth and the inclusion of other surrounding developments.
- Scenario 2b: dual mine operation phase (PY 9 2024) with background traffic growth and the inclusion of other surrounding developments.

- Scenario 3a: no-Project (PY 13 2028) with background traffic growth and the inclusion of other surrounding developments.
- Scenario 3b: underground mine operation only (PY 13 2028) with background traffic growth and the inclusion of other surrounding developments.

4.2 Sensitivity option testing

The following three sensitivity options have been assessed for this study as referenced from the *Social Impact Assessment* (Hansen Bailey 2015):

- Sensitivity Option 1 – Wollar Road Upgrade by end of PY 1, WAF operational for PY 1 and 2 only followed by the entire workforce being required to reside within the 'Local Area'. The Local Area being defined as areas within one hour drive of the Project (i.e. Mudgee, Wollar, Ulan, Rylstone, Kandos, Sandy Hollow and Denman).
- Sensitivity Option 2 – Wollar Road Upgrade by end of PY 1, WAF operational for PY 1 to 10 followed by the entire workforce being required to reside within the 'Local Area'.
- Sensitivity Option 3 – No upgrade of Wollar Road is completed and therefore Mudgee is outside the safe commute time and the WAF is required for the full Project life (PY 1 to 25).

4.3 Trip generation during construction

This section discusses the trip generation during construction activities for both the open cut and underground mines including the WAF.

In general, the assumptions around traffic generation are based on regular delivery and heavy vehicle activity anticipated for the site and the staff accommodation arrangements, as shown in the *Social Impact Assessment* (Hansen Bailey 2015).

Project Year 2 is considered the peak construction phase with a total workforce of 800. It is predicted that 650 will be accommodated in the WAF during this stage, which will be consistent for sensitivity testing. The remaining 150 staff will reside and travel from the local area.

4.3.1 Daily traffic generation

The project will generate traffic from two different locations, the WAF and the mine site.

Traffic generated by the WAF is expected to be bus only during project peak hours, as workers are transport to and from the site. During a typical weekday, it is expected that 1 light vehicle would access the WAF on a daily basis (though there may be other irregular light vehicle activity some days of the week). No heavy vehicles are expected to access the WAF.

Typical daily traffic generated by the mine site during this phase is expected to consist of:

- 12 return bus trips per day (from the WAF)
- 52 construction heavy vehicles (supplied by Hansen Bailey)
- 85 return light vehicle trips:
  - 150 staff not residing at the WAF
  - 50% of staff on shift = 75 staff
  - approx. 70% of staff are drivers (30% carpool) = 55 staff

- in addition there are 30 office staff (return trips)

- 120 light vehicles (deliveries) = 10 light vehicles across 12 hour day (supplied by Hansen Bailey).

A summary of the daily construction traffic generated by the WAF and site operations across all testing scenarios is shown in Table 4.1.

Table 4.1 Estimated construction vehicle trips per day at the WAF and the open cut mine sites (PY 2)

Site	Vehicle type	Preferred operations		Option 1/Option 2/Option 3	
		Vehicles/day	Vehicle trips/day (two-way)	Vehicles/day	Vehicle trips/day (two-way)
WAF	Light vehicles (employees)	0	0	0	0
	Light vehicles (deliveries)	1	2	1	2
	Buses (50 seater)	12	24	12	24
	Heavy vehicles (construction)	0	0	0	0
	Total	**13**	**26**	**13**	**26**
Site operations	Light vehicles (employees)	85	170	85	170
	Light vehicles (deliveries)	120	240	120	240
	Buses (50 seater) – from the WAF	12	24	12	24
	Heavy vehicles (construction)	52	104	52	104
	Total	**269**	**538**	**269**	**538**

4.3.2 Hourly traffic generation

Working hours for the construction of the WAF and mine sites is assumed to be two 12 hours shifts seven days a week. The construction working hours and the assumed construction employees' arrival/departure times are shown below:

- Assumed shift hours between 7.00 am to 7.00 pm, and 7.00 pm to 7.00 am. Day-time construction employees are assumed to arrive at the site between 6.30 am and 7.30 am and depart between 6.30 pm and 7.30 pm. Night shift construction employees will travel in the reverse direction during these hours.
- Light deliveries are assumed to be made throughout the day and will be equally distributed between 7.00 am and 7.00 pm.
- The delivery of construction materials by trucks were also assumed to be made throughout the day and will be equally distributed between 7.00 am and 7.00 pm.

It was assumed that 30% of construction staff (not in the WAF) will carpool with other staff (i.e. travel as a vehicle passenger) in order to convert construction employee numbers to the number of light vehicles.

Table 4.2 shows a summary of the hourly vehicle trips during construction phase.

Table 4.2 Estimated hourly construction vehicle trips at the WAF and the open cut mine sites (PY 2)

Working hours	Direction of traffic	Trip type	Time	Preferred Operations Contributors	Option 1/2/3 Contributors
Between 7.00 am and 7.00 pm	Inbound	Construction employee trip (light vehicles)	6.30 am to 7.30 am	34	34
	Inbound	Office workers (8.00 am to 4.00 pm shift)	7.00 am to 8.00 am	30	30
	Outbound		4.00 pm to 5.00 pm	30	30
	Inbound and outbound	Construction vehicle trip (heavy vehicles)	Throughout the day between 7.00 am and 7.00 pm	8	8
		Visitors and deliveries	Throughout the day between 7.00 am and 7.00 pm	20	20
	Outbound	Construction employee trip (light vehicles)	6.30 pm to 7.30 pm	34	34
Between 7.00 pm and 7.00 am	Inbound	Construction employee trip (light vehicles)	6.30 am to 7.30 am	34	34
	Outbound	Construction employee trip (light vehicles)	6.30 pm to 7.30 pm	34	34

4.4 Trip generation during dual mine scenarios

This section discusses the trip generation during operation for both the open cut and underground mines including the WAF.

A total of 450 mine workers are involved with the operation of the mine at this dual operations stage of the Project. None of these workers are assumed to be accommodated within the WAF during preferred operations, with the WAF decommissioned for the preferred option and Option 1 of sensitivity testing, and holding up to 147 workers for Option 2 and 379 workers for Option 3.

Workers travelling from accommodation outside of Bylong were assumed to carpool when driving to and from shifts. This assumes there will be a 30% reduction in the vehicle trips which will result from single-occupant journeys.

4.4.1 Employees

There will be three shifts for employees during operation of the mine site, daytime office hours, daytime mining and night-time mining, as shown in Table 4.3.

Table 4.3 Predicted number of employees during dual mine operation in PY 9 (daily)

Employment type	Working hours	Number of employees at sites			
		WAF*	Open cut	Underground	CHPP
Daytime office	8.00 am to 4.00 pm	0	8	8	4
Mine operation day	7.00 am to 7.00 pm	61/62	44	60	9
Mine operation night	7.00 pm to 7.00 am	61/62	44	60	9
Total			**96**	**128**	**22**

* employees located at the WAF while off shift, applicable for sensitivity scenarios 2/3. It is assumed that office staff will travel from the local area.

For the purposes of the traffic assessment, we have conservatively assumed staff will travel during the hour at shift changeover (mine staff), i.e. 6.30 am to 7.30 am and 6.30 pm to 7.30 pm, or the hour before and after office hours (office staff), i.e. 7.00 am to 8.00 am and 4.00 pm to 5.00 pm. It is assumed that approximately half the staff will be on site overnight and half on site during the day, thus, staff trips at shift changeover have been split evenly between the two peak hours.

4.4.2 Service and delivery vehicles

It is conservatively assumed that there will be approximately 10 light vehicles per hour (120 vehicles in/out per day, 240 trips per day) associated with service and deliveries. In addition, approximately 50 heavy vehicles are expected to access the site on a daily basis (100 trips, approximately 8 per hour). These light and heavy vehicle volumes include mine related deliveries for fuel, water, maintenance and service purposes.

4.4.3 Hourly traffic generation

A summary of the hourly traffic generated by the site during dual operations is shown in Table 4.4.

Table 4.4 Inbound and outbound vehicle trips at the WAF, the open cut and underground mine sites (PY 9)

Time	Employee type	Direction of traffic	Preferred Operations/ Option 1	Option 2 Contributors	Option 3 Contributors
6.30 am to 7.00 am	Day shift mine operation (light vehicles)	Inbound	83	56	16
	Day shift mine operation (buses)	Inbound and outbound	0	2	4
7.00 am to 7.30 am	Night shift mine operation (light vehicles)	Outbound	83	55	15
	Night shift mine operation (buses)	Inbound and outbound	0	2	4
7.00am to 8.00am	Day-time office (light vehicles)	Inbound	21	21	21
Throughout the day between 7.00 am and 7.00 pm	Contractors for delivery of materials and services (light vehicles)	Inbound and outbound	240	240	240
	(heavy vehicles)		20	20	20
4.00pm to 5.00pm	Day-time office (light vehicles)	Outbound	21	21	21
6.30 pm to 7.00 pm	Night shift mine operation (light vehicles)	Inbound	83	55	15
	Night shift mine operation (buses)	Inbound and outbound	0	2	4
7.00 pm to 7.30 pm	Day shift mine operation (light vehicles)	Outbound	83	56	16
	Day shift mine operation (buses)	Inbound and outbound	0	2	4

4.5 Trip generation during underground mine operation only (Scenario 3b)

This section discusses the trip generation during operation of the underground mine only including the WAF.

A total of 275 mine workers are involved with the operation of the mine at this stage of the project. No workers will be accommodated within the WAF during preferred operations, with the WAF decommissioned for the preferred Option and Option 1 and Option 2 of sensitivity testing. The WAF will house 231 workers for Option 3.

As with dual operations, it is expected that staff travelling to and from shifts by car will carpool, with a 30% reduction in light vehicle trip numbers.

4.5.1 Employee movements

There will be three shifts for employees during operation of the mine site, daytime office hours, daytime mining and evening mining, as shown in Table 4.5. Please note that this information shows the number of people on shift during the day (e.g. 240 underground mine staff translates to 120 on shift in a 24-hour period, and 60 on shift during the day or night shift). Also shown is Sensitivity Scenario 3 where a proportion of the staff will reside in the WAF.

Table 4.5 Predicted number of employees during underground mine operation only in PY 13 (weekdays)

Employment type	Working hours	Number of employees at sites		
		WAF (Sensitivity scenario 3)*	Underground	CHPP
Daytime office	8.00 am to 4.00 pm	0	15	5
Mine operation day	7.00 am to 7.00 pm	96	60	9
Mine operation night	7.00 pm to 7.00 am	96	60	9
Total			**135**	**23**

* This is employees located at the WAF while off shift, applicable for sensitivity scenario 3. It is assumed that office staff will travel from the local area. All other scenarios, there will be no employees at the WAF.

4.5.2 Service and delivery vehicles

It is conservatively assumed that there will be approximately 10 light vehicles per hour (120 vehicles in/out per day, 240 trips per day) associated with service and deliveries. In addition, approximately 10 heavy vehicles are expected to access the site on a daily basis (20 trips, approximately 2 per hour). These light and heavy vehicle volumes include mine related deliveries for fuel, water, maintenance and service purposes.

4.5.3 Hourly traffic generation

A summary of the hourly traffic generated by the site during underground mine operation is shown in Table 4.6.

Table 4.6 Inbound and outbound vehicle trips at the WAF and the underground mine sites (PY 13)

Time	Employee type	Direction of traffic	Preferred Operations/ Option 1/Option 2 Contributors	Option 3 Contributors
6.30 am to 7.00 am	Day shift mine operation (light vehicles)	Inbound	53	11
	Day shift mine operation (buses)	Inbound and outbound	0	2
7.00 am to 7.30 am	Night shift mine operation (light vehicles)	Outbound	53	10
	Night shift mine operation (buses)	Inbound and outbound	0	2
7.00 am to 8.00 am	Day-time office (light vehicles)	Inbound	21	21
Throughout the day between 7.00 am and 7.00 pm	Contractors for delivery of materials and services (light vehicles)	Inbound and outbound	240	240
	(heavy vehicles)		20	20
4.00 pm to 5.00 pm	Day-time office (light vehicles)	Outbound	21	21
6.30 pm to 7.00 pm	Night shift mine operation (light vehicles)	Inbound	53	10
	Night shift mine operation (buses)	Inbound and outbound	0	2
7.00 pm to 7.30 pm	Day shift mine operation (light vehicles)	Outbound	53	11
	Day shift mine operation (buses)	Inbound and outbound	0	2

4.6 Decommissioning

The mine site is expected to be decommissioned in completion of the project from PY 26 in 2041. Traffic generated during this phase will be light with some heavy vehicles associated with deconstruction works and land rehabilitation.

4.7 Trip distribution

Project related vehicle routes and their distributions during different phases (construction and operation) and stages of the project are explained as follows:

- Staff trips were distributed on the road network according to the location of accommodation, as estimated in the Social Impact Assessment (ref) according to employment profiling in the local area and availability of accommodation.

- Service and delivery vehicle trips were distributed according to the most accessible routes and direction from which the vehicles will likely travel, i.e. service and delivery vehicles are most likely to travel from Sydney, Newcastle and Muswellbrook (either on Golden Highway and Ulan Road and Wollar Road or along Bylong Valley Way to the east) then from Mudgee (along Wollar Road to the north-west). A small proportion of these trips will occur along Bylong Valley Way to the south. For the purpose of this assessment, it is assumed that there will be no heavy vehicles utilising the Bylong Valley Way, generally due to road constraints. However, there may be some occasions when heavy vehicles are able to travel these routes. These trips are consistent for both sensitivity options.

The estimates for light vehicle trips distribution (excluding bus trips, since all originate from the WAF) are shown in Figure 4.1. Note that staff light vehicle trip distributions are for the preferred operational case.

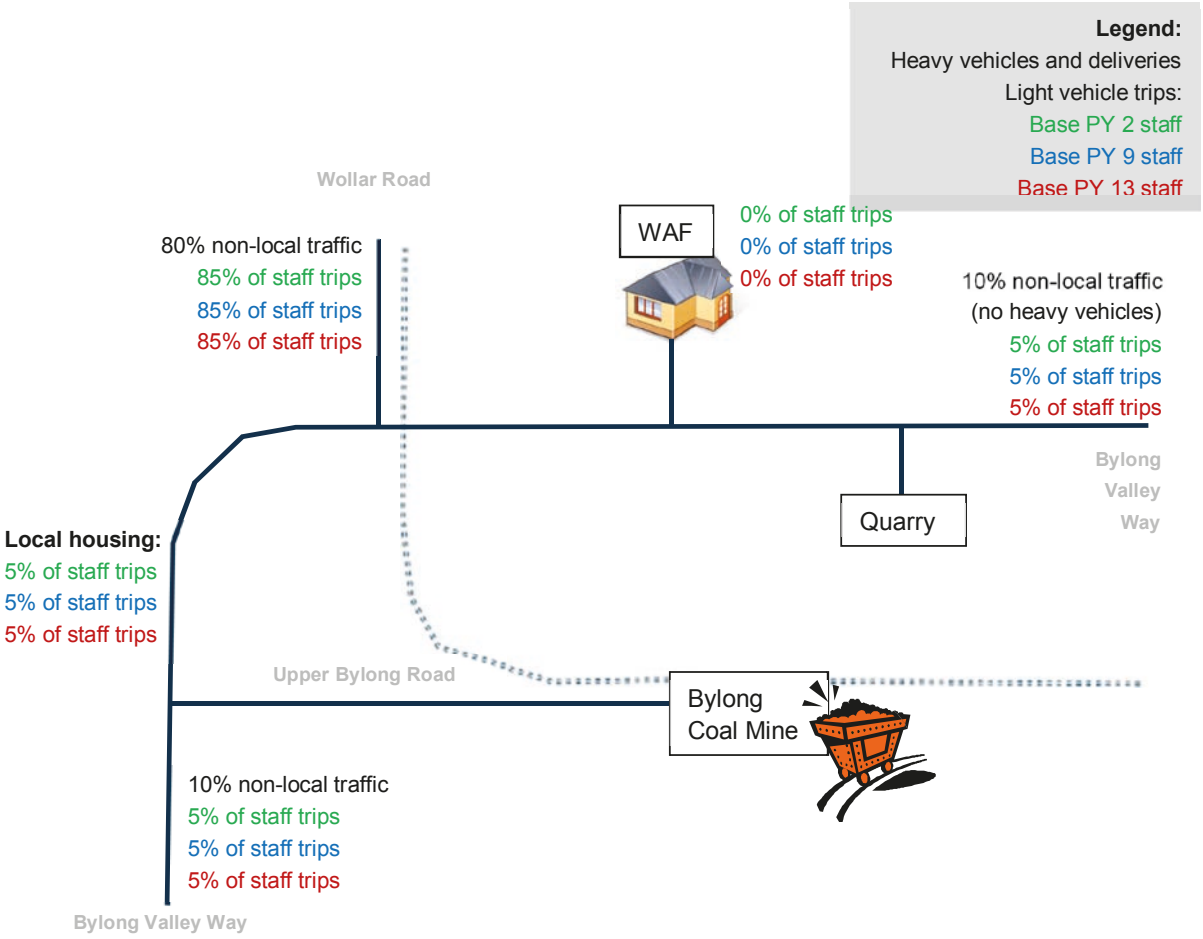


Figure 4.1 Light and heavy vehicle traffic distribution

In general, the majority of light vehicle trips generated by staff movements during the operational years are expected to come from Wollar Road from Mudgee and surrounds. No light vehicle trips are assumed to originate at the WAF as staff will be travelling by bus from this site.

4.7.1 Access routes

The anticipated access routes taken by construction vehicles, employee traffic and delivery and service vehicles travelling to the sites, during construction and operation are shown in Figure 4.2 and Table 4.7.

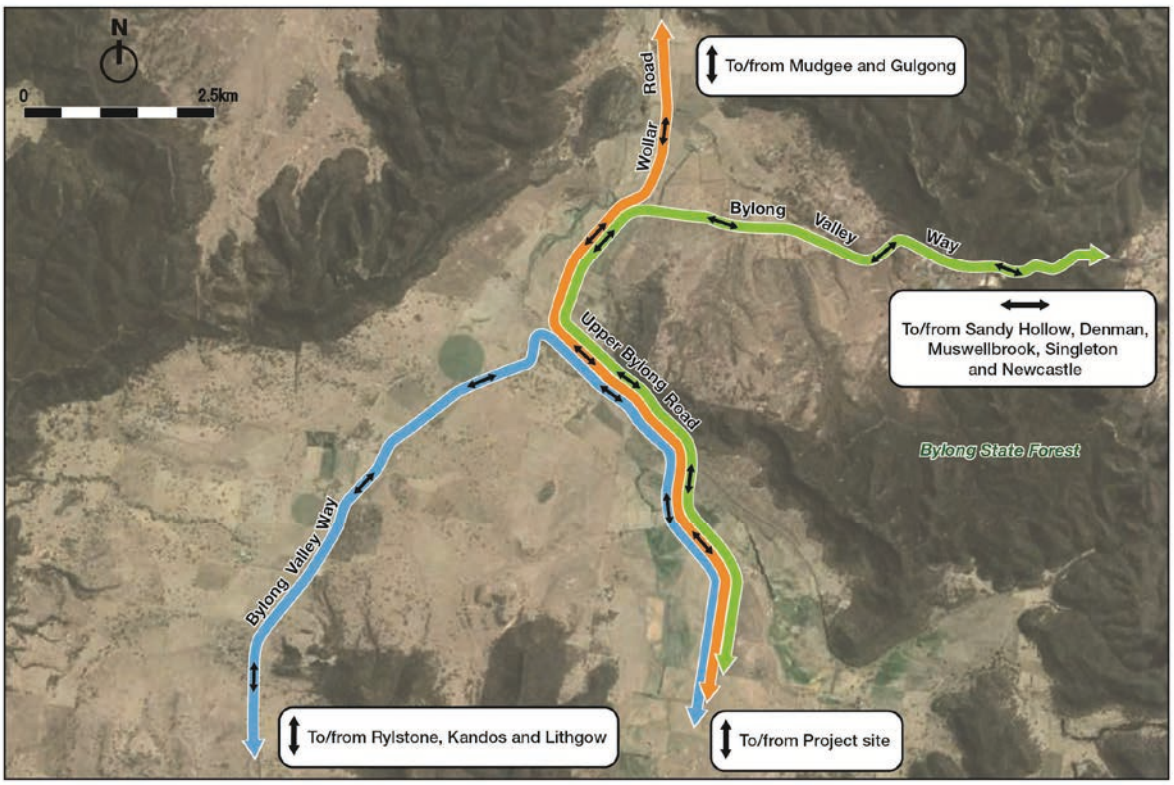


Figure 4.2 Vehicle access routes to and from the Project

Table 4.7 Site access points and access routes

Site	Access point location	Access to/from via			
		North	South	East	West
WAF	Off Bylong Valley Way	Bylong Valley Way, Wollar Road, Ulan Wollar Road, Ulan Road, Golden Highway	Bylong Valley Way, Castlereagh Highway (to Kandos, Rylstone)	Bylong Valley Way, Golden Highway (to Sandy Hollow, Denman)	Bylong Valley Way, Wollar Road, Ulan Road (to Mudgee)
Open cut	Off Upper Bylong Road	Upper Bylong Road, Bylong Valley Way, Wollar Road, Ulan Wollar Road, Ulan Road, Golden Highway	Upper Bylong Road, Bylong Valley Way, Castlereagh Highway (to Kandos, Rylstone)	Upper Bylong Road, Bylong Valley Way, Golden Highway (to Sandy Hollow, Denman)	Upper Bylong Road, Bylong Valley Way, Wollar Road, Ulan Road (to Mudgee)
Underground	Off Upper Bylong Road	Upper Bylong Road, Bylong Valley Way, Wollar Road, Ulan Wollar Road, Ulan Road, Golden Highway	Upper Bylong Road, Bylong Valley Way, Castlereagh Highway (to Kandos, Rylstone)	Upper Bylong Road, Bylong Valley Way, Golden Highway (to Sandy Hollow, Denman)	Upper Bylong Road, Bylong Valley Way, Wollar Road, Ulan Road (to Mudgee)

4.7.2 Construction phase

The construction employee workforce light vehicle trips of the open cut and underground mine sites will be made up of:

Project Year 2

- 5% to/from the east (Sandy Hollow, Denman)
- 85% to/from the west (Mudgee and MWCA suburbs)
- 5% to/from the south (Rylstone, Kandos)
- 0% to/from WAF
- 5% to/from local housing.

The construction and service vehicle trips of the open cut and underground mine sites will be made up of:

- 10% to/from the east (Sandy Hollow, Denman)
- 80% to/from the west (Mudgee and MWCA suburbs)
- 10% to/from the south (Rylstone, Kandos).

4.7.3 Operational phase

The operational employee workforce light vehicle trips of the open cut and underground mine sites will be made up of:

Project Years 9 & 13 (assuming no employees residing at WAF)

- 5% to/from the east (Sandy Hollow, Denman)
- 85% to/from the west (Mudgee and MWCA suburbs)
- 5% to/from the south (Rylstone, Kandos)
- 0% to/from WAF (unless WAF is in use)
- 5% to/from local housing.

The operational contractor and service vehicle trips of the open cut and underground mine sites will be made up of:

- 10% to/from the east (Sandy Hollow, Denman)
- 80% to/from the west (Mudgee and MWCA suburbs)
- 10% to/from the south (Rylstone, Kandos).

4.8 Distribution by time of day

Two separate peak hours have been assessed for each future year scenario:

- Local traffic peak hours: representing the highest traffic volumes in the weekday morning and afternoon periods associated with the sum of the background traffic growth and the operation of surrounding developments.
- Project traffic generation peak hours: the identified hour associated with the maximum traffic generation volumes in the weekday morning and afternoon peaks associated with the Project's employee trips and delivery trips.

The selection of the peak hours for this assessment was in one-hour intervals at individual key intersections.

4.9 Forecast traffic demand

The forecast traffic demand on the road network for PY 2 (2017) including Project related traffic is shown in Figures 4.3 to 4.6. The remaining traffic diagrams are shown in Appendix B.

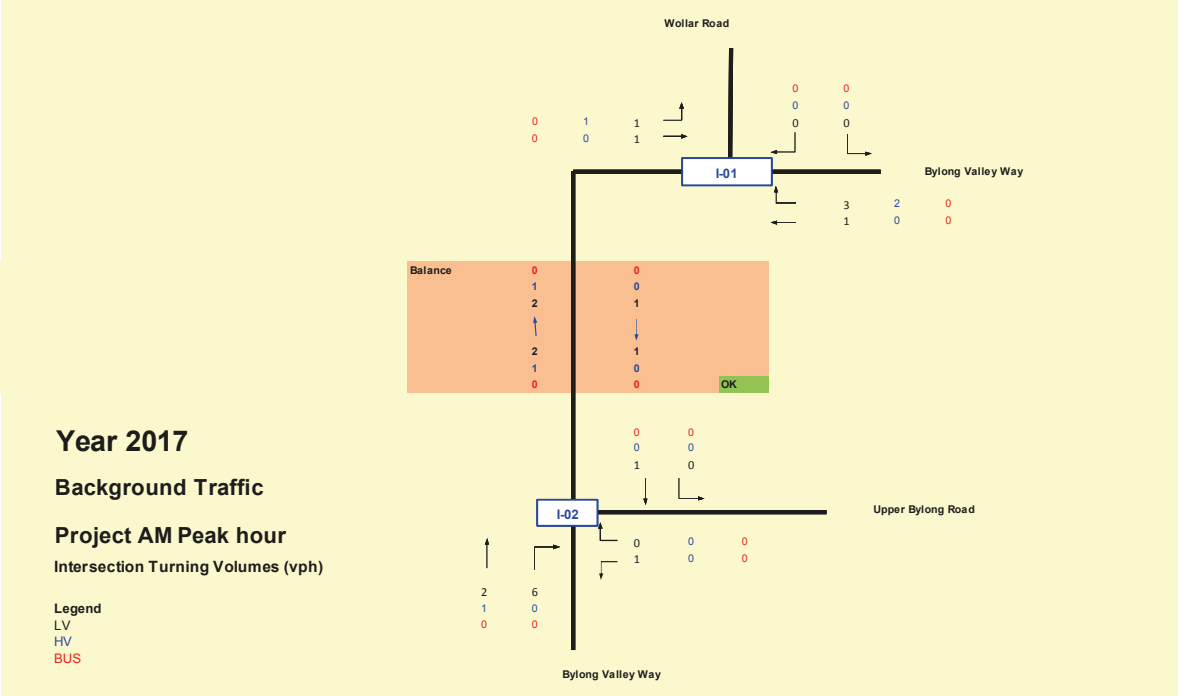


Figure 4.3 2017 AM Project peak hour traffic volumes (vph) – scenario 1a

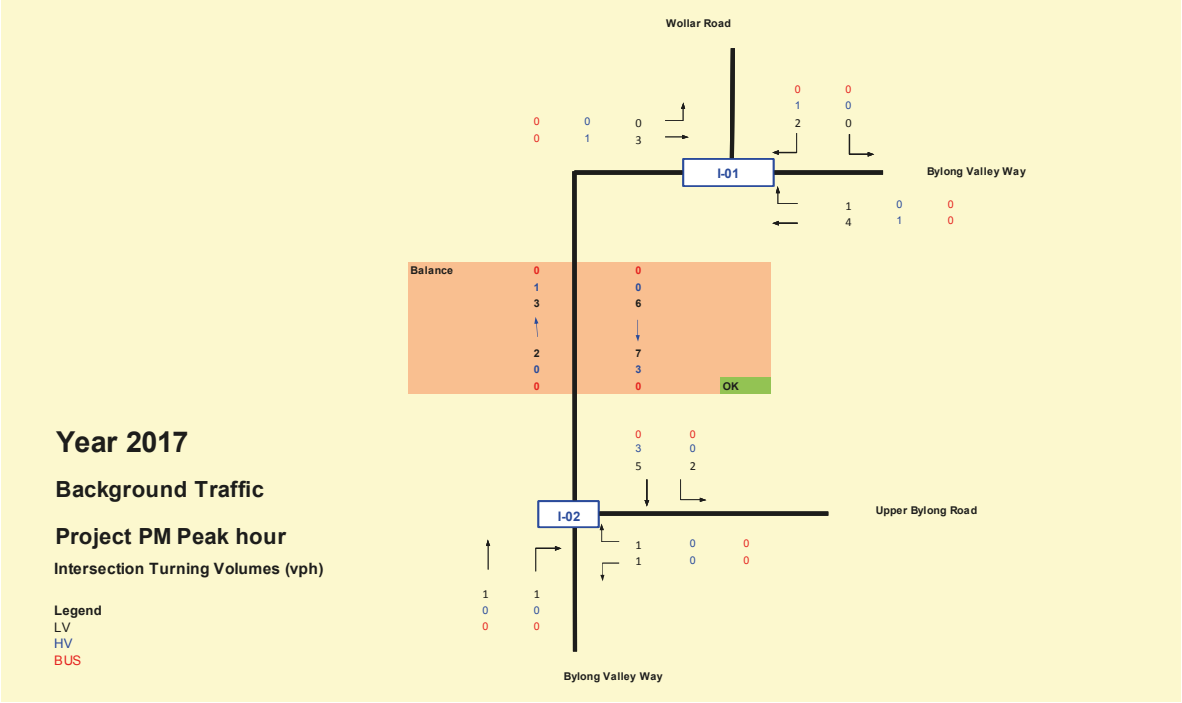


Figure 4.4 **2017 PM Project peak hour traffic volumes (vph) – scenario 1a**

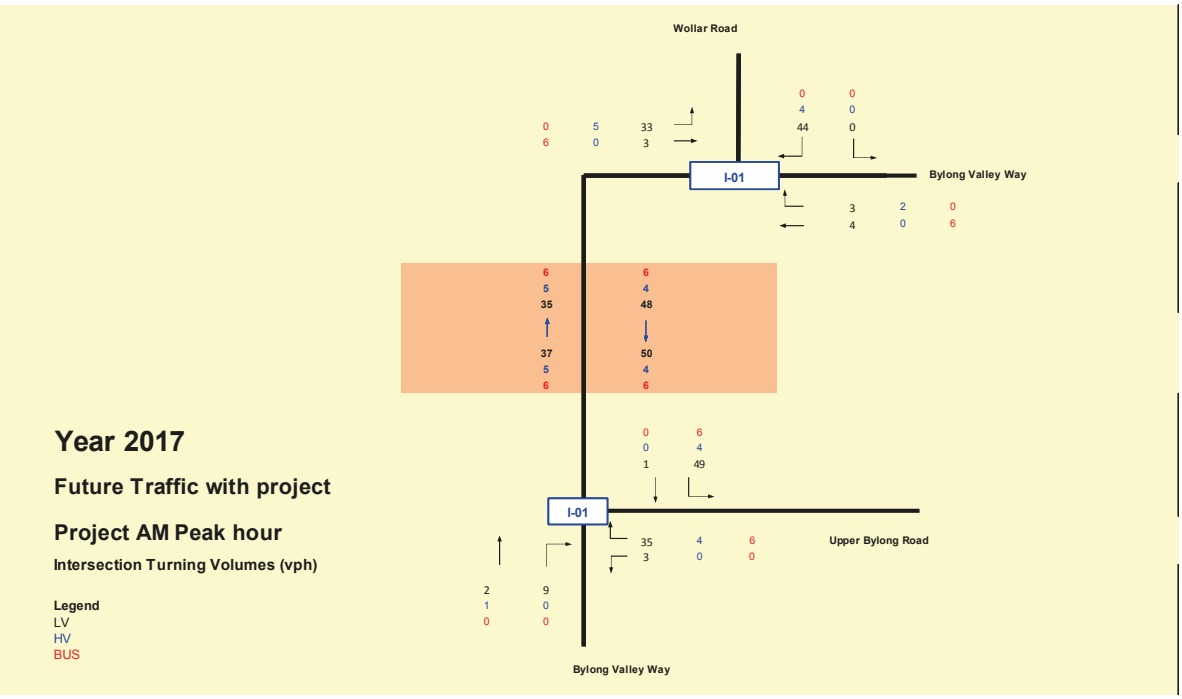


Figure 4.5 **PY 2, 2017 AM Project peak hour traffic volumes (vph) – scenario 1b (all options)**

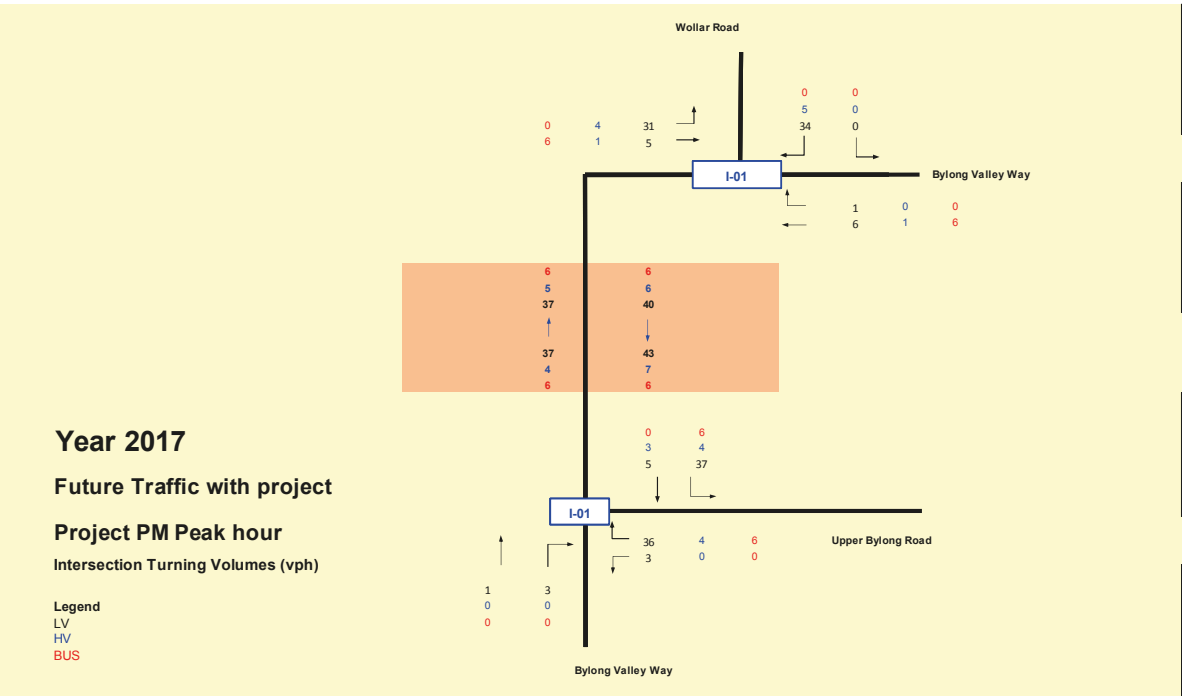


Figure 4.6 **PY 2, 2017 PM Project peak hour traffic volumes (vph) – scenario 1b (all options)**

4.10 Rail capacity and upgrades

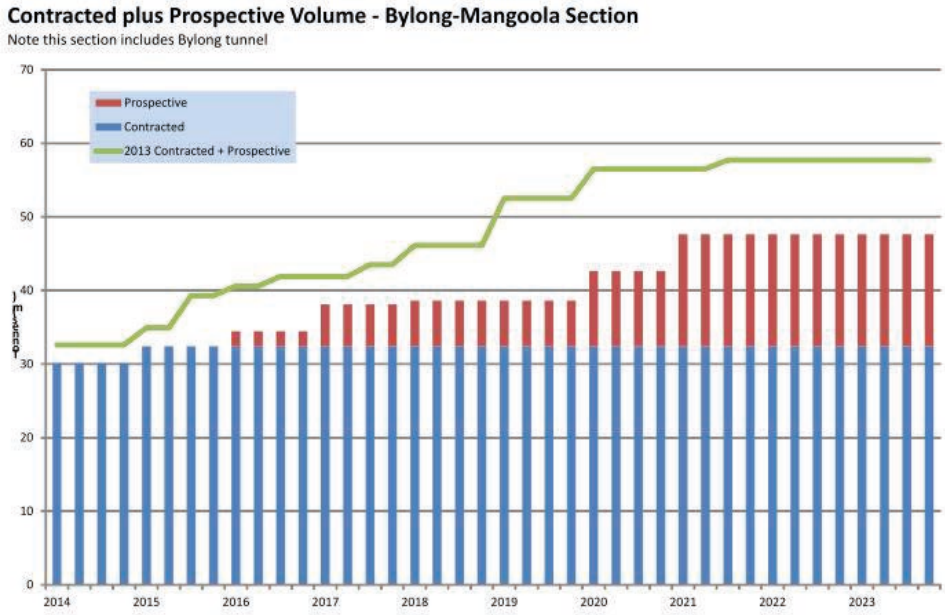
As discussed in section 2.10.1, there is adequate capacity for all contracted volume. Additional passing loops, or where necessary passing lanes, represent the main mechanism to deliver further incremental increases in the capacity of the line. Currently identified upgrades are shown in Table 4.8 below.

Table 4.8 **Ulan–Muswellbrook Loops, timing under contracted and prospective volume scenarios**

Project Name	Contracted Volumes	Prospective Volumes
Mt Pleasant loop (previously Bengalla west extension)	-	Q1 2021
Mangoola West Extension (to 310.5)	-	Not Required
324 km loop (or Denman bypass)	-	Not Required
337 km loop	-	Not Required
Baerami West Extension	-	Not Required
Widden Creek loop	-	Q1 2021
Bylong East Extension (to 377.0 km)	-	Not Required
Coggan Creek west extension (to 399.6)	-	Not Required
Gulgong loop	-	Not Required
Gulgong - Tallawang CTC	-	Not Required
Ulan - Tallawang track upgrading	-	Not Required

Source: ARTC 2014 HV Strategy

Figure 4.7 below presents the future contracted and prospective mine outputs. This figure shows that there is adequate capacity of the Sandy Hollow to Gulgong Railway line to accommodate Bylong Mine and other proposed mines or expanded mines in the area. It should be noted that the Mount Penny Mine to the west of the Project has now been cancelled. It should also be noted that the planned Cobbora Mine has also been postponed and therefore increased train paths and rail capacity will be available for the Project.



Source: ARTC 2014-2023 HV Corridor capacity strategy

Figure 4.7 Current volume forecasts vs 2014–2024 volume forecast, Bylong–Mangoola (Mtpa)

4.11 Rail movements

Based on the proposed product coal tonnages and a conservative 80% utilisation of the network (292 days of 365), the Bylong mine will require up to 2.1 trains per day at peak operation, averaging 1.4 trains per day over the period of 2017 to 2027. This assumes the standard 96 wagon (9,200t payload) trains are used. However, it is noted that KEPCO was in discussions with ARTC in December 2014 regarding a possible increase in train vehicle length to 100 cars and a gross payload of 9750 t. Use of this sized train is subject to further assessment.

4.12 Oversize and overmass vehicle movements

The use of an oversize or overmass vehicle will be subject to the grant of a permit from the relevant roads authority that these vehicles will be travelling (i.e. either RMS and/or the relevant Council). A separate Traffic Management Plan (TMP) will also be required for any of these oversize traffic movements.

Oversize and overmass permits as well as pilot vehicles and police escorts may be required for the transportation of larger equipment or infrastructure. Vehicles over 19 m long, 2.5 m wide or 4.3 m high are considered oversize and vehicles with a gross vehicle mass over 42.5 tonnes are considered overmass.

Oversized vehicles will need to travel to the Project site via Wollar Road due to an overhead rail bridge on Bylong Valley Way east of Wollar Road and the general steep terrain and tight horizontal curves on Bylong Valley Way.

Oversized vehicles are restricted to travel on public roads at certain times of the day only.

4.13 Transportation of dangerous goods

Dangerous goods will be required to be transported to the Project site. Some of these dangerous goods will include explosives, emulsions, diesel, various gases and other hydrocarbons.

The transportation of dangerous goods by road and rail transport is to comply with the *NSW Dangerous Goods (Road and Rail Transport) Regulation 2009* under the Dangerous Goods (Road and Rail Transport) Act 2008.

Persons involved in the transportation of dangerous goods must be properly qualified, trained and the vehicles transporting the goods meet the necessary licensing requirements.

In accordance with this regulation, a risk assessment is to be prepared by those involved in the transport of dangerous goods.

5. Traffic and transport impacts

This section describes the forecast traffic and transport related impacts of the Project.

5.1 Intersection performance

5.1.1 Scenario 1a:

Table 5.1 shows a summary of the forecast intersection performance using the SIDRA 6 program during both the total traffic and Project traffic peak hours in 2017 (PY 2). Both peak hours are presented for clarity purposes. Despite the fact that the Project does not occur in the Scenario, the forecast traffic conditions for the Project traffic peak hour periods are provided for comparison with those in Scenario1b, enabling traffic impacts to be evaluated over the same time period.

Table 5.1 PY 2, 2017 No Project intersection performance

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.014	3.6	A	0.6
		Local traffic peak	2.30 pm–3.30 pm	0.012	3.3	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.004	7.0	A	0.2
		Project traffic peak	6.30 pm–7.30 pm	0.004	3.2	A	0.1
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.012	2.0	A	0.5
		Local traffic peak	2.30 pm–3.30 pm	0.016	2.3	A	0.5
		Project traffic peak	6.30 am–7.30 am	0.005	3.2	A	0.2
		Project traffic peak	6.30 pm–7.30 pm	0.007	1.7	A	0

The results summarised in Table 5.1 show that the intersections in the vicinity of the Project are expected to operate at good levels of service with minimal delay and negligible queuing in 2017.

5.1.2 Scenario 1b:

Table 5.2 shows a summary of the forecast intersection performance during both the local traffic and Project traffic peak hours when construction is at its peak in PY 2.

Table 5.2 PY 2, 2017 Construction phase intersection performance

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.018	5.9	A	0.6
		Local traffic peak	2.30 pm–3.30 pm	0.019	5.5	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.043	6.7	A	1.0
		Project traffic peak	6.30 pm–7.30 pm	0.036	6.1	A	0.9
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.020	3.2	A	0.6
		Local traffic peak	2.30 pm–3.30 pm	0.023	3.2	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.045	4.7	A	1.2
		Project traffic peak	6.30 pm–7.30 pm	0.045	4.5	A	1.2

5.1.3 Scenario 2a:

Table 5.3 shows a summary of the forecast intersection performance during both the Local traffic and Project traffic peak hours in PY 9.

Table 5.3 PY 9, 2024 No Project intersection performance

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.015	3.6	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.014	3.4	A	0.7
		Project traffic peak	6.30 am–7.30 am	0.005	7.1	A	0.2
		Project traffic peak	6.30 pm–7.30 pm	0.004	2.9	A	0.1
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.013	2.1	A	0.5
		Local traffic peak	2.30 pm–3.30 pm	0.017	2.2	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.006	3.3	A	0.2

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
		Project traffic peak	6.30 pm–7.30 pm	0.008	1.4	A	0.0

5.1.4 Scenario 2b (Preferred operations and Sensitivity Option 1):

Table 5.4 shows a summary of the forecast intersection performance during both the Local traffic and Project traffic peak hours when the mine is at peak operation (dual operations) in PY 9 under the preferred operation and sensitivity option 1.

Table 5.4 PY 9, 2024 Dual Mine Operation intersection performance (Preferred operation and Sensitivity option 1)

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.017	5.3	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.017	5.0	A	0.7
		Project traffic peak	6.30 am–7.30 am	0.077	7.3	A	1.8
		Project traffic peak	6.30 pm–7.30 pm	0.073	6.7	A	1.7
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.017	5.3	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.020	2.9	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.082	4.7	A	1.9
		Project traffic peak	6.30 pm–7.30 pm	0.083	4.5	A	2.0

5.1.5 Scenario 2b (Sensitivity Option 2):

Table 5.5 shows a summary of the forecast intersection performance during both the Local traffic and Project traffic peak hours when the mine is at peak operation (dual operations) in PY 9 under sensitivity option 2.

Table 5.5 PY 9, 2024 Dual Mine Operation intersection performance (Sensitivity option 2)

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.017	5.4	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.017	5.0	A	0.7
		Project traffic peak	6.30 am–7.30 am	0.057	7.1	A	1.3

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
		Project traffic peak	6.30 pm–7.30 pm	0.053	6.6	A	1.2
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.018	2.9	A	0.5
		Local traffic peak	2.30 pm–3.30 pm	0.020	2.9	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.061	4.6	A	1.5
		Project traffic peak	6.30 pm–7.30 pm	0.062	4.4	A	1.5

5.1.6 Scenario 2b (Sensitivity Option 3):

Table 5.6 shows a summary of the forecast intersection performance during both the Local traffic and Project traffic peak hours when the mine is at peak operation (dual operations) in PY 9 under sensitivity option 3.

Table 5.6 PY 9, 2024 Dual Mine Operation intersection performance (Sensitivity option 3)

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.017	5.4	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.019	4.7	A	0.8
		Project traffic peak	6.30 am–7.30 am	0.027	6.5	A	0.6
		Project traffic peak	6.30 pm–7.30 pm	0.023	5.5	A	0.5
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.018	2.9	A	0.5
		Local traffic peak	2.30 pm–3.30 pm	0.049	3.5	A	1.7
		Project traffic peak	6.30 am–7.30 am	0.028	4.6	A	0.7
		Project traffic peak	6.30 pm–7.30 pm	0.029	4.1	A	0.7

5.1.7 Scenario 3a:

Table 5.7 shows a summary of the forecast intersection performance during both the Local traffic and Project traffic peak hours in PY 13 (2028).

Table 5.7 PY 13, 2028 No Project intersection performance

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.016	3.7	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.016	3.6	A	0.8
		Project traffic peak	6.30 am–7.30 am	0.006	7.3	A	0.2
		Project traffic peak	6.30 pm–7.30 pm	0.004	3.1	A	0.1
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.015	1.9	A	0.6
		Local traffic peak	2.30 pm–3.30 pm	0.018	2.3	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.007	3.2	A	0.2
		Project traffic peak	6.30 pm–7.30 pm	0.009	1.6	A	0.0

5.1.8 Scenario 3b (Base, Option 1 and Option 2):

Table 5.8 shows a summary of the forecast intersection performance during both the Local traffic and Project traffic peak hours when the underground mine is in operation only in PY 13 under the preferred operations, sensitivity option 1 and sensitivity option 2.

Table 5.8 PY 13, 2028 Underground Mine Operation only intersection performance (preferred operations, Sensitivity options 1 and 2)

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.017	5.2	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.018	5.1	A	0.8
		Project traffic peak	6.30 am–7.30 am	0.055	7.3	A	1.3
		Project traffic peak	6.30 pm–7.30 pm	0.050	6.8	A	1.2

Intersection	Control type	Peak hour	Peak hour time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.019	2.8	A	0.6
		Local traffic peak	2.30 pm–3.30 pm	0.020	2.9	A	0.6
		Project traffic peak	6:30 am – 7:30 am	0.055	4.6	A	1.3
		Project traffic peak	6:30 pm – 7:30 pm	0.056	4.4	A	1.3

5.1.9 Scenario 3b (Option 3):

Table 5.9 shows a summary of the forecast intersection performance during both the Local traffic and Project traffic peak hours when the underground mine is in operation only in PY 13 under sensitivity option 3.

Table 5.9 PY 13, 2028 Underground Mine Operation only intersection performance (sensitivity option 3)

Intersection	Control Type	Peak Hour	Peak Hour Time	DoS	Average Delay (seconds)	LoS	Queue (m)
Bylong Valley Way/ Wollar Road	Priority	Local traffic peak	10.45 am–11.45 am	0.017	5.3	A	0.7
		Local traffic peak	2.30 pm–3.30 pm	0.018	5.1	A	0.8
		Project traffic peak	6.30 am–7.30 am	0.024	6.9	A	0.5
		Project traffic peak	6.30 pm–7.30 pm	0.019	5.6	A	0.5
Bylong Valley Way/ Upper Bylong Road	Priority	Local traffic peak	10.45 am–11.45 am	0.019	2.8	A	0.6
		Local traffic peak	2.30 pm–3.30 pm	0.020	2.9	A	0.6
		Project traffic peak	6.30 am–7.30 am	0.022	4.4	A	0.5
		Project traffic peak	6.30 pm–7.30 pm	0.023	4.0	A	0.6

5.2 Intersection impacts and warrants

Increased traffic volumes are anticipated at intersections due to Project traffic. Dependant on the whether the WAF facility is in place for a few years or for the life of the Project, the Project traffic generation by employees and their origin and destinations will be quite different. For example, should employees travel from the Mudgee direction, increased vehicle movements are anticipated along Ulan Road and Wollar Road and intersections along these roads. However, should employees reside in the WAF, increased vehicle movements are only anticipated along Bylong Valley Way and Upper Bylong Road and intersections along these roads.

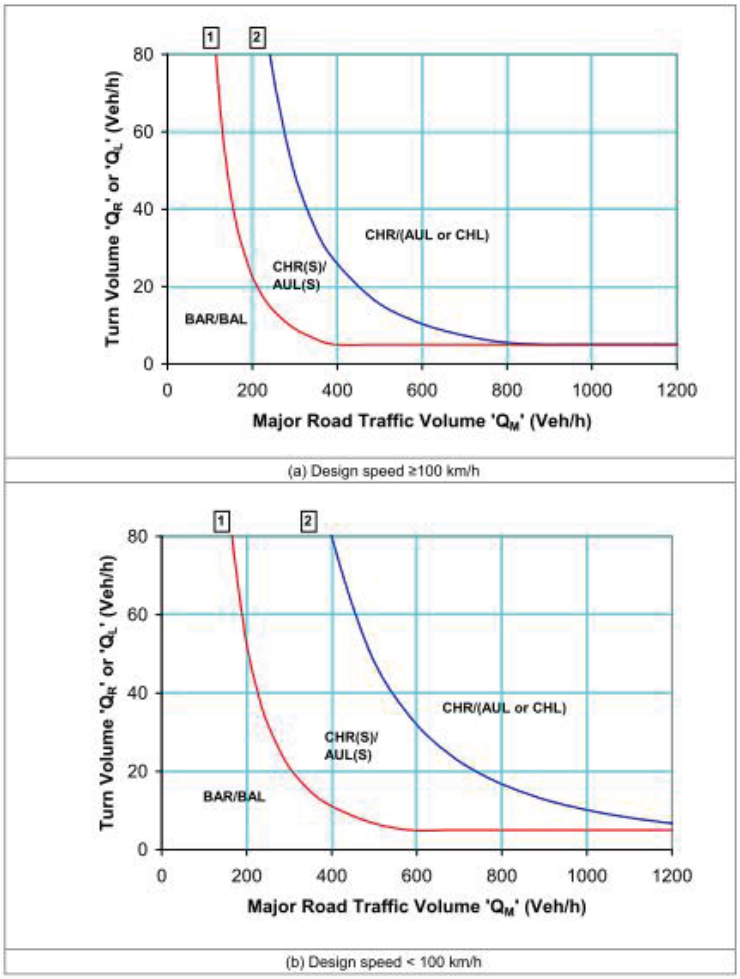
Project traffic towards the Mudgee direction is anticipated to have only small impacts to intersection performance at the intersections of Wollar Road/Ulan-Wollar Road and Wollar Road/Ulan Road. A maximum of 80 vehicles from the Project is anticipated in PY 9 (2024) at these intersections during peak periods.

The Wollar Road/Ulan–Wollar Road intersection carried approximately 90 vehicles during the peak based on 2011 intersection counts. For travel to and from Mudgee, the Project traffic would be the through vehicle traffic at this intersection and therefore given the low side road demand (Ulan-Wollar Road), the intersection is anticipated to continue to operate within capacity at good levels of service.

The Wollar Road/Ulan Road intersection carried approximately 1,100 vehicles during the peak based on 2011 intersection counts. The Project traffic would be the left and right turning vehicle traffic at this intersection. This intersection is anticipated to continue to operate within capacity at good levels of service.

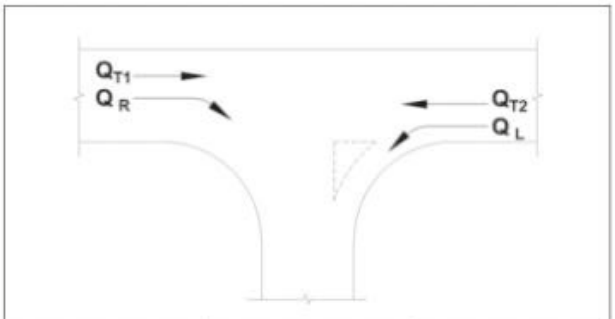
It should be noted that Project traffic through the Wollar Road/Ulan–Wollar Road and Wollar Road/Ulan Road will occur outside of the general intersection traffic peak periods given the travel time required to/from the Project site based on shift changeover times.

A review of intersection types and warrants for turn treatments at intersections based on future intersection traffic volumes with Project traffic has been undertaken. Figure 5.1 presents the warrants for turn treatments on major roads at unsignalised intersections for design speeds greater or equal to 100 km/h (a) and design speeds less than 100 km/h (b). Figure 5.2 presents the calculation of Q_M, the major road traffic volume.



Source: Austroads *Guide to Road Design, Part 4A Unsignalised and Signalised Intersections*, Figure 4.9

Figure 5.1 Warrants for turn treatments on the major road at unsignalised intersections



Turn type	Splitter island	Q_M (veh/h)
Right	No	$= Q_{T1} + Q_{T2} + Q_L$
Right	Yes	$= Q_{T1} + Q_{T2}$
Left	No/Yes	$= Q_{T2}$

Source: *Austroads Guide to Road Design, Part 4A Unsignalised and Signalised Intersections*, Figure 4.10

Figure 5.2 Calculation of the major road traffic volume parameter Q_M

5.2.1 Existing intersection future year operation

Bylong Valley Way and Wollar Road – this is an existing rural Type BA intersection. This intersection is proposed to be upgraded. Bylong Valley Way is the major road with a design speed assumed to be 100 km/h (posted 100 km/h speed limit at this location).

Warrant for left turn

Peak Project traffic is identified during dual-mine operation in PY 9 (2024). The major road traffic volume Q_M (veh/h) for a left turn warrant is equal to Q_{T2}. Q_{T2} is a maximum 20 vehicles per hour. The maximum left turn volume Q_L (veh/h) is 82 vehicles per hour. Based on the very low through traffic volumes on Bylong Valley Way, a Type BA intersection would suffice.

Bylong Valley Way and Upper Bylong Road – this is an existing rural Type BA intersection. This intersection is proposed to be upgraded. Bylong Valley Way is the major road with a design speed assumed to be 100 km/h (posted 50 km/h speed limit at this location).

Warrant for left turn

Peak Project traffic is identified during dual-mine operation in PY 9 (2024). The major road traffic volume Q_M (veh/h) for a left turn warrant is equal to Q_{T2}. Q_{T2} is a maximum 16 vehicles per hour. The maximum turn volume Q_L (veh/h) is 100 vehicles per hour. Based on the very low through traffic volumes on Bylong Valley Way, a Type BA intersection would suffice.

Warrant for right turn

Peak Project traffic is identified during dual-mine operation in PY 9 (2024). The major road traffic volume Q_M (veh/h) for a right turn warrant is equal to the addition of Q_{T1}, Q_{T2} and Q_L. Q_M is a maximum 104 vehicles per hour. The maximum turn volume Q_R (veh/h) is 12 vehicles per hour. Based on the very low through traffic volumes on Bylong Valley Way, a Type BA intersection would suffice.

5.2.2 Proposed intersection future year operation

Underground MIA Access Road and Upper Bylong Road – a rural Type CH intersection is proposed for this intersection with dedicated left and right turn lanes on Upper Bylong Road which would comfortable accommodate future intersection traffic volumes.

5.3 Mid-block road capacity and level of service

The impacts of the Project on the routes utilised on the surrounding road network have been assessed to determine the percentage increases in daily mid-block traffic volumes when compared to base daily traffic flows.

A mid-block capacity assessment has also been completed on Bylong Valley Way, Upper Bylong Road and Wollar Road to determine mid-block levels of service based on two-way hourly vehicle flows and the percent of heavy vehicles. The mid-block capacity has been based on the RMS G*uide to Traffic Generating Developments* and Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis* guidelines.

Mid-block capacities and Levels of Service based on two-lane rural roads are shown in Table 5.10.

Table 5.10 Peak hour flow on two-lane rural roads (veh/h)

Terrain	Level of Service	Percent of heavy vehicles			
		0%	5%	10%	15%
Level	B*	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290

Note: * vehicles per hour less than those documented in the row assigned for Level of Service B indicate a Level of Service A performance

Source: RMS *Guide to Traffic Generating Developments, 2002*

The mid-block road capacity and level of service assessment has been completed for both the construction (PY 2) and dual mine operation under preferred operations (PY 9) as shown in Table 5.11. The daily heavy vehicle percentage is approximately 13% on Bylong Valley Way, 12% of Upper Bylong Road and 50% on Wollar Road under existing conditions. This percentage is expected to increase during the Project construction stage, hence an increase heavy vehicle percentage has been utilised for future year assessments.

Table 5.11 Mid-block road capacity and level of service

Road	Between	Daily# base flow (two-way vehicles)	Construction (PY 2)			Dual Mine Operation (PY 9)		
			Daily project vehicles (two-way)	Daily traffic increase (%)	Mid-Block LoS	Daily project vehicles (two-way)	Daily traffic increase (%)	Mid-Block LoS
Bylong Valley Way	Upper Bylong Road and Wollar Road	313	511	63%	A	511	63%	A
Upper Bylong Road	Bylong Valley Way and Project site	171	538	215%	A	640	274%	A
Wollar Road	North of Bylong Valley Way	140	457	227%	A	544	289%	A

Traffic counts undertaken between 5.00 am and 8.00 pm on a weekday (not a 24 hour full day count, although vehicle volumes outside of this time range over a 24 hour period is negligible)

Table 5.11 shows that although there is a large percentage increase in daily traffic due to the Project traffic, the mid-block road capacity continues to operate at good levels of service, with ample spare capacity.

5.4 Road impacts

Given the low amount of traffic generated by the Project over a daily and peak hourly period, and given the existing low volumes of traffic, only minimal impacts are foreseen on the surrounding road network. Road mid-block capacities and intersection performance on Bylong Valley Way, Upper Bylong Road and Wollar Road will continue to perform well within capacity with the introduction of Project traffic.

The closure of Upper Bylong Road will impact on property accesses to the south of the Project. As discussed in section 3.5.1, the upgrade of either Lee Creek Road or Budden Gap Road for connection to Bylong Valley Way is being considered. The closure of Upper Bylong Road will increase travel times for residents to the south of the Project by up to 30 minutes, if they utilised Lee Creek Road to access Bylong Valley Way (and Bylong Village) in its current state. The upgrade of Lee Creek Road or Budden Gap Road will improve travel times to Bylong Valley Way.

5.5 Pavement impacts

Pavement deterioration is expected due to increased vehicle movements and particularly increased truck traffic. It is suggested that road dilapidation inspections be undertaken where the Project is likely to result in additional heavy vehicles traffic usage of the MWRC's maintained road network on a sustained basis. Further information is provided in section 7 of the report.

5.6 Public transport impacts

No public transport impacts are envisaged. There will be operational changes to school bus operation dependant on whether the NSW Department of Education & Communities decides that Bylong Upper Public School is to be relocated or closed. Work shifts for construction and during mine operation do not coincide with school start or finish times. Project related traffic throughout the course of the day and likely to travel during peak school periods is anticipated to be negligible and will not impact on school bus route safety.

5.7 Pedestrian and cyclist impacts

The Project is likely to generate minimal to no pedestrian or cyclist activity, therefore no additional facilities are considered for these users.

5.8 Rail impacts

Trains to and from the Project will not travel across the level railway crossing on either Bylong Valley Way (east of Wollar Road) or the Projects underground mine access road. Trains will enter and exit the Project's rail loop prior to both these level railway crossings. Vehicle delays for Project related traffic are anticipated at the existing level railway crossings (due to train movements to and from other mines further west); however these delays will be insignificant due to infrequent and the low volume of train movements across the day.

6. Mitigation measures

This section discusses the recommended mitigation measures to remove or ameliorate any Project related impacts.

6.1 Provision of shuttle bus

Shuttle buses are proposed to transport workers between the WAF and the mine sites. These shuttle buses are anticipated to operate at the start and end of both the construction shift and mining operation shifts. The shuttle buses are assumed to have a capacity of 50 persons per bus. The provision of shuttle buses will reduce and limit the number of light vehicle movements to and from the mine sites and reduce the staff parking requirements on site. The use of shuttle buses has been included in the assessment to further minimise traffic impacts.

There is potential to continue the operation of all or part of the car park at the WAF site after the closedown of the WAF and for the life of the project, as required. This would reduce the volume of private vehicles parked at the mine site and shuttle buses would continue to transport staff between the car park and the mine site, reducing vehicle volumes on Bylong Valley Way and via mine accesses.

6.2 Speed and fatigue management

Speed and fatigue are common crash risk factors across NSW and are possible factors in the crash data assessed. This is particularly true for miners who tend to work long (12 hour) shifts and many travel up to an hour from home to attend their shift, where private vehicle travel is the only viable mode.

Speed and fatigue management strategies are a key part of minimising the risk of crashes and thus the impact of mine traffic on the local road network. For example as a crash mitigation measure, a shuttle bus will be provided for staff travelling from the WAF (as discussed in section 6.1). This will eliminate the risk altogether for those mine workers, particularly as they will be residing at the WAF during the earlier years of the Project and without the upgrade to Wollar Road (assumed by the end of PY 1) will have to travel more than 1 hour from Mudgee to get to the mine site.

Further to this and subject to future assessment, there is potential to provide Mudgee to Bylong mine bus services which would transport mine staff. This would remove additional traffic from Wollar Road and Bylong Valley Way and reduce the hazards associated with speed and/or fatigued mine staff.

For other workers living within one hour of the site, road safety improvements and intersection upgrades are proposed for several roads and intersections surrounding the site. These are discussed in section 3.6 and section 6.3 of this report. Improvements which relate to speed and fatigue management include improved road alignment (particularly reduction of long straight segments), improved sight distances and tactile road markings, and clear zones on either side of the roadway in addition to other road upgrades.

6.3 Road safety improvements

Several measures are recommended to improve general road safety for travel to and from the Project sites. Some of the road safety improvements include:

- Road widening and upgrade of Upper Bylong Road including realignment by MWRC with monetary funding by KEPCO.
- Upgrade of either Lee Creek Road or Budden Gap Road by MWRC with monetary funding by KEPCO.
- Improved intersection layout and intersection throat widening to assist vehicle turning movements for the intersections of Bylong Valley Way/Upper Bylong Road and Bylong Valley Way/Wollar Road by MWRC with monetary funding by KEPCO in support of regional funding from MWRC and the NSW State Government (Resources for Regions Grants Program).
- Improved intersection layout and intersection throat widening to assist vehicle turning movements for the intersection of Bylong Valley Way/WAF access by MWRC with monetary funding by KEPCO.
- Improved level rail crossing access road alignment and storage area for vehicle queuing on Bylong Valley Way by MWRC with monetary funded by a $14m grant which has been secured for the upgrade under the NSW Resources for Regions Grants Program.
- Sealing of Wollar Road for approximately 17 km with shoulders either side by MRWC with monetary funded by a $14m grant which has been secured for the upgrade under the NSW Resources for Regions Grants Program.
- improved signage (sight boards, give way) and linemarking (centre linemarking, yield line marking, tactile markings)
- trim tree branches and remove kerbside overgrown vegetation
- schedule vehicle movements outside of school drop and pick up periods
- potential for bus services between Mudgee and Bylong mine subject to future assessment
- potential for train freight carrying bulk materials, subject to future assessment and discussions surrounding rail line capacity.

It is suggested that a formal road safety audit be completed on the existing road conditions, in order to confirm the most appropriate road upgrade measures.

6.4 Management and maintenance of Bylong Valley Way

KEPCO have been in ongoing discussion with Council about the management and maintenance of Bylong Valley Way. This management and maintenance strategy will be finalised in the Voluntary Planning Agreement (VPA) between KEPCO and Mid-Western Regional Council and is dependent on the outcome of the Resources for Region Funding.

6.5 Rail safety improvements

Several measures are recommended to improve rail safety for vehicles crossing the railway line to and from the Project sites. Some of the potential rail safety improvements include:

- boom gates and flashing lights (particularly for fog and wet weather conditions)
- signs (rail crossing, stop) and lines (stop lines)
- staff induction and awareness

- timetable vehicle movements, deliveries, shift start and end times outside of when rail line in use
- sight distance and vehicle storage improvements (increased length of access road between rail line and Upper Bylong Road)
- street lighting.

6.6 Project site accesses

New roads and intersections will be built for vehicle access to the mine sites.

The upgraded Upper Bylong Road will provide direct entry to the open cut MIA and also the underground MIA. A new road will be built between the upgraded Upper Bylong Road and the existing level railway line and the proposed underground MIA. This road will provide adequate storage area for queued vehicles, improved sight distance for drivers due to the roadway being built perpendicular to the railway line and a T-junction with the underground MIA access road.

The existing driveway to the proposed WAF will be upgraded to allow two lane two-way vehicle travel on the access road connecting with Bylong Valley Way. The throat of the intersections will be widened to accommodate heavy vehicle turning vehicle movements.

6.7 Permit and pilot vehicle requirements

All oversize and overmass loads will be accompanied by escort vehicles in accordance with the relevant roads authority requirements to ensure the safety of all road users. The transportation contractor is to obtain the necessary permits and notify Council and the RMS on behalf of the contractor when transportation movements are proposed to commence.

6.7.1 Specific permits

The oversize transport vehicles will be regarded as Restricted Access Vehicles (RAVs). In accordance with RMS's *Operating Conditions: Specific permits for oversize and overmass vehicles and loads, 2008*, the operators of oversize and overmass must carry the relevant General Class 1 Oversize Notice and also be required to apply to the RMS for a specific permit to allow them to travel in NSW when the height, width or length of a vehicle exceeds any of the maximum dimension limits specified in Table 6.1.

Table 6.1 Statutory dimension limits for oversize load-carrying vehicle

Vehicle type	Height (m)	Width (m)	Length (m)
Loaded rigid motor vehicle	4.3	3.5	12.5
Loaded combination consisting of prime mover and a semi-trailer	4.3	3.5	19.0
Loaded rigid vehicle and trailer combination	4.3	3.5	19.0
Unloaded articulated low loader	4.3	2.5	19.0
Unloaded articulated low loader with eight tyres per axle	4.3	2.7	25.0

Source: Operating Conditions: Specific permits for oversize and overmass vehicles and loads, RMS, 2008

The overmass permit is also required when the gross weight of a vehicle exceeds 42.5 tonnes.

6.7.2 Pilot vehicles

The responsibilities of a pilot vehicle are to provide advance warning to approaching traffic and to be positioned to give adequate warning to other road users.

Based on RMS's *Operating Conditions*, pilot vehicles are required when delivery vehicle travel in NSW during the night time if:

- a vehicle's width is less than or equal to 3.5 m and its length is less than or equal to 25 m, two pilot vehicles are required on restricted roads
- a vehicle is wider than 3.5 m or longer than 25 m, two pilot vehicles are required for travel on all roads
- a vehicle is wider than 5.5 m or longer than 35 m, two pilot vehicles are required and the vehicle operator must notify police prior to travel.

6.8 School bus route safety

It is proposed that Project related vehicle movements during both construction and operation be limited to travel during school drop off and pick up periods. KEPCO is awaiting the decision of the NSW Department of Education & Communities as to whether the Bylong Upper Public School will either be relocated or permanently closed and therefore Upper Bylong Road will no longer be the predominant bus route.

6.9 General Project requirements

The objectives of the Project will be to:

- ensure public safety
- ensure that affected local residents are advised of any disruption to traffic flows, parking and public transport services
- ensure that disruptions to traffic flows on public streets are minimised and, where unavoidable, managed in consultation with the relevant road authority
- provide alternative access routes to local residents that may be impacted by road closures
- ensure that disruptions to road users as a result of blasting activities are minimised
- provide ample notice to local residents advising them of the temporary road closures required for the realignment of Upper Bylong Road and minimise the disruption where possible
- minimise the exposure of the community to heavy construction vehicle traffic impacts and associated noise and vibration
- ensure safe access to work site including sight distance
- ensure that road damage from construction traffic is monitored and addressed in consultation with the relevant road authority.

To ensure the key objectives are achieved, the following mitigation actions will be undertaken during the construction phase:

- signs will be provided at each access point to assist in deliveries to each work site
- traffic controllers will be located at Project access points where increased vehicle movements are anticipated

- traffic control measures such as portable traffic signals or traffic controllers will be positioned at either end of sections of road where two way traffic is not feasible by heavy vehicles simultaneously with a one lane one way traffic system operating between traffic control on Upper Bylong Road
- an emergency response plan will be developed for construction traffic incidents
- a pre and post construction assessment of road pavement assets will be conducted in areas likely to be used by construction traffic
- consideration of flooding on access roads and the use of alternative access roads
- implement measures so that mud or gravel is not tracked onto the road network from the access roads by construction vehicles
- public communications will be conducted to warn the community and local residents of vehicle movements and anticipated effects on the local road network relating to the site works
- access to all private properties adjacent to the works will be maintained during construction
- during Project inductions all heavy vehicle drivers will be provided with the emergency response plan for construction traffic incidents as well as safety measures for the level railway crossings
- undertake road safety audits where required or deemed necessary
- coordination of project staging, vehicle movement and scheduling, equipment and resourcing.

6.10 Construction methods

Construction methods will seek to manage the construction traffic impacts for the following:

- traffic management and vehicle queueing on the narrow sections of Upper Bylong Road where two lane two-way traffic for heavy vehicles simultaneously is not feasible during the construction stage
  - use traffic controllers or temporary traffic signals to manage traffic flows
  - limit simultaneous two way heavy vehicle use of Upper Bylong Road during construction
  - provide necessary warning signage and linemarking of the changed traffic conditions
- heavy vehicle traffic:
  - minimise the number of heavy vehicle trips on road
  - minimise the distance travelled by heavy vehicles by encouraging multi-drop delivery trips
  - minimise disruption on the local road network by using nominated haulage routes, which aim to avoid sensitive areas such as schools (wherever possible)
  - minimise the running of empty trucks
- construction worker traffic:
  - encourage the use of alternative travel modes to the work sites. Encourage car ‘pooling’ where possible
  - potential introduction of bus service between Mudgee and Bylong mine site subject to future investigation and upgrade of Wollar Road
  - provide emergency vehicle parking within worksites
- temporary worksite access:
  - use existing accesses wherever possible
  - use traffic controllers to manage site access
  - close and lock site access points/gates after construction hours
  - minimise construction traffic during school start and end times near schools.

6.11 Subsidence and extraction management plan

The impacts of subsidence will be managed according to subsidence and extraction management plans. The subsidence impacts to the existing Bylong Valley Way structure will be managed by carrying out various monitoring and mitigation works on the road structure. KEPCO will conduct a range of visual inspections and monitoring over the area being mined by underground mining operations to identify the impacts as they are occurring and confirming any mitigation measures that need to be implemented to ensure road safety issues are appropriately managed.

6.12 Property access

KEPCO will work in close collaboration with the MWRC and local residents within the study area affected by the Project to make sure that property access is maintained and that adequate roadway is provided for servicing properties. This will include consultation in relation to the various road closures, road upgrades and realigned existing roads.

7. Road dilapidation

Road dilapidation inspections should be undertaken where the Project is likely to result in additional heavy vehicles traffic usage of the MWRC's maintained road network on a sustained basis. The inspections should consider the pavement and drainage structure in consultation with the RMS and MWRC prior to the commencement of construction and after construction is complete. Any damage resulting from construction of the Project, beyond normal wear and tear, should be repaired unless alternative arrangements are made with the relevant road authority.

8. Subsidence assessment

The effects of underground mining on roads will result in ground movement. This could include vertical subsidence, horizontal strains, ground curvature and tilt. Subsidence may impact on road geometry, structures and water courses.

The subsidence effects associated with the underground mining operations for the Project are anticipated to result in impacts to the local road network in the vicinity of the Subsidence Impact Limit. Subsidence effects will likely result in modified drainage characteristics on the road surface and surrounds (including additional ponding) and may cause road surfaces to crack and potentially experience heaving effects.

KEPCO is committed to ensuring that any impacts on the local road network due directly to subsidence are remediated to ensure the ongoing safety of the road network. Ongoing visual inspections of the public road network (referring to Bylong Valley Way) within the Subsidence Study Area will be undertaken during the active subsidence period to identify any areas on the network requiring immediate attention by KEPCO in consultation with and to the approval of MWRC.

9. Construction traffic management

Prior to any construction commencing, a construction traffic management plan should be prepared as part of the pre-construction planning. The construction traffic management plan should detail how the traffic associated with the construction will be managed in accordance with the Roads and Traffic Authority 2010, *Traffic Control at Work Sites*, as well as relevant Australian Standards including AS1742.

The Construction Traffic Management Plans should be developed for the narrow section of Upper Bylong Road during the construction period where two-way simultaneous heavy vehicle traffic movements are not considered feasible. Plans should also be developed for the road upgrades, road widening and new intersections with particular attention to those locations in close proximity of the railway line and level railway crossings.

The construction traffic management plan should also be used to develop site-specific traffic management measures once the construction methods and haulage routes are finalised. These measures should be developed as part of the site-specific management plans to indicate how traffic should be controlled and managed during each stage of the construction.

The construction traffic management plan should contain the following information:

- The proposed works and construction traffic impacts:
  - Proposed construction activities.
  - Estimated duration of the works.
  - Increased traffic volume by vehicle type.
  - Anticipated or designated routes for the delivery of materials and equipment.
  - Summary of the potential construction impacts on the road network and any feasible measures to reduce the forecast impacts.
- Considerations:
  - Retention of local property and emergency access where practicable.
  - Provide a swept path analysis to ascertain that sufficient manoeuvring space is provided for all vehicles at intersections along the haulage routes.
  - Warning signs to advise road users in advance of work zones and surrounding intersections.
  - Safety signage to be installed to warn construction vehicle drivers of the presence of cyclists and pedestrians.
  - U-turn facilities for construction vehicles where necessary.
  - Emphasis on the school bus routes.
  - Repair damaged road pavement and pavement shoulder.
- Stakeholders:
  - The main stakeholders in the construction traffic management plan.
  - Roles and responsibilities of all stakeholders.
  - Contact details for all stakeholders.

- The person responsible for developing, updating and implementing the plan.
- Any required approvals and licenses.

- Community consultation:
  - Direct consultation with affected residents who are directly impacted by road closures are involved and informed of KEPCO plans to minimise transport impacts
  - Letterbox drops to local residents advising of potential property access restrictions (if required).
  - Signposting and advertising to warn motorists of proposed road closures and traffic diversions and other temporary traffic arrangements.
  - Advertisements in local newspapers.

Traffic control plans should be prepared as part of the construction traffic management plan for specific stages of work or locations as required. A review of temporary road work traffic control measures, signage and speed limits in areas of potential risk will also be undertaken.

The construction traffic management plan should also outline procedures to audit implementation of the plan and particularly to ensure safety aspects are being observed.

The construction traffic management plan should be prepared in consultation with and to the approval of the MWRC as the relevant roads authority.

10. Conclusions

The Project is remotely located within the Bylong Valley, which is primarily accessed by the Bylong Valley Way which links the Golden Highway to the north-east with the Castlereagh Highway to the south-east.

KEPCO has held discussions with the MWRC in relation to the upgrades to Wollar Road. The upgrade of the Wollar Road will place Mudgee within less than an hours drive from the Project and make it an attractive and suitable place of residence for the Project employees and support local MWRC community.

The Project's impacts on the existing road and rail network have been assessed utilising the various environmental planning instruments, policies, guidelines and plans including the RMS Guide to Traffic Generating Developments, Austroads Guides to Road Design and Traffic Studies and RMS Supplements.

As documented in Table 1.1 the various Secretary's Environmental Assessment Requirements (SEARs) and Agency Requirements have been addressed in this report.

The assessment has shown that the Project will have a minimal impact on the surrounding road network in terms of road traffic. The Bylong Valley Way, Upper Bylong Road and Wollar Road will continue to operate within plenty of spare capacity and at more than reasonable levels of service throughout the life of the Project.

Only small impacts to the operation of the Wollar Road/Ulan–Wollar Road and Wollar Road/Ulan Road intersections are anticipated during peak Project traffic periods.

The assessment of the potential implications of the Project on the capacity of the rail network has determined that ARTC is well prepared for the additional capacity required for the Project. Accordingly, minimal impacts are anticipated to the capacity of the Sandy Hollow to Gulgong Railway Line.

The Project proposes to upgrade existing roads and intersections and build new roads and intersections as required. Road upgrades include the widening of Upper Bylong Road between Bylong Valley Way and the open cut MIA, the realignment of Upper Bylong Road to the east, a new access road from Upper Bylong Road to the underground MIA and the improvements to the existing driveway access from Bylong Valley Way to the proposed WAF.

The closure of Upper Bylong Road south of the open cut mine area will impact residents to the south. Alternative routes will include Lee Creek Road or Budden Gap Road; however due to the state of these road being unsealed, this would be an unfavourable alternative. KEPCO will need to reach an agreement with the MWRC in relation to the upgrade of either Lee Creek or Budden Gap Road to provide a suitable route to Bylong Valley Way and Bylong Village for these residents. The planning approvals for these roads will be subject to a separate application with the MWRC.

KEPCO will consult directly with affected residents who are directly impacted by road closures and will make sure that residents are involved and informed of the plans to minimise transport impacts.

Subsidence related impacts will be managed according to relevant mine planning protocols, and will endeavour to manage and maintain any impacts to the road surface.

Several mitigation measures have been proposed to manage the Project related impacts as identified within this assessment.

The Projects impacts on the road network is minor and the surrounding road network and access intersections to the Project site have ample spare capacity to accommodate Project related traffic movements.

The Projects impacts on the rail network are minor with ample spare capacity provided on the Sandy Hollow to Gulgong Railway line. The Projects rail loop has also been designed not to impact or interfere with train movements on the main line (Sandy Hollow to Gulgong Railway line).

11. References

The following documents were referenced in preparation of this study:

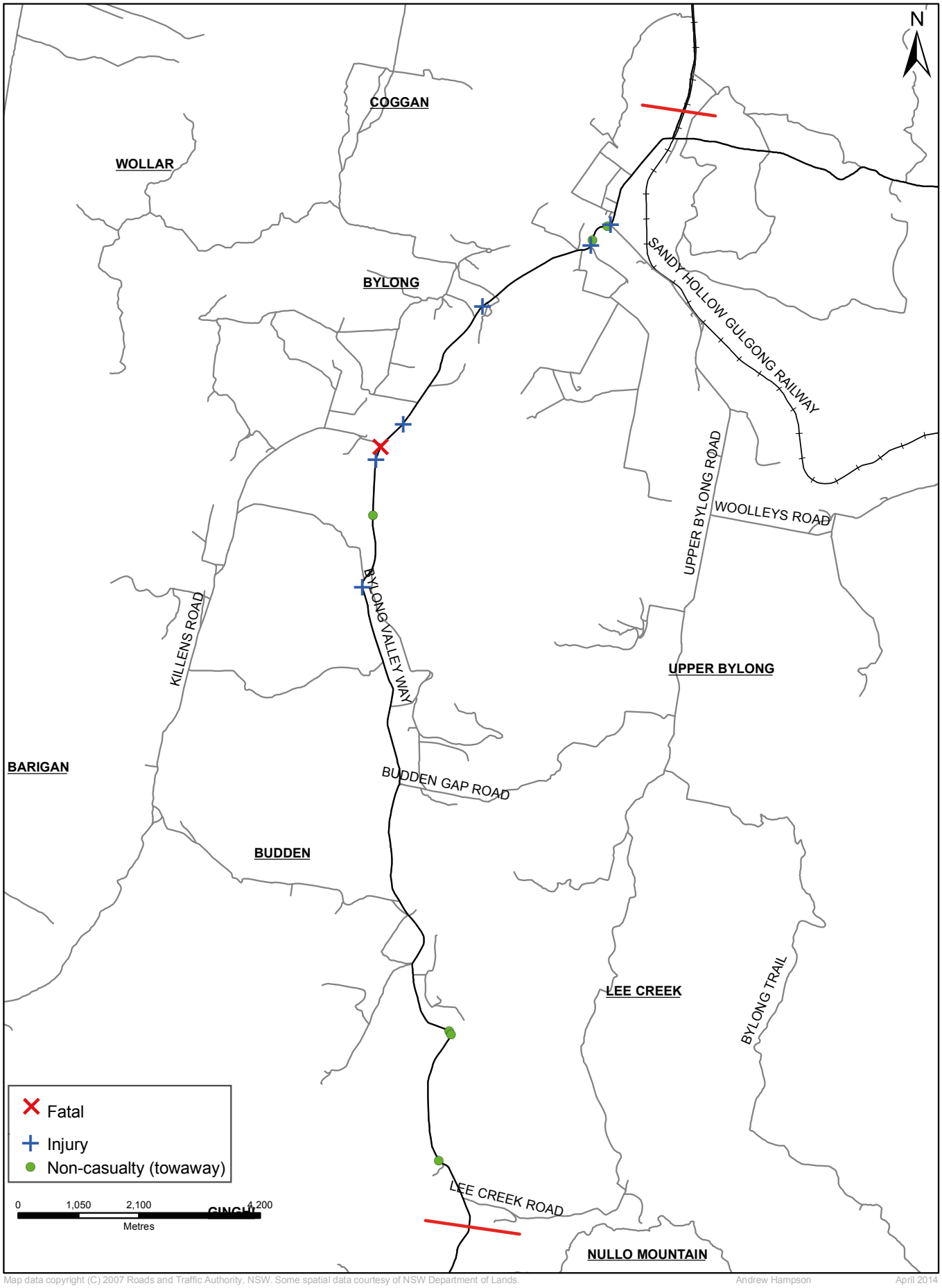
- *Bylong Coal Project, Gateway Certificate Application Supporting Document* – Hansen Bailey (January 2014).
- *Bylong Coal Project – Feasibility Study Chapter 13* – Parsons Brinckerhoff (August 2014).
- *Bylong Coal Project – Pit to Port Logistics Study* – Hatch (July 2014).
- *Bylong Quarry Project, Traffic Assessment* – Wells Environmental (January 2012).
- *Development Control Plan 2013* – Mid-Western Regional Council (December 2013).
- G*uide to Traffic Generating Developments* – Roads and Maritime Services (2002).
- *Guide to Traffic Management Part 3: Traffic Studies and Analysis* – Austroads (2009).
- *Guide to Road Design Part4A: Unsignalised and Signalised Intersections* – Austroads (2010).
- *Moolarben Coal Project Stage 2, Traffic Impact Assessment Final, Appendix 12* – SKM (November 2008).
- *Mount Penny Coal Project, Traffic Impact Assessment* – SKM (February 2012).
- *Operating Conditions: Specific permits for oversize and overmass vehicles and loads* – Roads and Maritime Services (2008).
- *NSW Dangerous Goods (Roads and Rail Transport) Regulation* – NSW Government (2009).
- *Social Impact Assessment Assumptions* – Hansen Bailey (2014).
- *The Ulan Coal Continued Operations Project at Ulan, Appendix 13* – Transport & Urban Planning (August 2009).
- *Wilpinjong Coal Project, Road Transport Assessment, Appendix K* – Traffix (April 2005).
- *2014-2023 Hunter Valley Corridor Capacity Strategy* – ARTC (July 2014).

Appendix A

RMS crash data

Bylong Valley Way, Wollar Road to Lee Creek Road, Bylong

Crash period 01/07/2008 to 30/06/2013
plus provisional data (which is incomplete & subject to change) to date



Andrew Hampson
April 2014

Detailed Crash Report - sorted

Transport for NSW
Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
					Natural Lighting															S F
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
669444	12/02/2009	Thu	22:30	2.16 km W	BYLONG TN	2WY	CRV	Fine	Dry	100	1	M/C	M23	W in BYLONG VALLEY WAY	85 Proceeding in lane		I	0	1	S
E36119244					Darkness	DCA : 805		Out of control on bend												
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
698582	06/02/2010	Sat	16:45	45 km N	RYLSTONE TN	2WY	STR	Raining	Wet	100	1	M/C	M70	S in BYLONG VALLEY WAY	Unk Proceeding in lane		I	0	1	F
E42326888					Daylight	DCA : 705		Out of control on cway												
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
722183	02/07/2010	Fri	18:00	at	SERVICE SN	2WY	STR	Raining	Wet	50	2	TRK	M33	S in BYLONG VALLEY WAY	Unk Proceeding in lane		N	0	0	
E190058093					Darkness	DCA : 704		Right off cway into obj				TRK		N in BYLONG VALLEY WAY	0 Parked					
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
726797	01/10/2010	Fri	15:00	15 m N	UPPER BYLONG RD	2WY	CRV	Fine	Dry	50	2	WAG	M55	W in BYLONG VALLEY WAY	15 Perform U-turn		I	0	3	
E42305818					Daylight	DCA : 304		Same - U-turn				LOR	M U	W in BYLONG VALLEY WAY	45 Proceeding in lane					
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
742325	11/02/2011	Fri	17:30	4.8 km S	BYLONG TN	2WY	CRV	Fine	Dry	100	1	CAR	F23	S in BYLONG VALLEY WAY	90 Proceeding in lane		I	0	1	S
E44367065					Daylight	DCA : 803 R		Off right bend into obj				Fence (prior to 2014)								
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
769616	11/09/2011	Sun	04:40	3.155 km N	LEE CREEK RD	2WY	CRV	Fine	Dry	100	1	4WD	M30	S in BYLONG VALLEY WAY	70 Proceeding in lane		N	0	0	S
E48174181					Darkness	DCA : 801 R		Off cway right bend												
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
791954	26/11/2011	Sat	10:00	225 m S	BYLONG RIVER BDGE	2WY	CRV	Fine	Dry	100	1	M/C	M53	W in BYLONG VALLEY WAY	80 Proceeding in lane		I	0	1	S
E47463005					Daylight	DCA : 805		Out of control on bend												
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
779065	22/12/2011	Thu	16:00	40 m S	UPPER BYLONG RD	2WY	CRV	Raining	Wet	50	1	4WD	F20	S in BYLONG VALLEY WAY	50 Proceeding in lane		N	0	0	
E46937728					Daylight	DCA : 804 R		Off left bend into obj				Utility pole								
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
816751	08/11/2012	Thu	07:35	800 m N	LEE CREEK RD	2WY	CRV	Overcast	Dry	100	1	4WD	M51	N in BYLONG VALLEY WAY	90 Proceeding in lane		N	0	0	S
E49948279					Daylight	DCA : 803 L		Off right bend into obj				Fence (prior to 2014)								
Western Region					**Mid-Western Regional LGA**			**Bylong**						**Bylong Valley Way**						
810285	22/11/2012	Thu	18:15	5 km S	BYLONG TN	2WY	CRV	Fine	Dry	100	1	M/C	M57	N in BYLONG VALLEY WAY	Unk Proceeding in lane		F	1	0	S F
E237157593					Daylight	DCA : 803 L		Off right bend into obj				Tree/bush								

Detailed Crash Report - sorted

Transport for NSW
Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors S	Factors F
Natural Lighting																						
Western Region				**Mid-Western Regional LGA**			**Bylong**								**Bylong Valley Way**							
829374	09/03/2013	Sat	13:20	5.62 km	N	KILLENS RD	2WY	CRV	Fine	Dry	100	2	M/C	M41	N in BYLONG VALLEY WAY	90 Incorrect side		I	0	1	S	
E50347370				Daylight			DCA : 201	Opp - Head on					WAG	M68	S in BYLONG VALLEY WAY	40 Proceeding in lane						
Western Region				**Mid-Western Regional LGA**			**Bylong**								**Bylong Valley Way**							
845307	04/07/2013	Thu	14:00	6.25 km	S	BYLONG TN	2WY	STR	Fine	Dry	80	1	CAR	F19	N in BYLONG VALLEY WAY	75 Proceeding in lane		N	0	0		F
E51585617				Daylight			DCA : 701	Off carriageway to left														
Western Region				**Mid-Western Regional LGA**			**Bylong**								**Bylong Valley Way**							
844910	19/07/2013	Fri	12:20	30 km	N	LUE RD	2WY	CRV	Unk	Wet	100	1	CAR	M23	N in BYLONG VALLEY WAY	Unk Proceeding in lane		N	0	0		
E219093494				Daylight			DCA : 804 R	Off left bend into obj					Guide Post									

Report Totals: Total Crashes: 13 Fatal Crashes: 1 Injury Crashes: 6 Killed: 1 Injured: 8

Crashid dataset Bylong Valley Way, Wollar Road to Lee Creek Road, Bylong - crash data from 01/07/2008 to 30/06/2013 plus provisional data to date

Note: Ordered by: Crash Date,Crash Time,Crash No. Data for the 9 month period prior to the generated date of this report are incomplete and are subject to change.

Summary Crash Report

Transport for NSW
Centre for Road Safety

# Crash Type		
Car Crash	8	61.5%
Light Truck Crash	1	7.7%
Rigid Truck Crash	1	7.7%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(1)	(7.7%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(1)	(7.7%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	5	38.5%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	0	0.0%
Non intersection	13	100.0%

* Up to 10 metres from an intersection
~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	10	76.9%
Multi Vehicle	3	23.1%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	13	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	7	53.8%
Fatigue	3	23.1%

Weather		
Fine	8	61.5%
Rain	3	23.1%
Overcast	1	7.7%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	4	30.8%
Dry	9	69.2%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	10	76.9%
Dusk	0	0.0%
Darkness	3	23.1%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	1	7.7%
Opposing vehicles; turning	0	0.0%
U-turn	1	7.7%
Rear-end	0	0.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	1	7.7%
Off road on straight, hit object	1	7.7%
Out of control on straight	1	7.7%
Off road, on curve	1	7.7%
Off road on curve, hit object	5	38.5%
Out of control on curve	2	15.4%
Other crash type	0	0.0%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	1	7.7%
50 km/h zone	3	23.1%	90 km/h zone	0	0.0%
60 km/h zone	0	0.0%	100 km/h zone	9	69.2%
70 km/h zone	0	0.0%	110 km/h zone	0	0.0%
~ 40km/h or less	0	0.0%			

CRASHES	13	
Fatal crash	1	7.7%
Injury crash	6	46.2%
Non-casualty crash	6	46.2%

CASUALTIES	9	
Killed	1	11.1%
Injured	8	88.9%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group			% of Day
00:01 - 02:59	0	0.0%	12.5%
03:00 - 04:59	1	7.7%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	1	7.7%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	1	7.7%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	1	7.7%	4.2%
13:00 - 13:59	1	7.7%	4.2%
14:00 - 14:59	1	7.7%	4.2%
15:00 - 15:59	1	7.7%	4.2%
16:00 - 16:59	2	15.4%	4.2%
17:00 - 17:59	1	7.7%	4.2%
18:00 - 18:59	2	15.4%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	1	7.7%	8.3%

Street Lighting Off/Nil		% of Dark
2	of 3 in Dark	66.7%

Crashes		Casualties
3	2013	1
2	2012	1
4	2011	2
3	2010	4
1	2009	1

~ School Travel Time		
Involvement	1	7.7%

McLean Periods			% Week
A	1	7.7%	17.9%
B	1	7.7%	7.1%
C	2	15.4%	17.9%
D	2	15.4%	3.5%
E	0	0.0%	3.6%
F	0	0.0%	10.7%
G	5	38.5%	7.1%
H	1	7.7%	7.1%
I	0	0.0%	12.5%
J	1	7.7%	10.7%

Day of the Week						# Holiday Periods		
Monday	0	0.0%	Thursday	5	38.5%	Sunday	1	7.7%
Tuesday	0	0.0%	Friday	4	30.8%	WEEKDAY	9	69.2%
Wednesday	0	0.0%	Saturday	3	23.1%	WEEKEND	4	30.8%

New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	0	0.0%
Aust. Day	0	0.0%	Labour Day	1	7.7%	June/July SH	1	7.7%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	1	7.7%
Anzac Day	0	0.0%	January SH	0	0.0%	December SH	1	7.7%

Crashid dataset Bylong Valley Way, Wollar Road to Lee Creek Road, Bylong - crash data from 01/07/2008 to 30/06/2013 plus provisional data to date
Note: Data for the 9 month period prior to the generated date of this report are incomplete and are subject to change.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

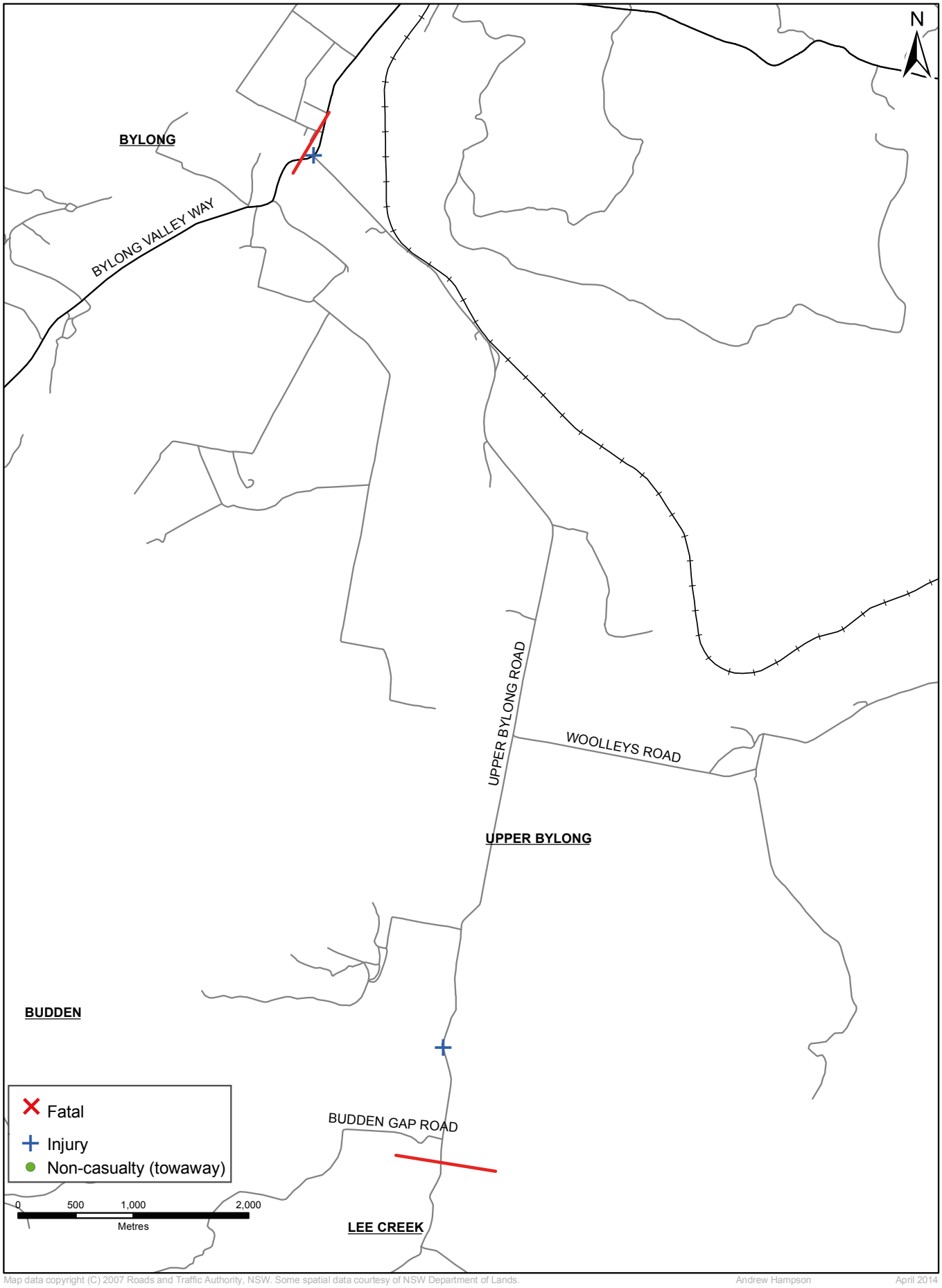
Rep ID: REG01 **Office:** Hunter **User ID:** hampsona

Generated: 06/05/2014 08:36

Upper Bylong Rd, Bylong Valley Way to Lee Creek Rd, Bylong

Crash period 01/07/2008 to 30/06/2013
plus provisional data (which is incomplete & subject to change) to date

Transport Roads & Maritime Services



Andrew Hampson April 2014

Detailed Crash Report - sorted

Transport for NSW
Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Western Region				**Mid-Western Regional LGA**			**Bylong**							**Bylong Valley Way**						
726797	01/10/2010	Fri	15:00	15 m N	UPPER BYLONG RD	2WY	CRV	Fine	Dry	50	2	WAG	M55	W in BYLONG VALLEY WAY	15 Perform U-turn		I	0	3	
E42305818				Daylight		DCA : 304	Same - U-turn					LOR	M U	W in BYLONG VALLEY WAY	45 Proceeding in lane					
Western Region				**Mid-Western Regional LGA**			**Bylong**							**Upper Bylong Rd**						
804018	11/07/2012	Wed	21:45	8.7 km S	BYLONG VALLEY WAY	2WY	CRV	Fine	Wet	100	1	4WD	M39	S in UPPER BYLONG RD	60 Proceeding in lane		I	0	1	
E50746384				Darkness		DCA : 804 L	Off left bend into obj					Tree/bush								

Report Totals: Total Crashes: 2 Fatal Crashes: 0 Injury Crashes: 2 Killed: 0 Injured: 4

Crashid dataset Upper Bylong Road, Bylong Valley Way to Lee Creek Road, Bylong - crash data from 01/07/2008 to 30/06/2013 plus provisional data to date
Note: Ordered by: Crash Date,Crash Time,Crash No. Data for the 9 month period prior to the generated date of this report are incomplete and are subject to change.

Summary Crash Report

Transport for NSW
Centre for Road Safety

# Crash Type		
Car Crash	2	100.0%
Light Truck Crash	0	0.0%
Rigid Truck Crash	1	50.0%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(1)	(50.0%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(1)	(50.0%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	0	0.0%
Non intersection	2	100.0%

* Up to 10 metres from an intersection
~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	1	50.0%
Multi Vehicle	1	50.0%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	1	50.0%
Unclassified Road	1	50.0%

Contributing Factors		
Speeding	0	0.0%
Fatigue	0	0.0%

Weather		
Fine	2	100.0%
Rain	0	0.0%
Overcast	0	0.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	1	50.0%
Dry	1	50.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	1	50.0%
Dusk	0	0.0%
Darkness	1	50.0%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	0	0.0%
U-turn	1	50.0%
Rear-end	0	0.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	0	0.0%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	1	50.0%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	1	50.0%	90 km/h zone	0	0.0%
60 km/h zone	0	0.0%	100 km/h zone	1	50.0%
70 km/h zone	0	0.0%	110 km/h zone	0	0.0%

~ 40km/h or less 0 0.0%

CRASHES	2	
Fatal crash	0	0.0%
Injury crash	2	100.0%
Non-casualty crash	0	0.0%

CASUALTIES	4	
Killed	0	0.0%
Injured	4	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group			% of Day
00:01 - 02:59	0	0.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	0	0.0%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	0	0.0%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	0	0.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	0	0.0%	4.2%
15:00 - 15:59	1	50.0%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	0	0.0%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	1	50.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
1	of 1 in Dark	100.0%

Crashes		Casualties
1	2012	1
1	2010	3

~ School Travel Time		
Involvement	0	0.0%

McLean Periods			% Week
A	0	0.0%	17.9%
B	0	0.0%	7.1%
C	0	0.0%	17.9%
D	0	0.0%	3.5%
E	0	0.0%	3.6%
F	0	0.0%	10.7%
G	1	50.0%	7.1%
H	0	0.0%	7.1%
I	1	50.0%	12.5%
J	0	0.0%	10.7%

Day of the Week						# Holiday Periods		
Monday	0	0.0%	Thursday	0	0.0%	Sunday	0	0.0%
Tuesday	0	0.0%	Friday	1	50.0%	WEEKDAY	2	100.0%
Wednesday	1	50.0%	Saturday	0	0.0%	WEEKEND	0	0.0%

New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	0	0.0%
Aust. Day	0	0.0%	Labour Day	1	50.0%	June/July SH	1	50.0%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	1	50.0%
Anzac Day	0	0.0%	January SH	0	0.0%	December SH	0	0.0%

Crashid dataset Upper Bylong Road, Bylong Valley Way to Lee Creek Road, Bylong - crash data from 01/07/2008 to 30/06/2013 plus provisional data to date
Note: Data for the 9 month period prior to the generated date of this report are incomplete and are subject to change.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Appendix B

Traffic demand diagrams

B1. PY 2 Traffic

Local peak hours

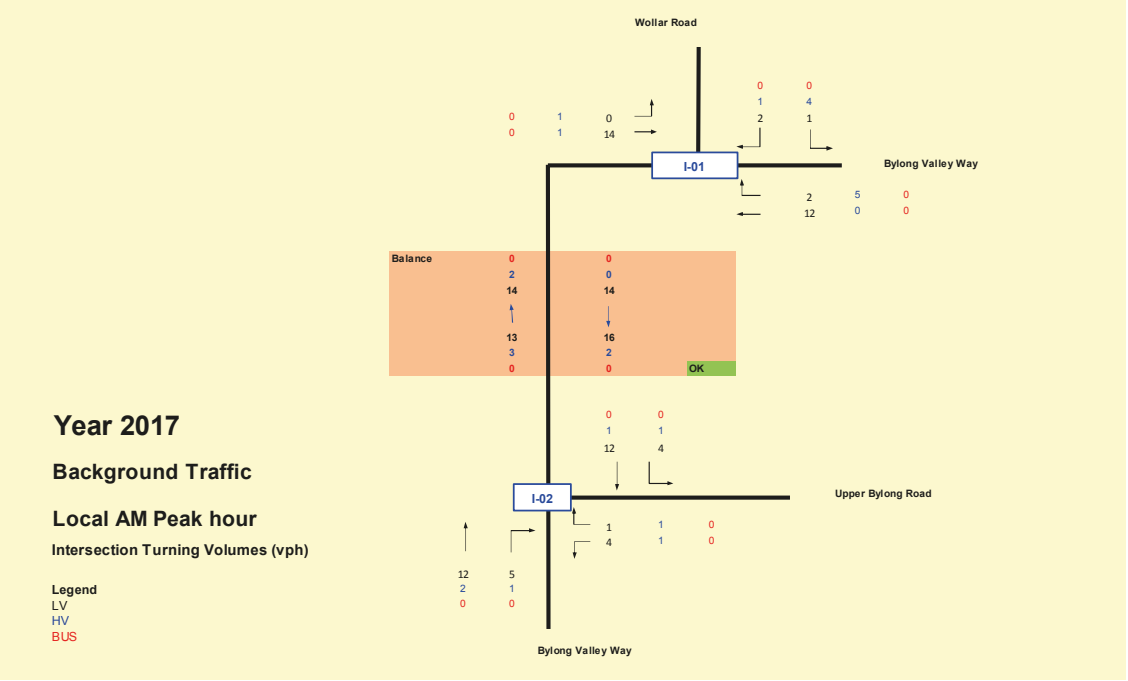


Figure B1.1 PY 2, 2017 AM local peak hour traffic volumes (vph) – scenario 1a

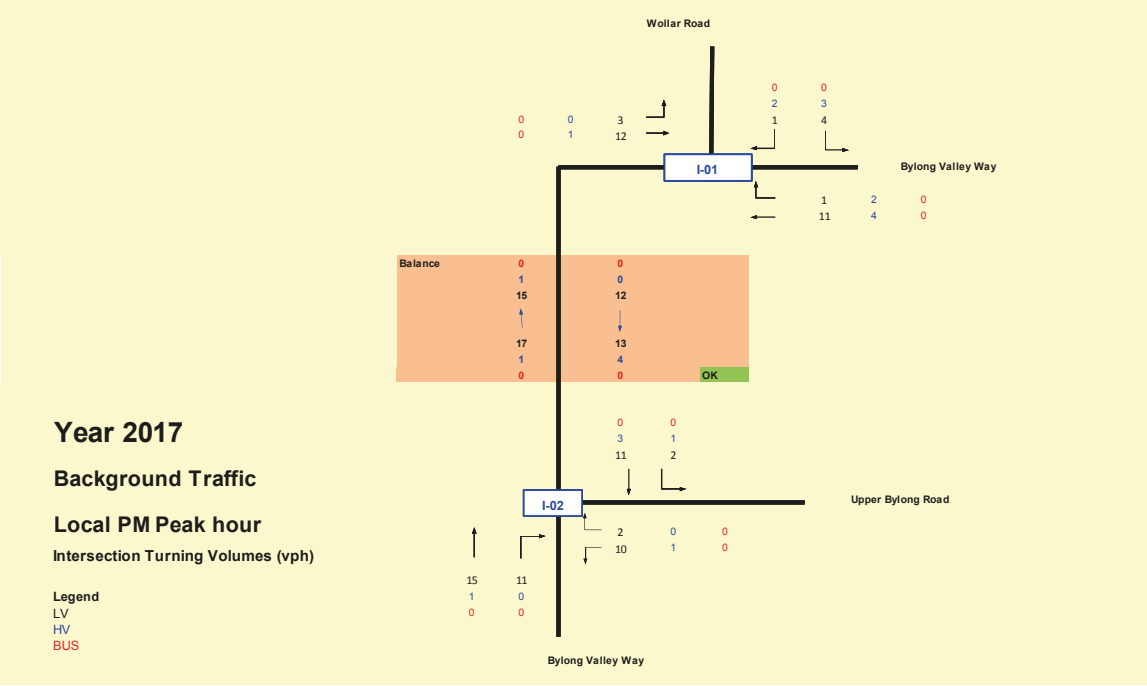


Figure B1.2 PY 2, 2017 PM local peak hour traffic volumes (vph) – scenario 1a

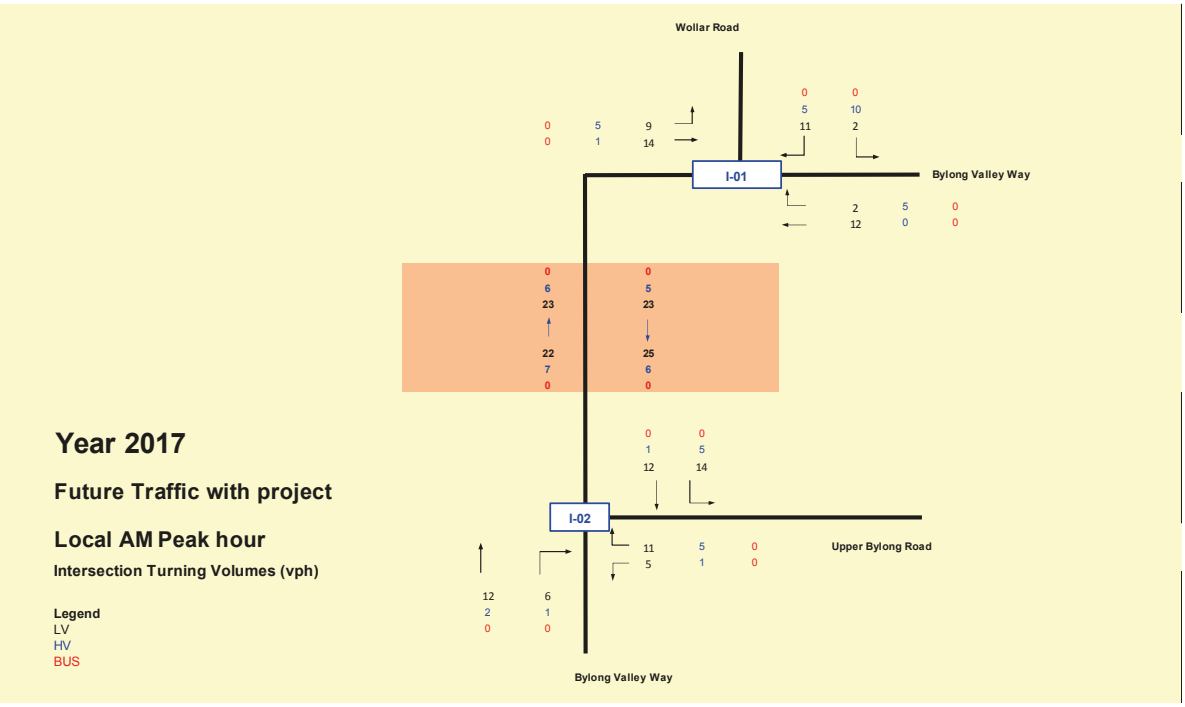


Figure B1.3 PY 2, 2017 AM local peak hour traffic volumes (vph) – scenario 1b (all options)

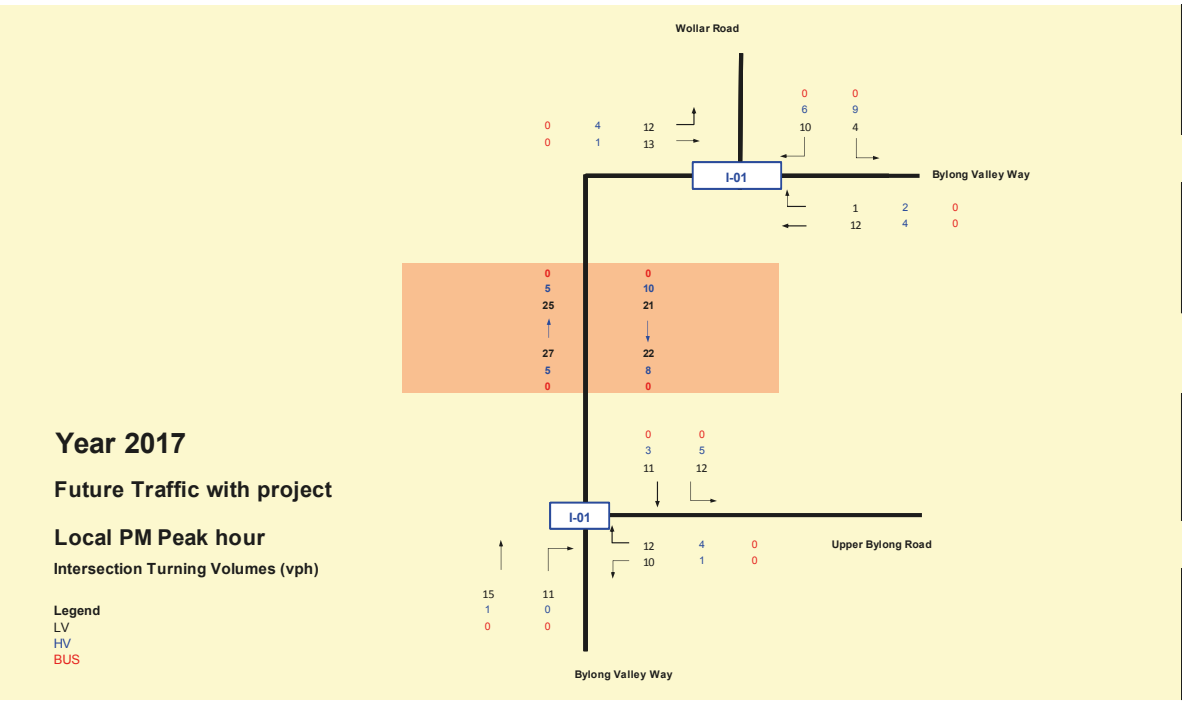


Figure B1.4 PY 2, 2017 PM local peak hour traffic volumes (vph) – scenario 1b (all options)

B2. PY 9 Traffic

Project peak hours

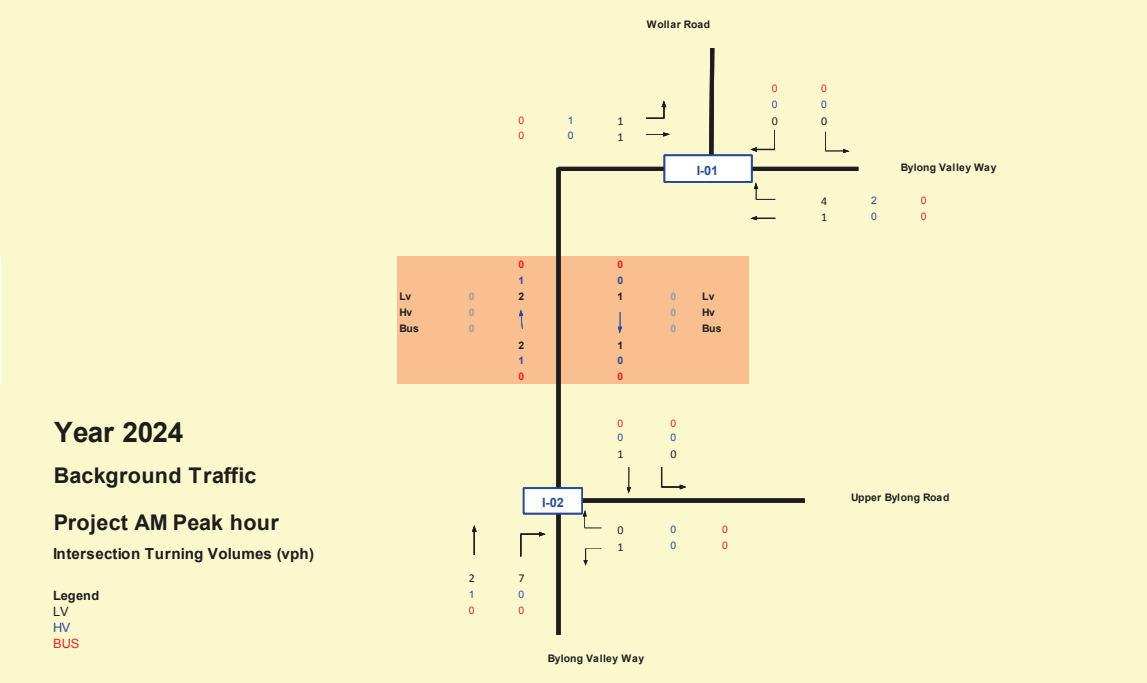


Figure B2.1 PY 9, 2024 AM project peak hour traffic volumes (vph) – scenario 2a

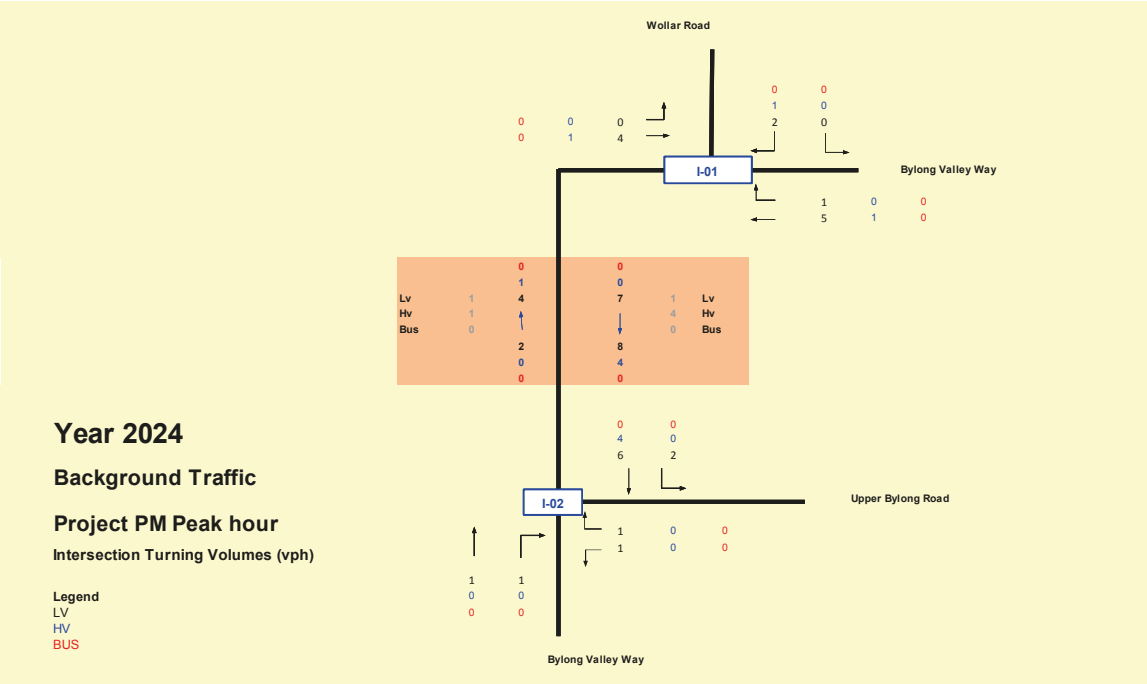


Figure B2.2 PY 9, 2024 PM project peak hour traffic volumes (vph) – scenario 2a

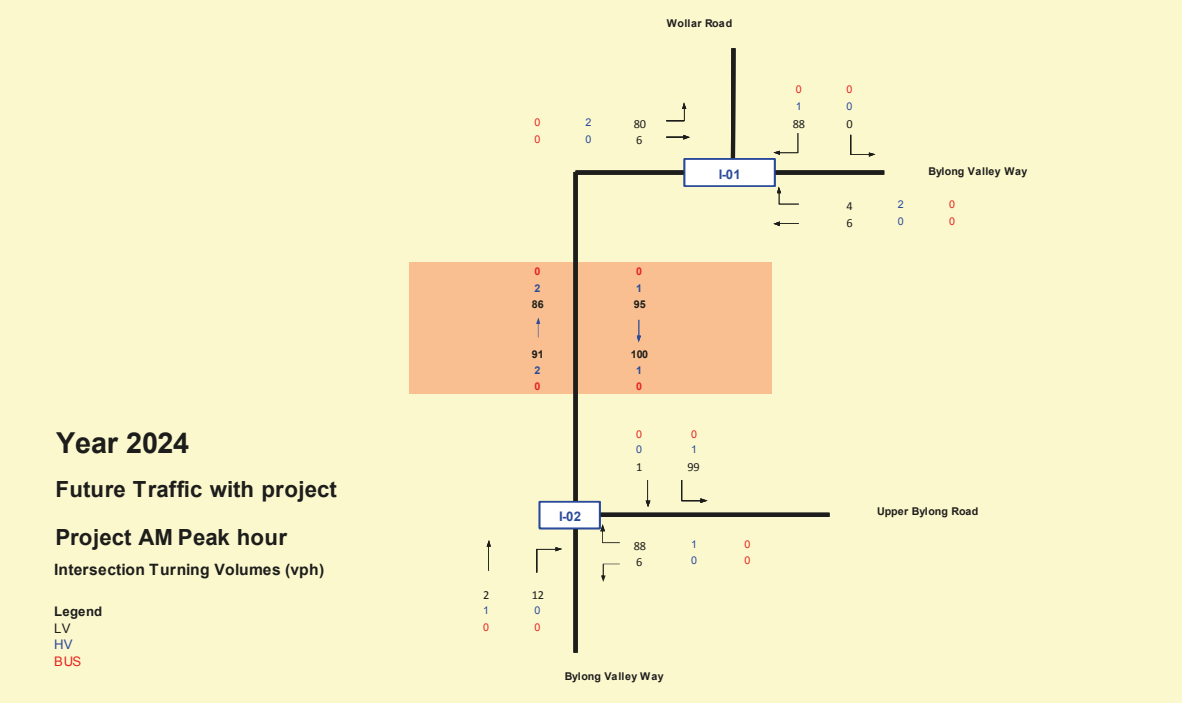


Figure B2.3 **PY 9, 2024 AM project peak hour traffic volumes (vph) – scenario 2b (preferred operations, Option 1)**

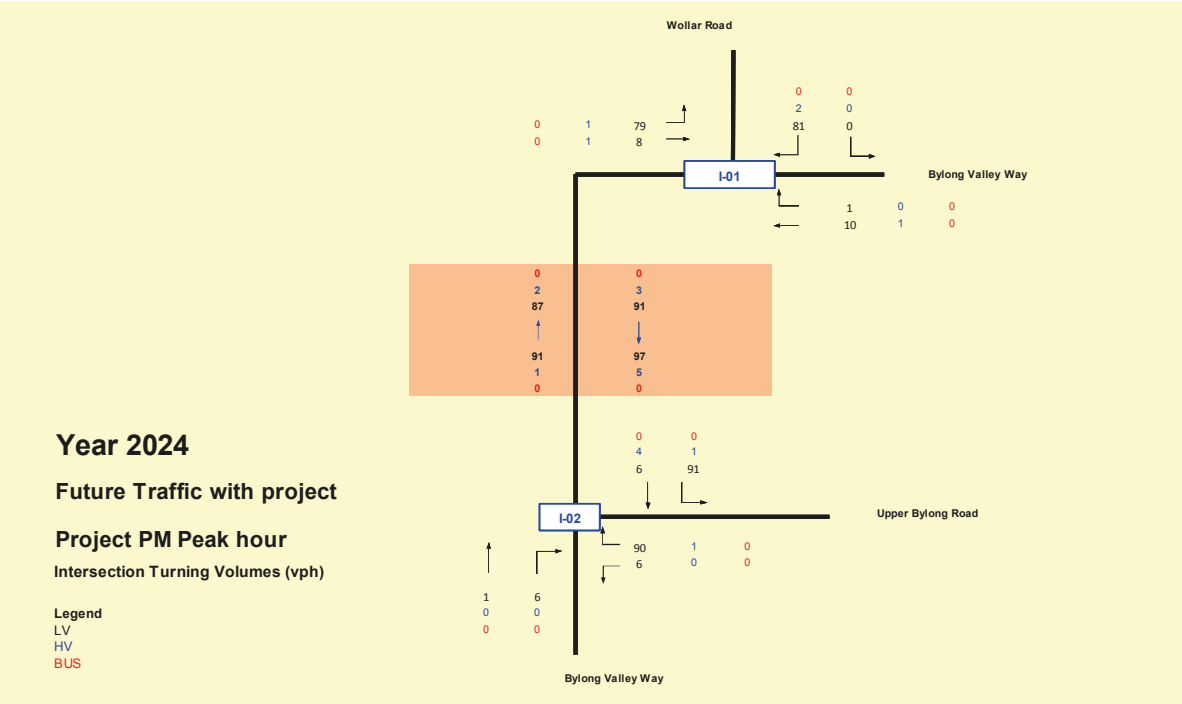


Figure B2.4 **PY 9, 2024 PM project peak hour traffic volumes (vph) – scenario 2b (preferred operations, Option 1)**

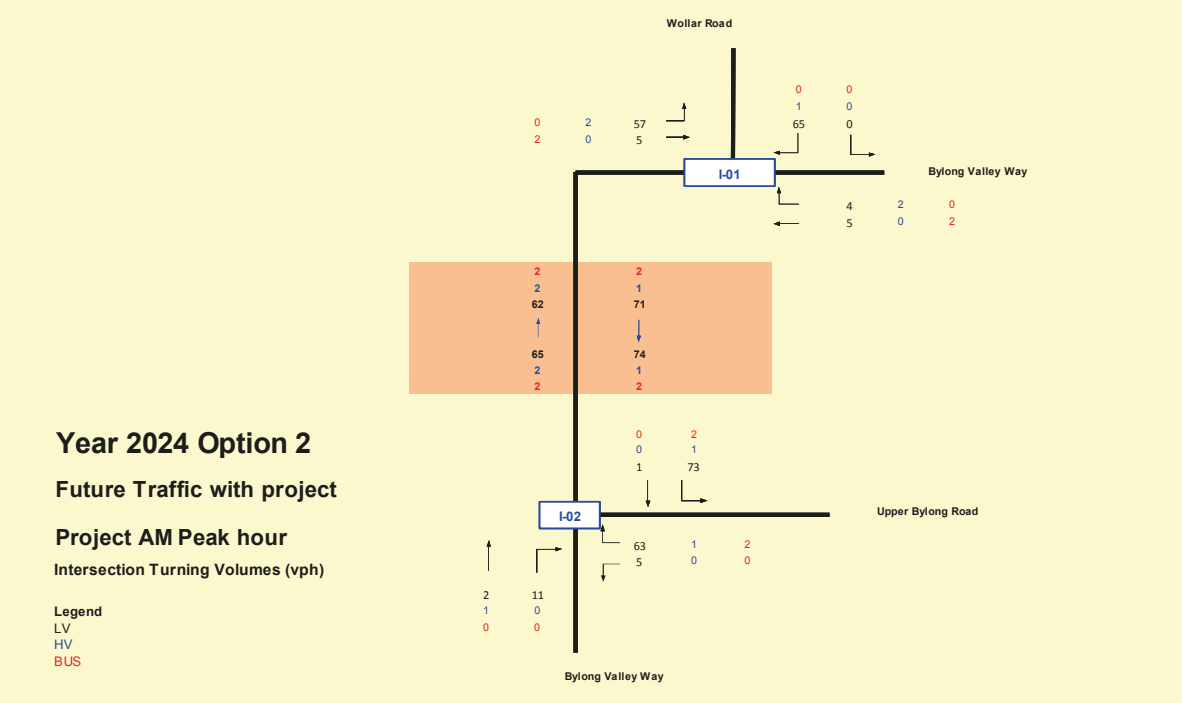


Figure B2.5 PY 9, 2024 AM project peak hour traffic volumes (vph) – scenario 2b (Sensitivity Option 2)

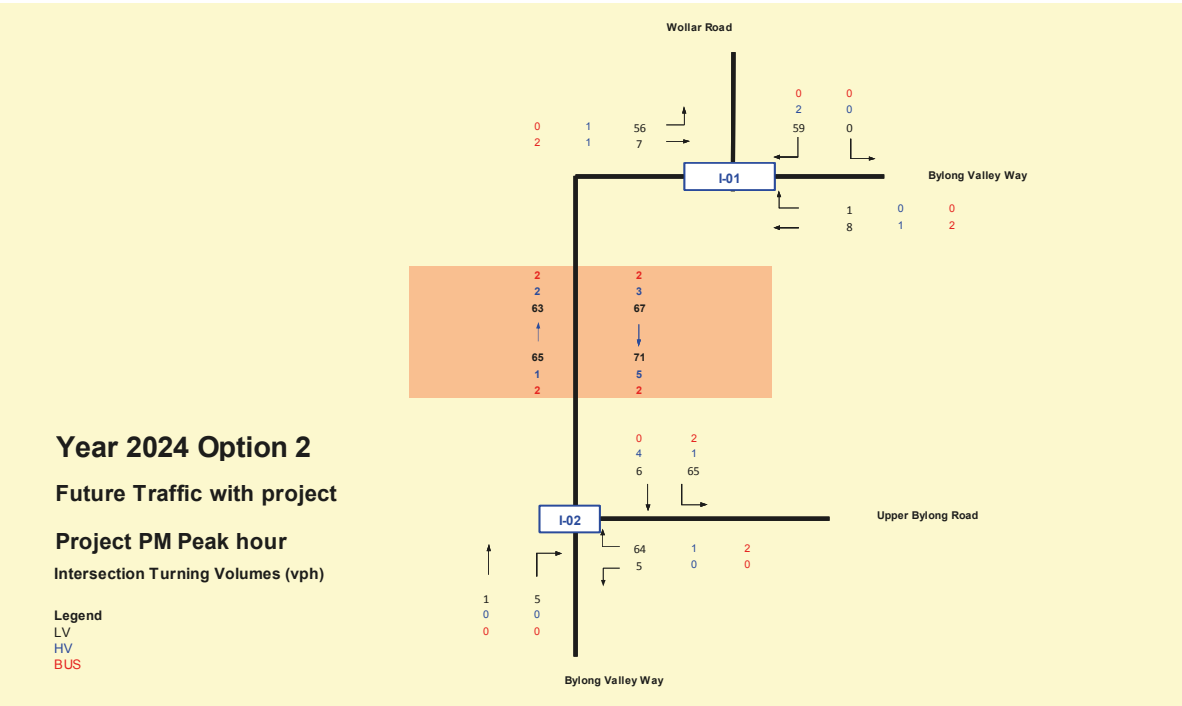


Figure B2.6 PY 9, 2024 PM project peak hour traffic volumes (vph) – scenario 2b (Sensitivity Option 2)

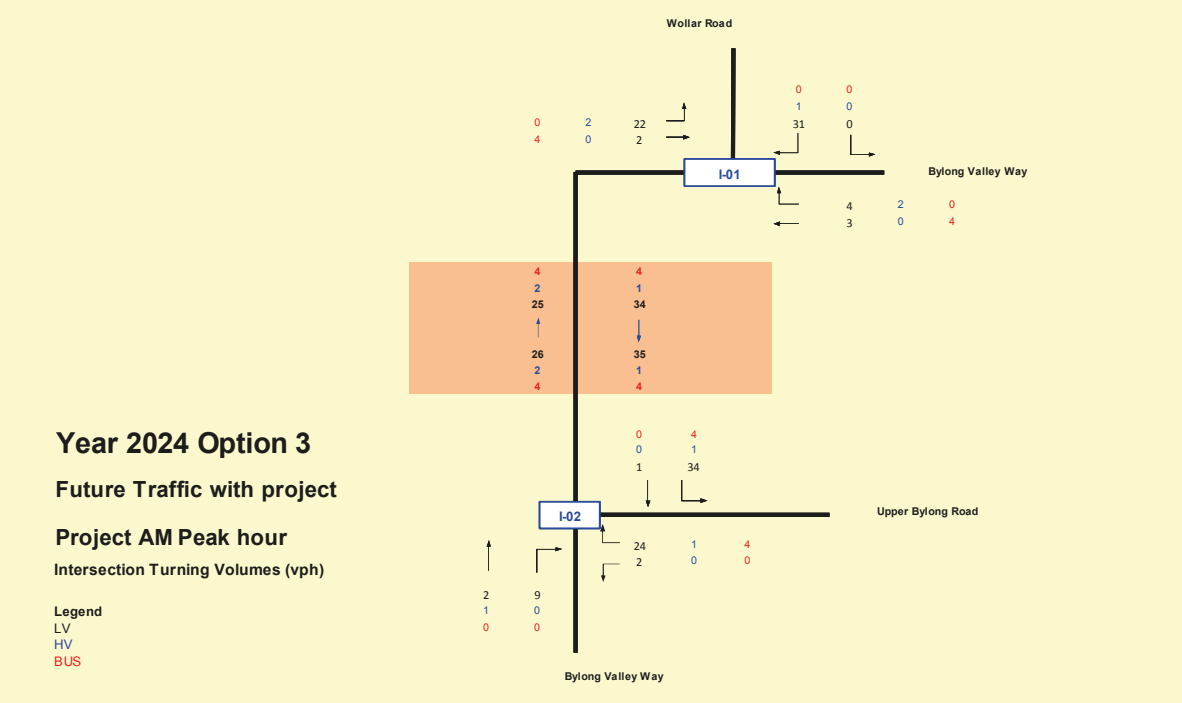


Figure B2.7 **PY 9, 2024 AM project peak hour traffic volumes (vph) – scenario 2b (Sensitivity Option 3)**

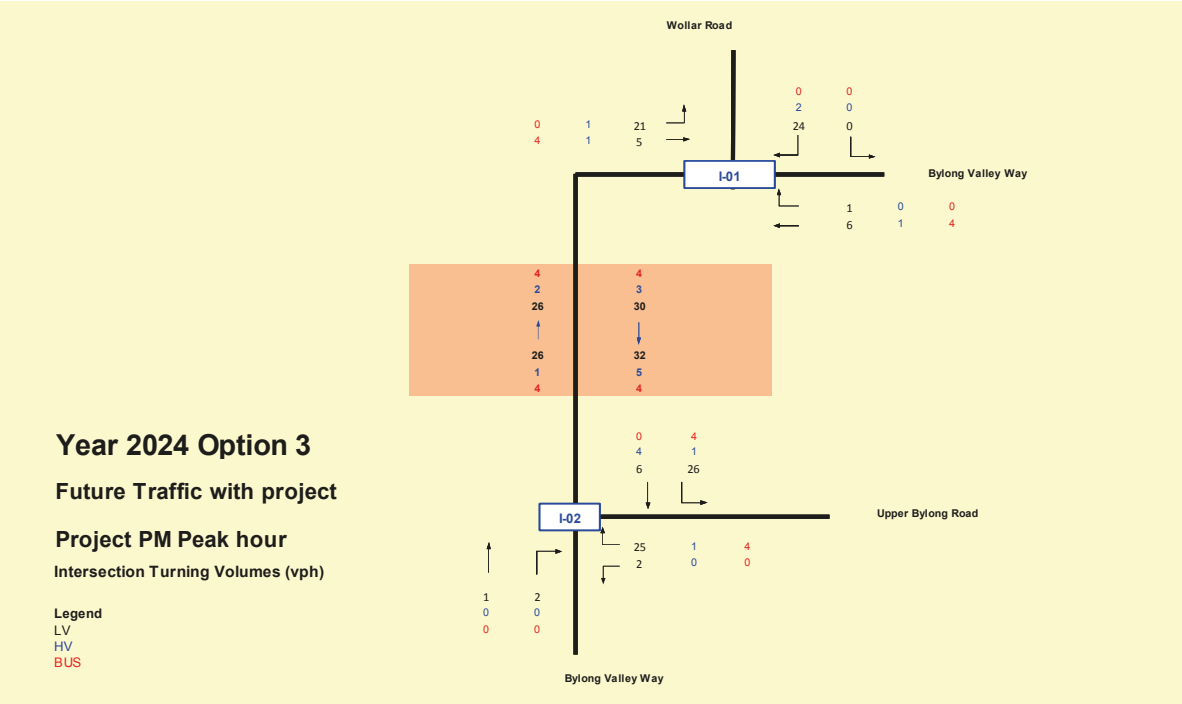


Figure B2.8 **PY 9, 2024 PM project peak hour traffic volumes (vph) – scenario 2b (Sensitivity Option 3)**

Local peak hours

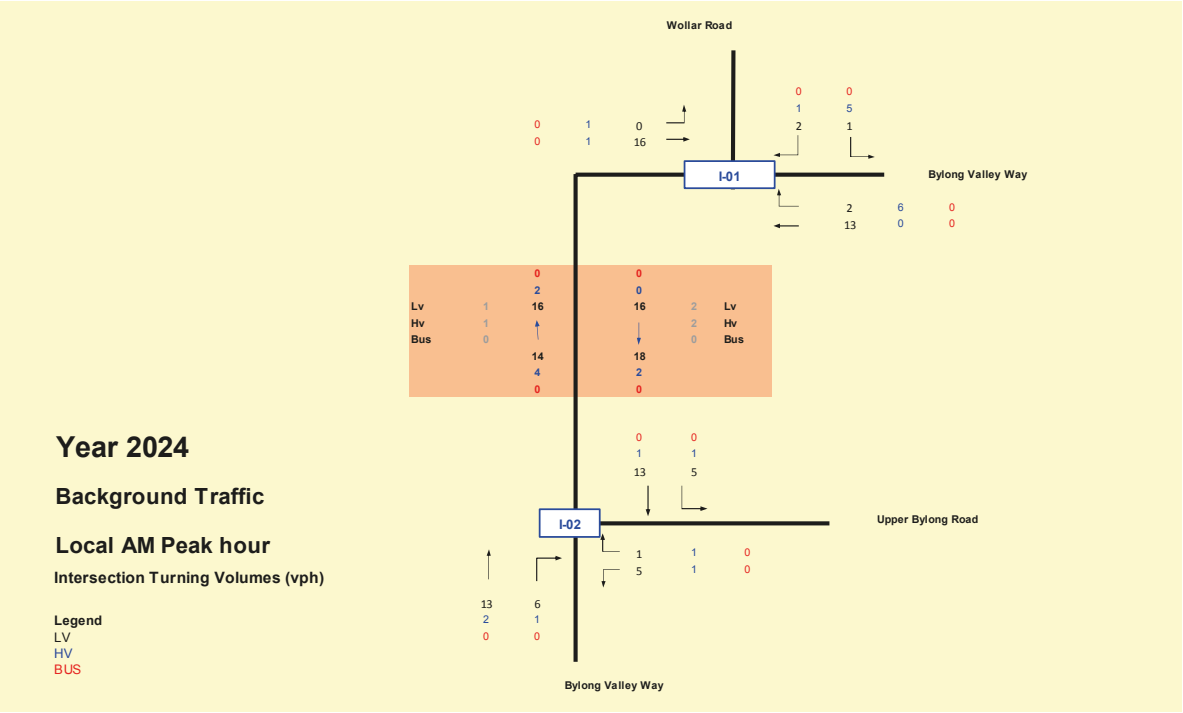


Figure B2.9 PY 9, 2024 AM local peak hour traffic volumes (vph) – scenario 2a

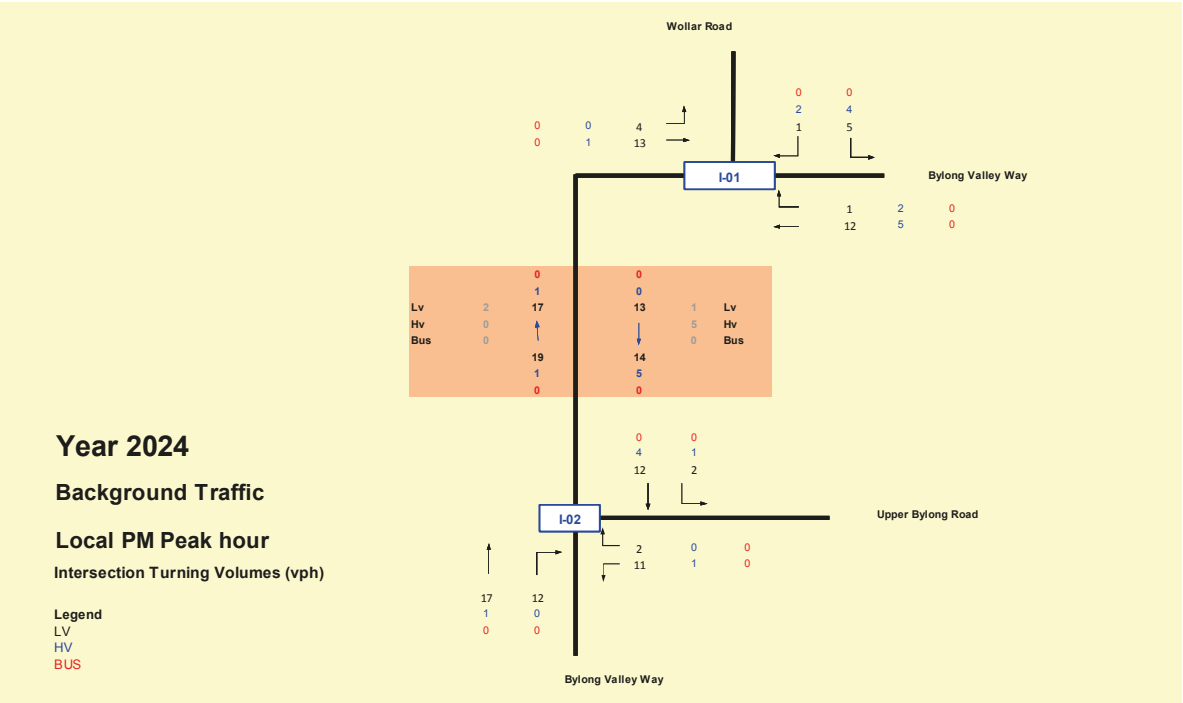


Figure B2.10 PY 9, 2024 PM local peak hour traffic volumes (vph) – scenario 2a

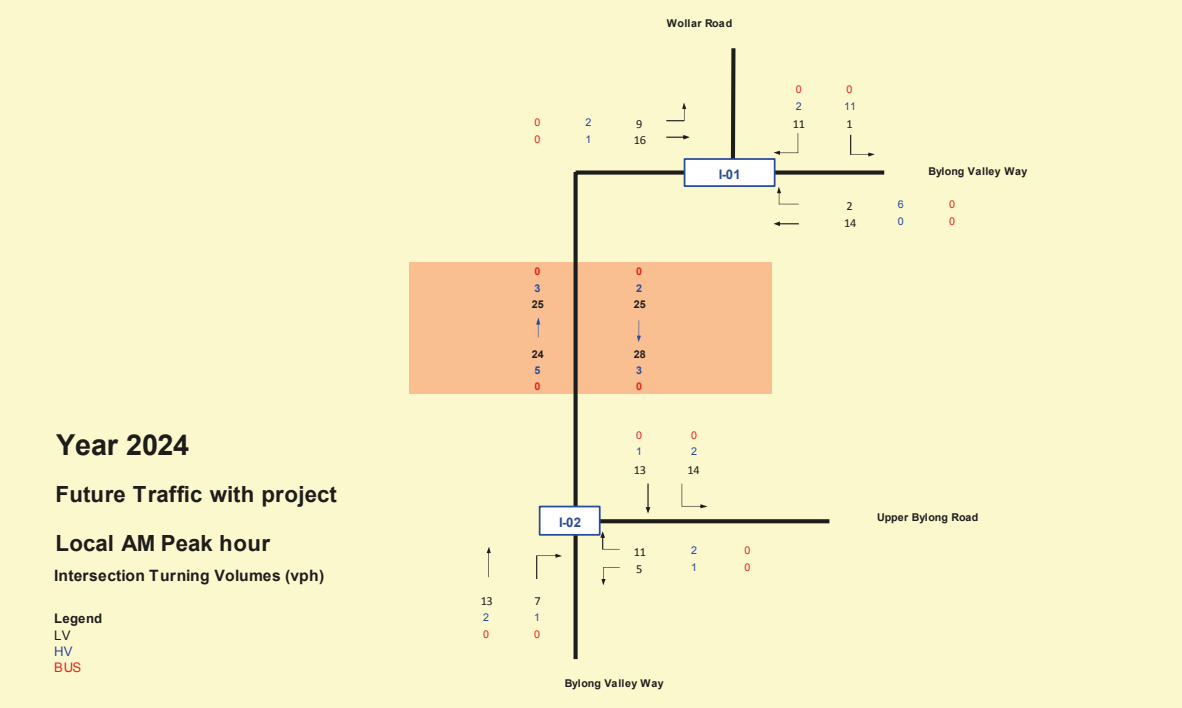


Figure B2.11 PY 9, 2024 AM local peak hour traffic volumes (vph) – scenario 2b (all options)

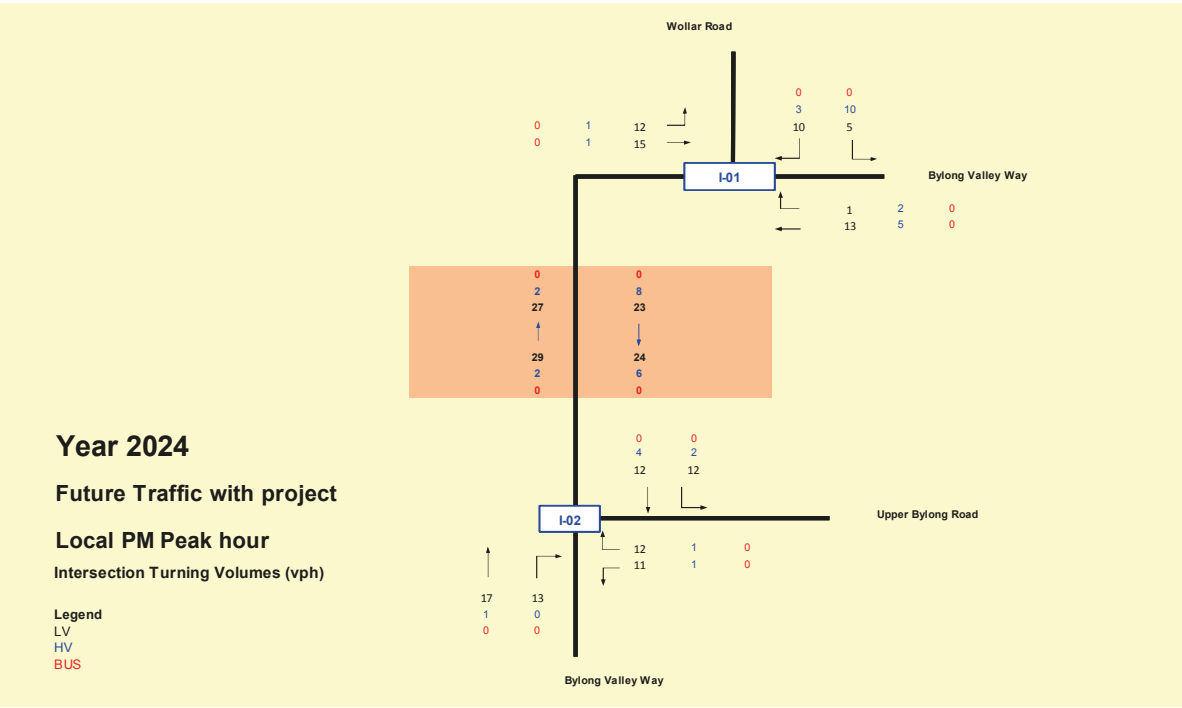


Figure B2.12 PY 9, 2024 PM local peak hour traffic volumes (vph) – scenario 2b (all options)

B3. PY 13 Traffic

Project peak hours

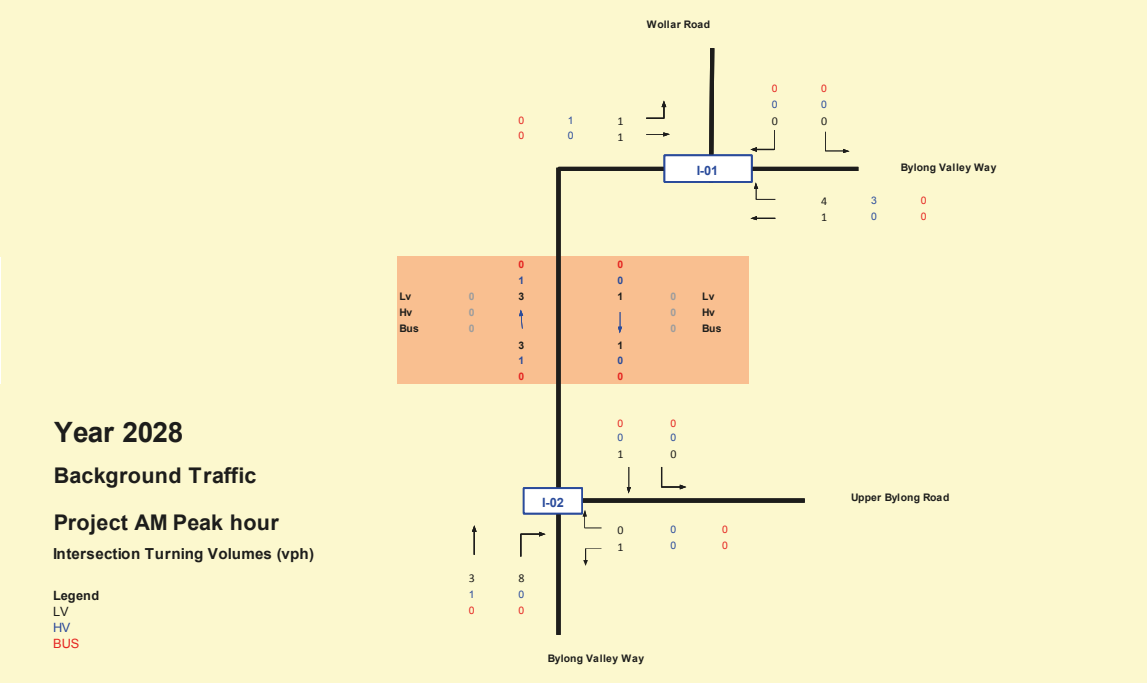


Figure B3.1 PY 13, 2028 AM project peak hour traffic volumes (vph) – scenario 3a

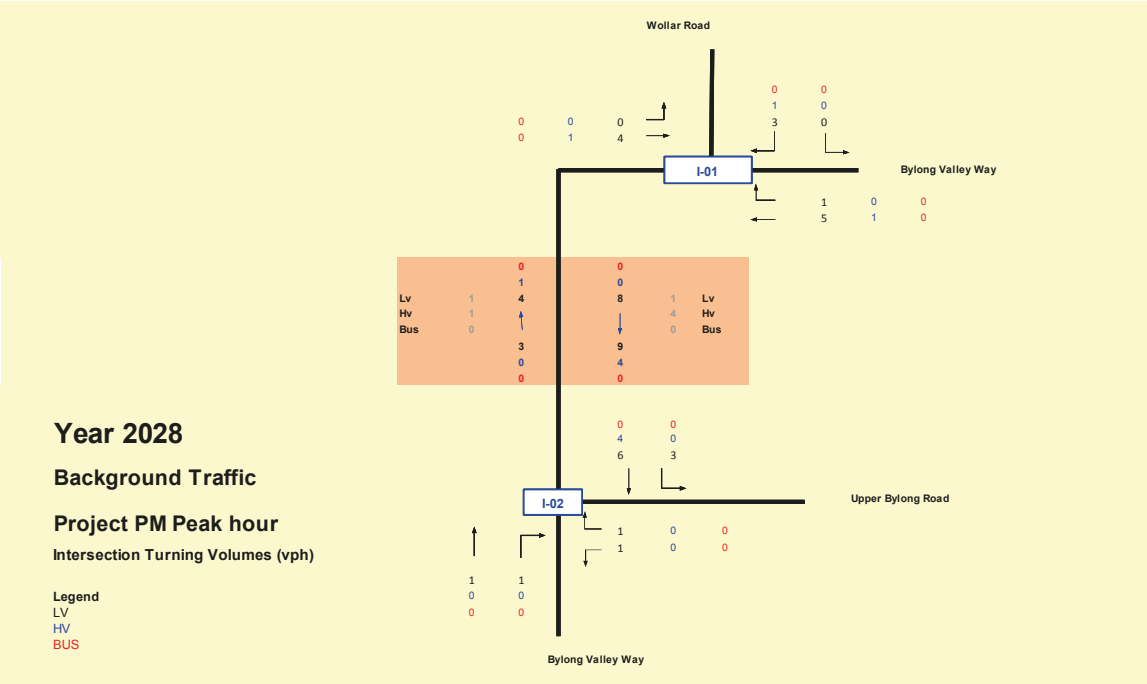


Figure B3.2 PY 13, 2028 PM project peak hour traffic volumes (vph) – scenario 3a

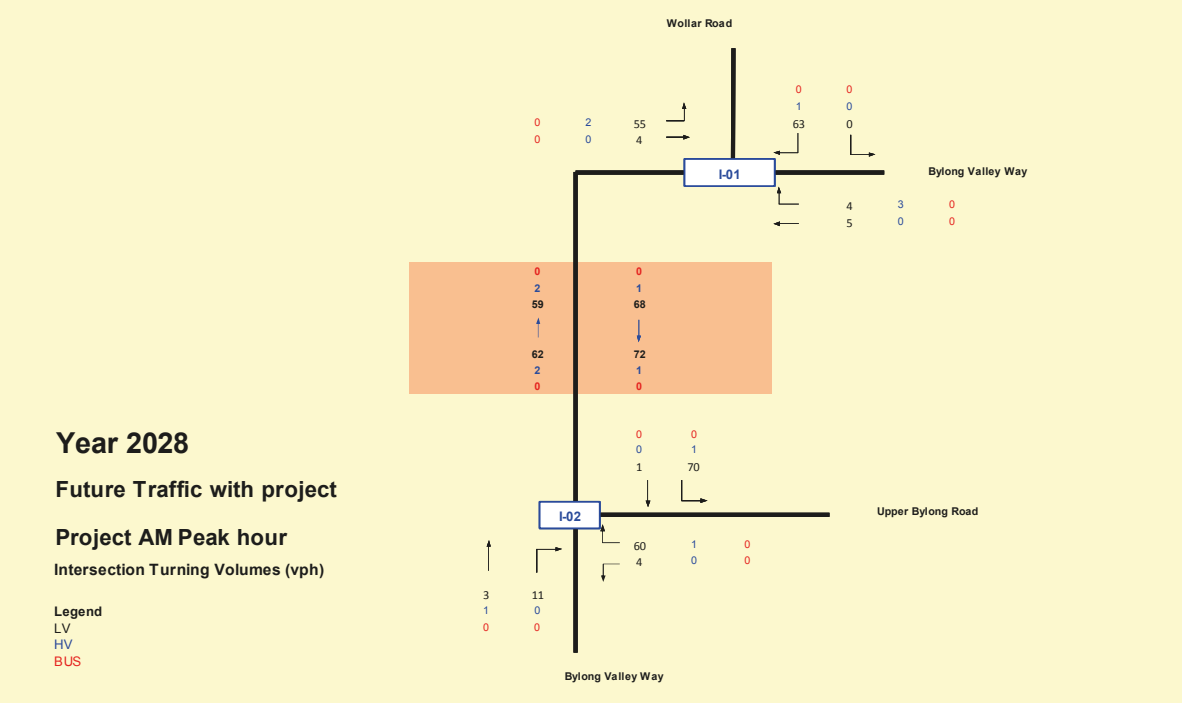


Figure B3.3 **PY 13, 2028 AM project peak hour traffic volumes (vph) – scenario 3b (Preferred operations, Option 1 and Option 2)**

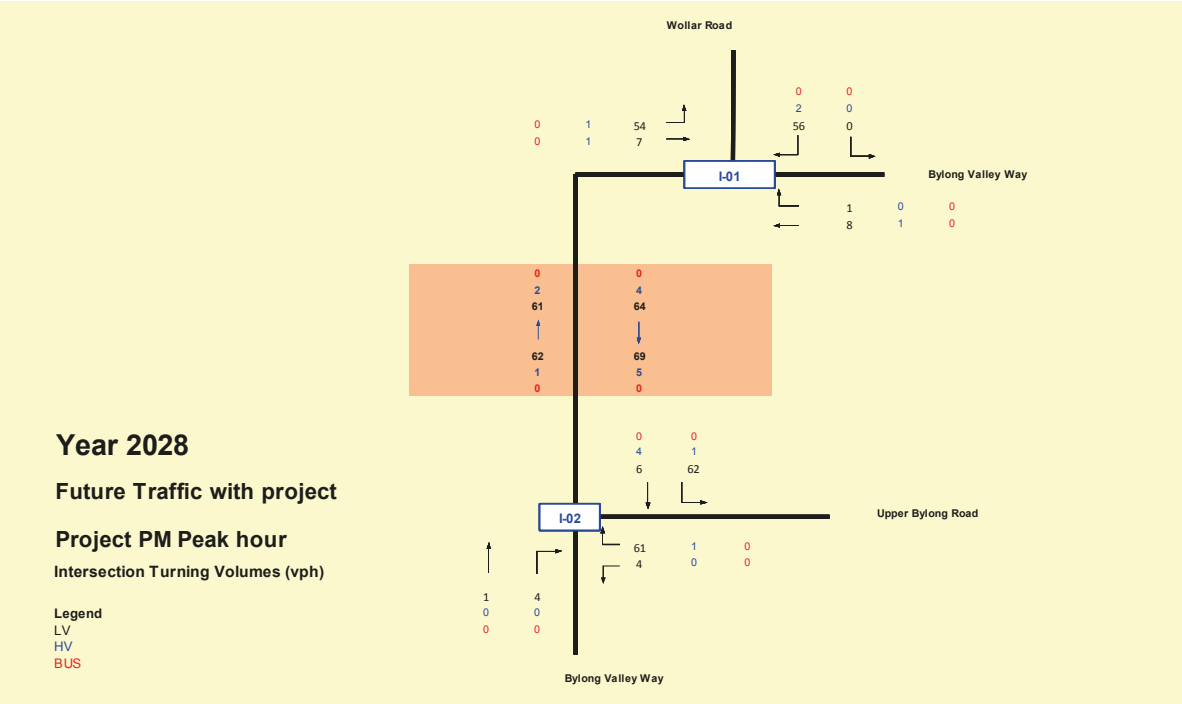


Figure B3.4 **PY 13, 2028 PM project peak hour traffic volumes (vph) – scenario 3b (Preferred operations, Option 1 and Option 2)**

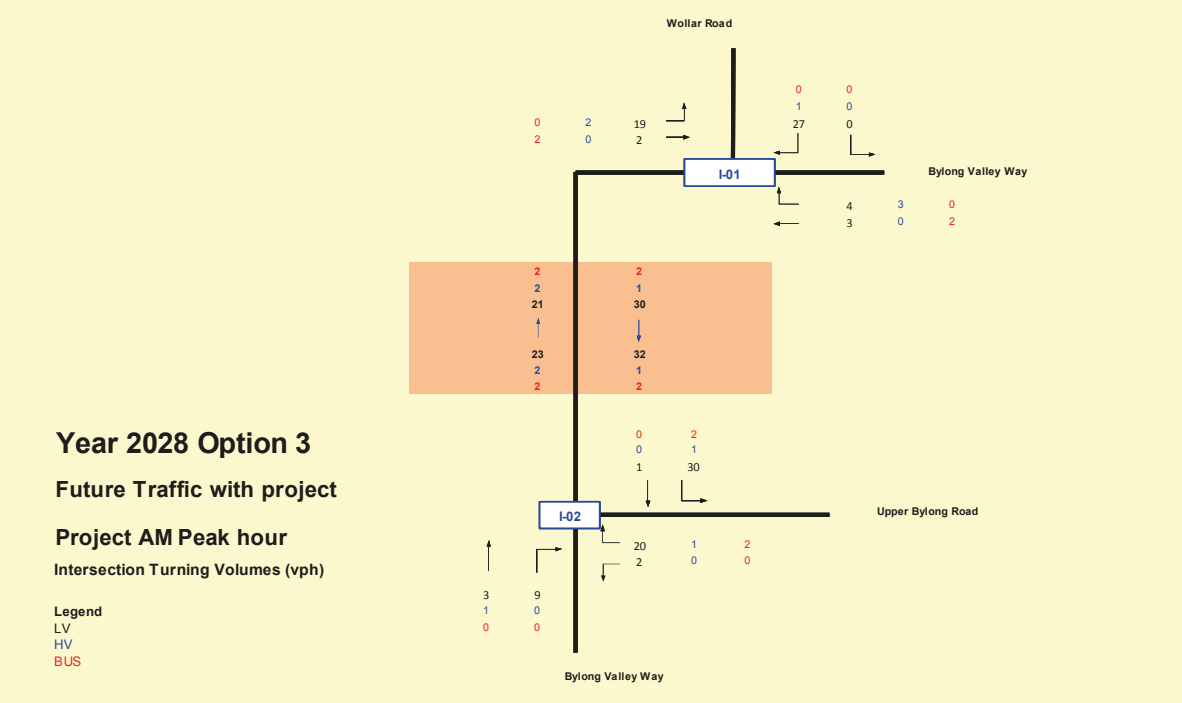


Figure B3.5 PY 13, 2028 AM project peak hour traffic volumes (vph) – scenario 3b (Option 3)

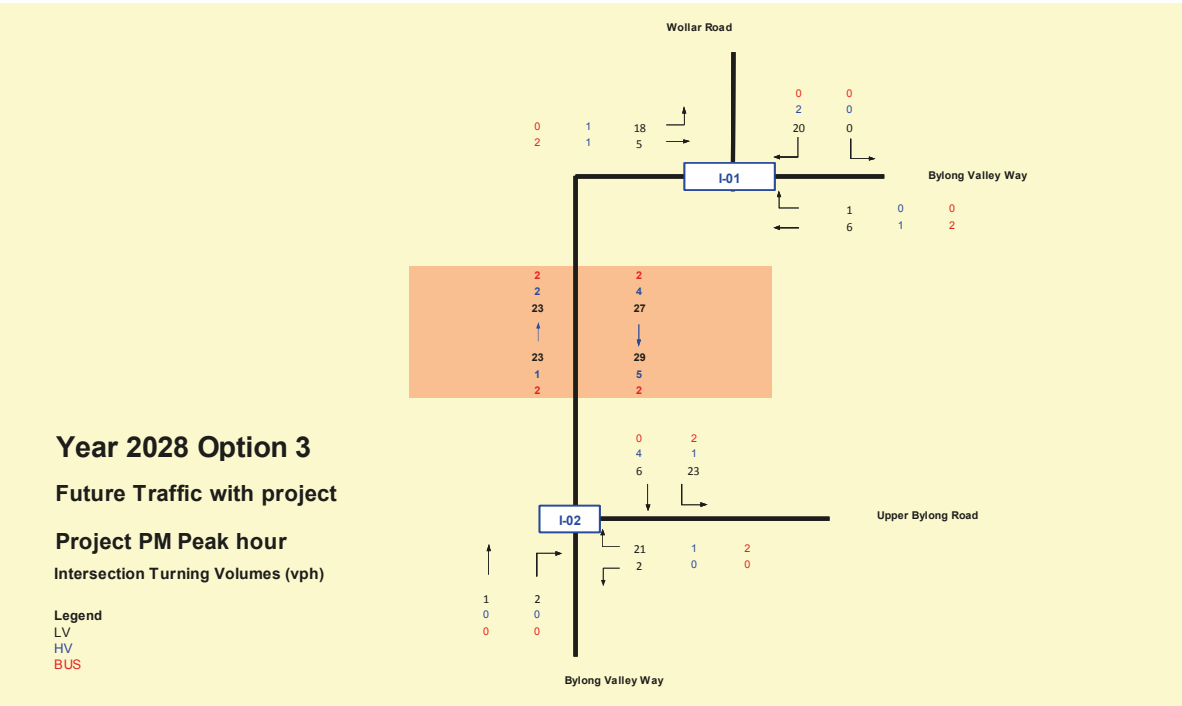


Figure B3.6 PY 13, 2028 PM project peak hour traffic volumes (vph) – scenario 3b (Option 3)

Local peak hours

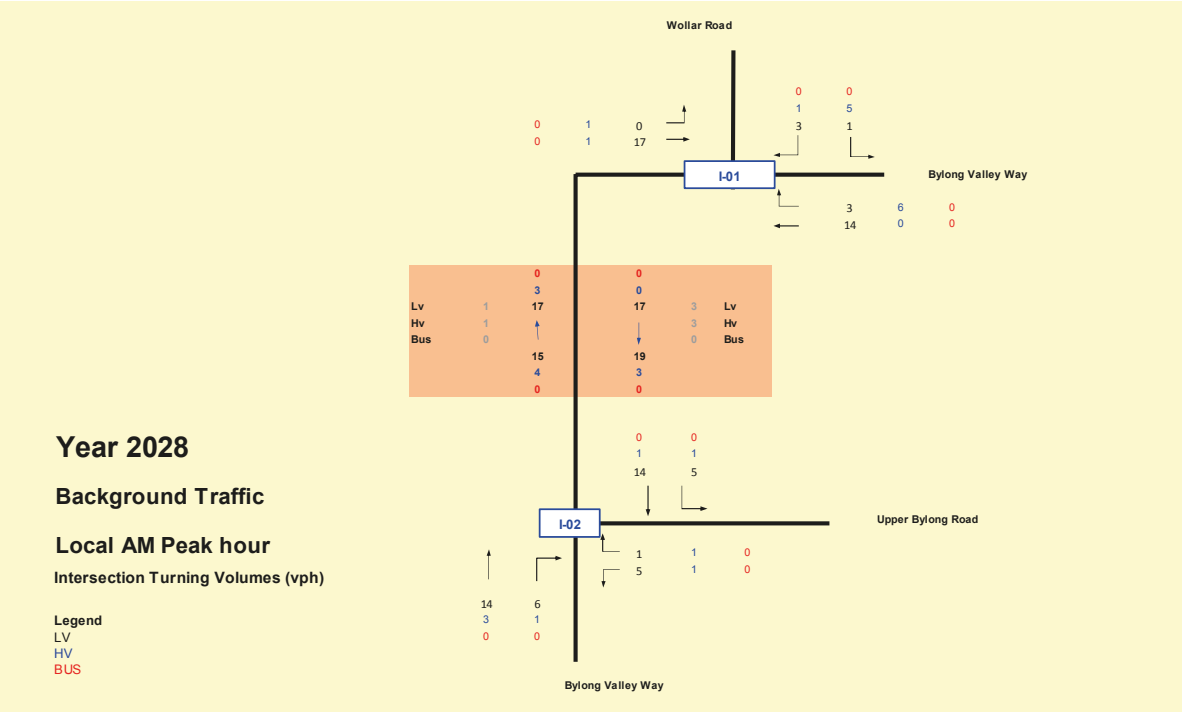


Figure B3.7 PY 13, 2028 AM local peak hour traffic volumes (vph) – scenario 3a

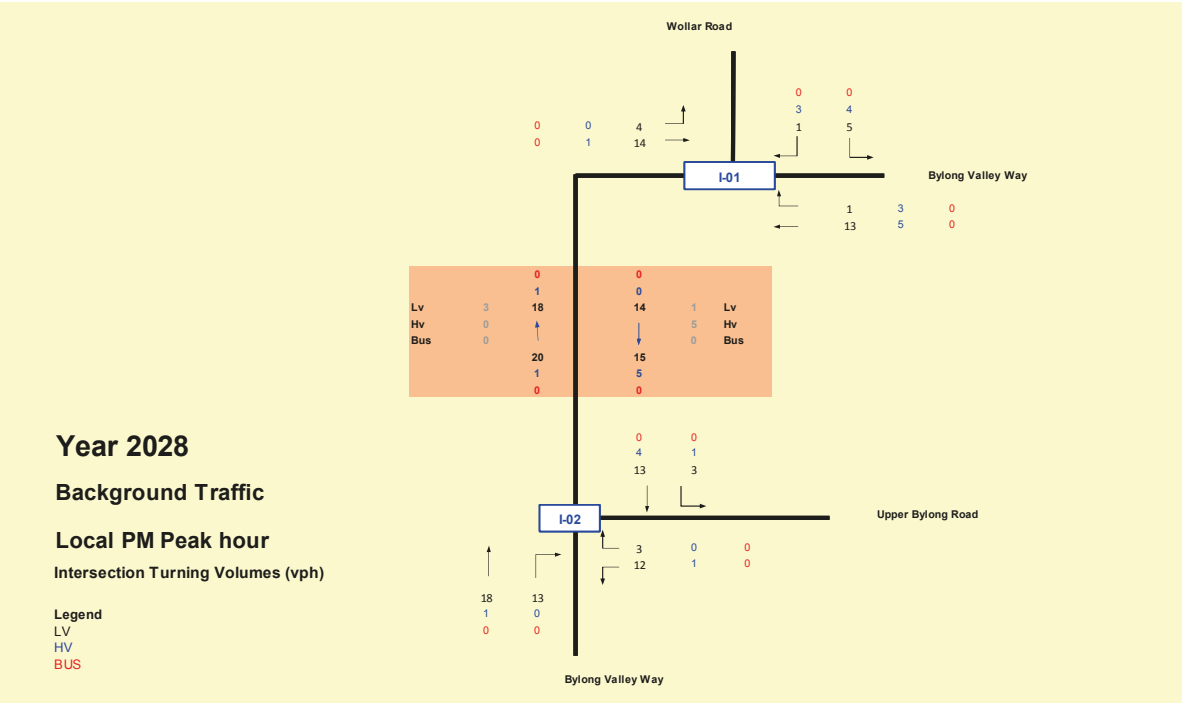


Figure B3.8 PY 13, 2028 PM local peak hour traffic volumes (vph) – scenario 3a

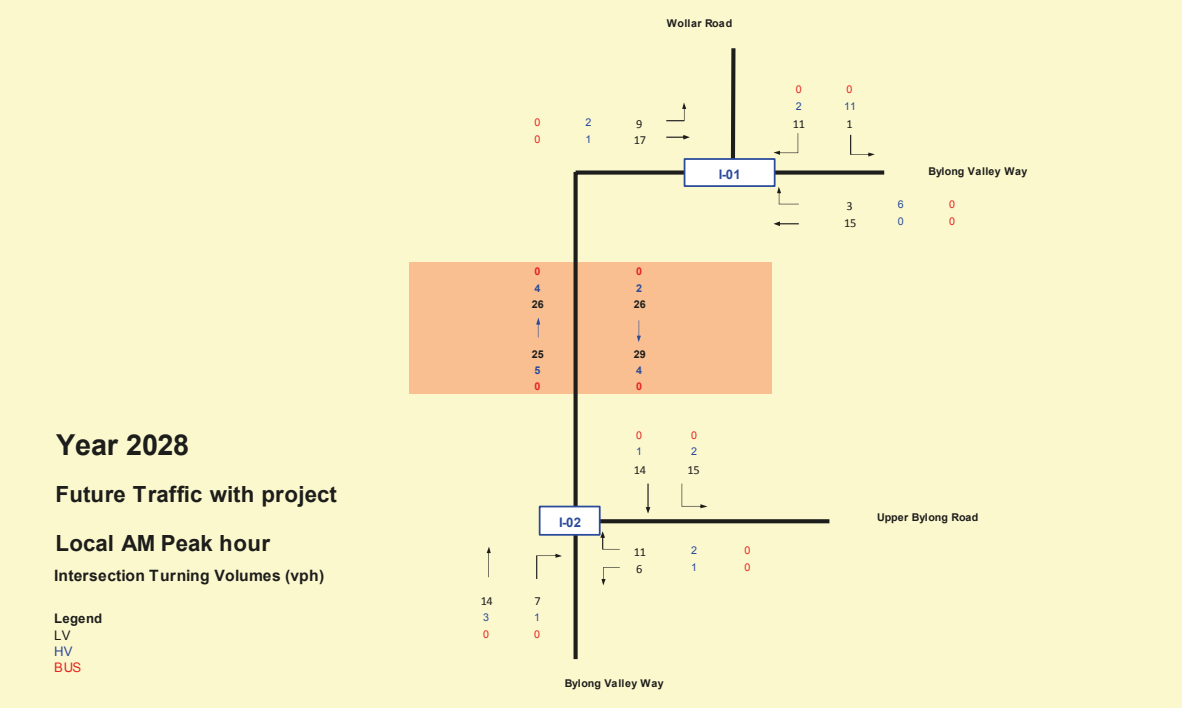


Figure B3.9 PY 13, 2028 AM local peak hour traffic volumes (vph) – scenario 3b (all options)

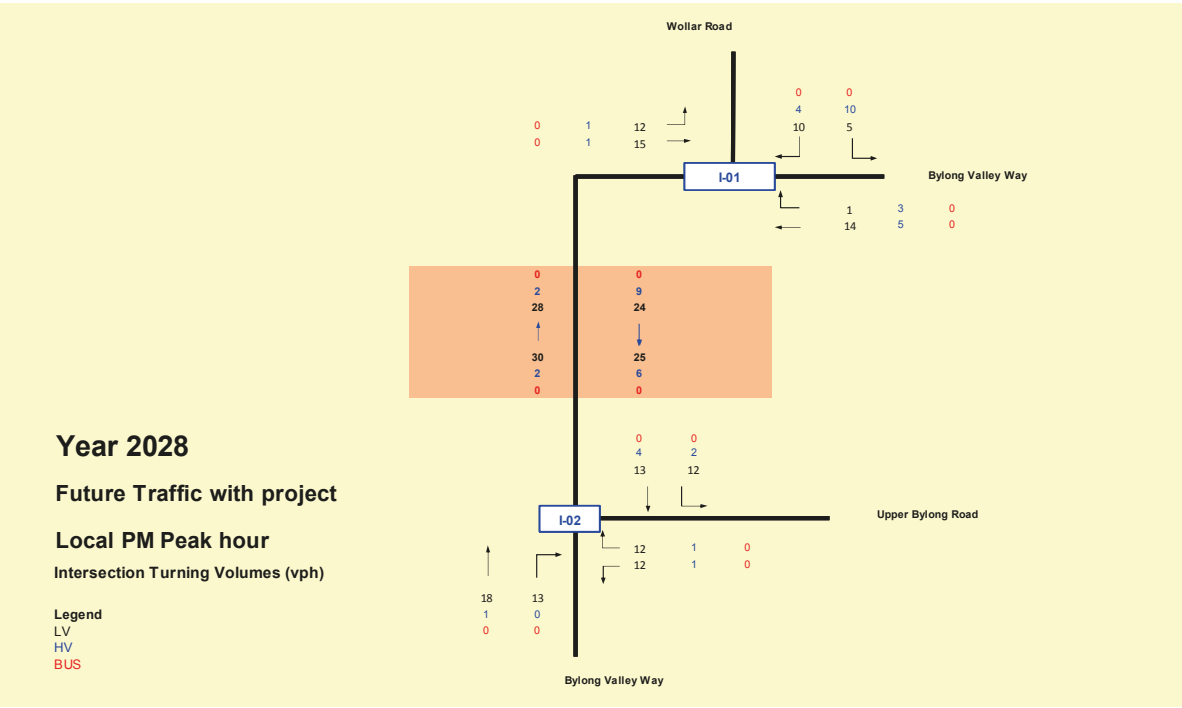


Figure B3.10 PY 13, 2028 PM local peak hour traffic volumes (vph) – scenario 3b (all options)

Appendix C

SIDRA reports

MOVEMENT SUMMARY

▽ Site: 1. Bylong Valley Way / Wollar Rd 2014 AM Peak Hour

Bylong Valley Way and Wollar Rd
2014 Base Traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	12	0.0	0.013	0.1	LOS A	0.1	0.6	0.08	0.25	95.8
6	R2	7	71.4	0.013	9.6	LOS A	0.1	0.6	0.08	0.25	59.6
Approach		19	27.8	0.013	3.8	NA	0.1	0.6	0.08	0.25	77.5
North: Wollar Road (N)											
7	L2	5	80.0	0.005	10.0	LOS A	0.0	0.2	0.08	0.63	52.8
9	R2	3	33.3	0.005	8.4	LOS A	0.0	0.2	0.08	0.64	62.8
Approach		8	62.5	0.005	9.4	LOS A	0.0	0.2	0.08	0.64	56.1
West: Bylong Valley Way (W)											
10	L2	1	100.0	0.009	9.1	LOS A	0.0	0.0	0.00	0.08	67.3
11	T1	15	7.1	0.009	0.0	LOS A	0.0	0.0	0.00	0.08	98.5
Approach		16	13.3	0.009	1.1	NA	0.0	0.0	0.00	0.08	95.5
All Vehicles		43	29.3	0.013	3.7	NA	0.1	0.6	0.05	0.26	77.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2014 PM Peak Hour

Bylong Valley Way and Wollar Rd
2014 Base Traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	11	20.0	0.007	0.1	LOS A	0.0	0.4	0.11	0.10	96.3
6	R2	1	100.0	0.007	9.1	LOS A	0.0	0.4	0.11	0.10	65.7
Approach		12	27.3	0.007	1.6	NA	0.0	0.4	0.11	0.10	92.4
North: Wollar Road (N)											
7	L2	2	100.0	0.004	9.2	LOS A	0.0	0.1	0.08	0.62	59.0
9	R2	4	25.0	0.004	8.2	LOS A	0.0	0.1	0.09	0.64	65.3
Approach		6	50.0	0.004	8.6	LOS A	0.0	0.1	0.09	0.63	63.1
West: Bylong Valley Way (W)											
10	L2	5	20.0	0.012	8.4	LOS A	0.0	0.0	0.00	0.15	76.6
11	T1	18	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.15	96.1
Approach		23	4.5	0.012	1.9	NA	0.0	0.0	0.00	0.15	90.8
All Vehicles		41	17.9	0.012	2.7	NA	0.0	0.4	0.04	0.21	85.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2. Bylong Valley Way / Upper Bylong Rd 2014 AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2014 Base Traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	14	15.4	0.012	0.1	LOS A	0.1	0.4	0.08	0.17	48.8
6	R2	6	16.7	0.012	4.9	LOS A	0.1	0.4	0.08	0.17	47.5
Approach		20	15.8	0.012	1.6	NA	0.1	0.4	0.08	0.17	48.4
East: Upper Bylong Road (E)											
7	L2	5	20.0	0.006	4.8	LOS A	0.0	0.2	0.06	0.52	46.2
9	R2	2	50.0	0.006	5.2	LOS A	0.0	0.2	0.06	0.52	45.2
Approach		7	28.6	0.006	4.9	LOS A	0.0	0.2	0.06	0.52	45.9
North: Bylong Valley Way (N)											
10	L2	5	20.0	0.010	4.7	LOS A	0.0	0.0	0.00	0.16	48.4
11	T1	13	8.3	0.010	0.0	LOS A	0.0	0.0	0.00	0.16	49.2
Approach		18	11.8	0.010	1.4	NA	0.0	0.0	0.00	0.16	48.9
All Vehicles		45	16.3	0.012	2.1	NA	0.1	0.4	0.04	0.22	48.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2014 PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2014 Base Traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	12	9.1	0.009	0.0	LOS A	0.0	0.3	0.07	0.15	48.9
6	R2	4	0.0	0.009	4.7	LOS A	0.0	0.3	0.07	0.15	47.9
Approach		16	6.7	0.009	1.3	NA	0.0	0.3	0.07	0.15	48.7
East: Upper Bylong Road (E)											
7	L2	11	0.0	0.015	4.6	LOS A	0.1	0.4	0.06	0.53	46.4
9	R2	11	0.0	0.015	4.7	LOS A	0.1	0.4	0.06	0.53	46.0
Approach		21	0.0	0.015	4.7	LOS A	0.1	0.4	0.06	0.53	46.2
North: Bylong Valley Way (N)											
10	L2	1	0.0	0.008	4.6	LOS A	0.0	0.0	0.00	0.04	49.3
11	T1	14	15.4	0.008	0.0	LOS A	0.0	0.0	0.00	0.04	49.7
Approach		15	14.3	0.008	0.3	NA	0.0	0.0	0.00	0.04	49.7
All Vehicles		52	6.1	0.015	2.4	NA	0.1	0.4	0.05	0.27	47.9

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2017 AM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	13	0.0	0.014	0.1	LOS A	0.1	0.6	0.09	0.23	96.0
6	R2	7	71.4	0.014	9.6	LOS A	0.1	0.6	0.09	0.23	59.6
Approach		20	26.3	0.014	3.6	NA	0.1	0.6	0.09	0.23	78.4
North: Wollar Road (N)											
7	L2	5	80.0	0.005	10.0	LOS A	0.0	0.2	0.08	0.63	52.7
9	R2	3	33.3	0.005	8.4	LOS A	0.0	0.2	0.08	0.64	62.8
Approach		8	62.5	0.005	9.4	LOS A	0.0	0.2	0.08	0.64	56.1
West: Bylong Valley Way (W)											
10	L2	1	100.0	0.009	9.1	LOS A	0.0	0.0	0.00	0.08	67.3
11	T1	16	6.7	0.009	0.0	LOS A	0.0	0.0	0.00	0.08	98.6
Approach		17	12.5	0.009	1.1	NA	0.0	0.0	0.00	0.08	95.8
All Vehicles		45	27.9	0.014	3.6	NA	0.1	0.6	0.05	0.25	77.9

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2017 PM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	16	26.7	0.012	0.1	LOS A	0.1	0.6	0.08	0.11	97.1
6	R2	3	66.7	0.012	9.5	LOS A	0.1	0.6	0.08	0.11	61.3
Approach		19	33.3	0.012	1.7	NA	0.1	0.6	0.08	0.11	88.5
North: Wollar Road (N)											
7	L2	7	42.9	0.006	9.0	LOS A	0.0	0.2	0.07	0.64	60.9
9	R2	3	66.7	0.006	9.4	LOS A	0.0	0.2	0.07	0.64	54.4
Approach		11	50.0	0.006	9.1	LOS A	0.0	0.2	0.07	0.64	58.8
West: Bylong Valley Way (W)											
10	L2	3	0.0	0.009	7.8	LOS A	0.0	0.0	0.00	0.13	85.4
11	T1	14	7.7	0.009	0.0	LOS A	0.0	0.0	0.00	0.13	95.9
Approach		17	6.3	0.009	1.5	NA	0.0	0.0	0.00	0.13	93.7
All Vehicles		46	27.3	0.012	3.3	NA	0.1	0.6	0.05	0.23	80.8

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2017 Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	1	0.0	0.004	0.0	LOS A	0.0	0.2	0.03	0.55	86.2
6	R2	5	40.0	0.004	8.7	LOS A	0.0	0.2	0.03	0.55	63.5
Approach		6	33.3	0.004	7.3	NA	0.0	0.2	0.03	0.55	66.4
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.02	0.65	75.3
9	R2	1	0.0	0.001	7.4	LOS A	0.0	0.0	0.03	0.65	75.1
Approach		2	0.0	0.001	7.6	LOS A	0.0	0.0	0.02	0.65	75.2
West: Bylong Valley Way (W)											
10	L2	2	50.0	0.002	9.1	LOS A	0.0	0.0	0.00	0.45	63.4
11	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.45	90.3
Approach		3	33.3	0.002	6.1	NA	0.0	0.0	0.00	0.45	70.4
All Vehicles		12	27.3	0.004	7.0	NA	0.0	0.2	0.02	0.54	69.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2017 Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	5	20.0	0.004	0.0	LOS A	0.0	0.1	0.04	0.11	95.5
6	R2	1	0.0	0.004	7.7	LOS A	0.0	0.1	0.04	0.11	84.9
Approach		6	16.7	0.004	1.3	NA	0.0	0.1	0.04	0.11	93.6
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.03	0.64	75.1
9	R2	3	33.3	0.003	8.4	LOS A	0.0	0.1	0.05	0.66	63.0
Approach		4	25.0	0.003	8.2	LOS A	0.0	0.1	0.05	0.65	65.7
West: Bylong Valley Way (W)											
10	L2	1	0.0	0.003	7.8	LOS A	0.0	0.0	0.00	0.14	84.6
11	T1	4	25.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.14	94.9
Approach		5	20.0	0.003	1.6	NA	0.0	0.0	0.00	0.14	92.7
All Vehicles		16	20.0	0.004	3.2	NA	0.0	0.1	0.03	0.26	83.8

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	15	14.3	0.012	0.1	LOS A	0.1	0.5	0.08	0.17	48.9
6	R2	6	16.7	0.012	4.9	LOS A	0.1	0.5	0.08	0.17	47.6
Approach		21	15.0	0.012	1.5	NA	0.1	0.5	0.08	0.17	48.5
East: Upper Bylong Road (E)											
7	L2	5	20.0	0.006	4.8	LOS A	0.0	0.2	0.06	0.52	46.2
9	R2	2	50.0	0.006	5.2	LOS A	0.0	0.2	0.06	0.52	45.2
Approach		7	28.6	0.006	4.9	LOS A	0.0	0.2	0.06	0.52	45.9
North: Bylong Valley Way (N)											
10	L2	5	20.0	0.011	4.7	LOS A	0.0	0.0	0.00	0.15	48.4
11	T1	14	7.7	0.011	0.0	LOS A	0.0	0.0	0.00	0.15	49.2
Approach		19	11.1	0.011	1.3	NA	0.0	0.0	0.00	0.15	49.0
All Vehicles		47	15.6	0.012	2.0	NA	0.1	0.5	0.05	0.21	48.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	17	6.3	0.016	0.1	LOS A	0.1	0.5	0.08	0.23	48.5
6	R2	12	0.0	0.016	4.7	LOS A	0.1	0.5	0.08	0.23	47.5
Approach		28	3.7	0.016	2.0	NA	0.1	0.5	0.08	0.23	48.1
East: Upper Bylong Road (E)											
7	L2	12	9.1	0.009	4.7	LOS A	0.0	0.3	0.06	0.51	46.3
9	R2	2	0.0	0.009	4.7	LOS A	0.0	0.3	0.06	0.51	46.0
Approach		14	7.7	0.009	4.7	LOS A	0.0	0.3	0.06	0.51	46.3
North: Bylong Valley Way (N)											
10	L2	3	33.3	0.011	4.9	LOS A	0.0	0.0	0.00	0.09	48.5
11	T1	15	21.4	0.011	0.0	LOS A	0.0	0.0	0.00	0.09	49.5
Approach		18	23.5	0.011	0.9	NA	0.0	0.0	0.00	0.09	49.3
All Vehicles		60	10.5	0.016	2.3	NA	0.1	0.5	0.05	0.25	48.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	3	33.3	0.005	0.0	LOS A	0.0	0.2	0.02	0.38	47.7
6	R2	6	0.0	0.005	4.7	LOS A	0.0	0.2	0.02	0.38	46.7
Approach		9	11.1	0.005	3.1	NA	0.0	0.2	0.02	0.38	47.0
East: Upper Bylong Road (E)											
7	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.01	0.55	46.6
9	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.01	0.55	46.1
Approach		2	0.0	0.001	4.6	LOS A	0.0	0.0	0.01	0.55	46.3
North: Bylong Valley Way (N)											
10	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.00	0.27	48.0
11	T1	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.27	48.5
Approach		2	0.0	0.001	2.3	NA	0.0	0.0	0.00	0.27	48.3
All Vehicles		14	7.7	0.005	3.2	NA	0.0	0.2	0.02	0.39	47.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.06	0.28	48.3
6	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.06	0.28	47.3
Approach		2	0.0	0.001	2.4	NA	0.0	0.0	0.06	0.28	47.8
East: Upper Bylong Road (E)											
7	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.05	0.53	46.5
9	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.05	0.53	46.0
Approach		2	0.0	0.001	4.6	LOS A	0.0	0.0	0.05	0.53	46.2
North: Bylong Valley Way (N)											
10	L2	2	0.0	0.007	4.6	LOS A	0.0	0.0	0.00	0.11	48.6
11	T1	8	37.5	0.007	0.0	LOS A	0.0	0.0	0.00	0.11	49.1
Approach		11	30.0	0.007	0.9	NA	0.0	0.0	0.00	0.11	49.0
All Vehicles		15	21.4	0.007	1.7	NA	0.0	0.0	0.01	0.19	48.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 1. Bylong Valley Way / Wollar Rd 2017 AM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	13	0.0	0.014	0.2	LOS A	0.1	0.6	0.12	0.22	95.4
6	R2	7	71.4	0.014	9.7	LOS A	0.1	0.6	0.12	0.22	59.4
Approach		20	26.3	0.014	3.7	NA	0.1	0.6	0.12	0.22	78.0
North: Wollar Road (N)											
7	L2	13	83.3	0.018	10.1	LOS A	0.1	0.5	0.08	0.63	52.1
9	R2	17	31.3	0.018	8.4	LOS A	0.1	0.5	0.11	0.64	63.4
Approach		29	53.6	0.018	9.2	LOS A	0.1	0.5	0.10	0.64	58.0
West: Bylong Valley Way (W)											
10	L2	15	35.7	0.018	8.8	LOS A	0.0	0.0	0.00	0.33	68.6
11	T1	16	6.7	0.018	0.0	LOS A	0.0	0.0	0.00	0.33	92.2
Approach		31	20.7	0.018	4.2	NA	0.0	0.0	0.00	0.33	79.1
All Vehicles		80	34.2	0.018	5.9	NA	0.1	0.6	0.07	0.41	69.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2017 PM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	17	25.0	0.013	0.2	LOS A	0.1	0.6	0.12	0.10	96.7
6	R2	3	66.7	0.013	9.6	LOS A	0.1	0.6	0.12	0.10	61.1
Approach		20	31.6	0.013	1.6	NA	0.1	0.6	0.12	0.10	88.6
North: Wollar Road (N)											
7	L2	14	69.2	0.019	9.7	LOS A	0.1	0.6	0.08	0.63	54.8
9	R2	17	37.5	0.019	8.6	LOS A	0.1	0.6	0.11	0.64	61.5
Approach		31	51.7	0.019	9.1	LOS A	0.1	0.6	0.10	0.64	58.3
West: Bylong Valley Way (W)											
10	L2	17	25.0	0.019	8.5	LOS A	0.0	0.0	0.00	0.36	71.3
11	T1	15	7.1	0.019	0.0	LOS A	0.0	0.0	0.00	0.36	90.7
Approach		32	16.7	0.019	4.5	NA	0.0	0.0	0.00	0.36	79.2
All Vehicles		82	33.3	0.019	5.5	NA	0.1	0.6	0.07	0.40	71.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2017 Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	11	60.0	0.011	0.2	LOS A	0.0	0.5	0.16	0.21	90.1
6	R2	5	40.0	0.011	8.8	LOS A	0.0	0.5	0.16	0.21	67.7
Approach		16	53.3	0.011	3.1	NA	0.0	0.5	0.16	0.21	81.2
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.05	0.63	75.0
9	R2	51	8.3	0.043	7.8	LOS A	0.1	1.0	0.12	0.63	70.9
Approach		52	8.2	0.043	7.8	LOS A	0.1	1.0	0.12	0.63	70.9
West: Bylong Valley Way (W)											
10	L2	40	13.2	0.031	8.2	LOS A	0.0	0.0	0.00	0.54	71.2
11	T1	9	66.7	0.031	0.0	LOS A	0.0	0.0	0.00	0.54	83.6
Approach		49	23.4	0.031	6.6	NA	0.0	0.0	0.00	0.54	73.2
All Vehicles		117	20.7	0.043	6.7	NA	0.1	1.0	0.07	0.54	73.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2017 Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2017 Traffic with project
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	14	53.8	0.010	0.1	LOS A	0.0	0.4	0.14	0.05	95.3
6	R2	1	0.0	0.010	7.8	LOS A	0.0	0.4	0.14	0.05	84.7
Approach		15	50.0	0.010	0.7	NA	0.0	0.4	0.14	0.05	94.4
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.06	0.62	74.9
9	R2	41	12.8	0.036	7.9	LOS A	0.1	0.9	0.12	0.64	69.2
Approach		42	12.5	0.036	7.9	LOS A	0.1	0.9	0.12	0.64	69.4
West: Bylong Valley Way (W)											
10	L2	37	11.4	0.030	8.1	LOS A	0.0	0.0	0.00	0.50	72.3
11	T1	13	58.3	0.030	0.0	LOS A	0.0	0.0	0.00	0.50	84.4
Approach		49	23.4	0.030	6.0	NA	0.0	0.0	0.00	0.50	75.1
All Vehicles		106	22.8	0.036	6.1	NA	0.1	0.9	0.07	0.49	74.8

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	15	14.3	0.013	0.1	LOS A	0.1	0.5	0.11	0.18	48.7
6	R2	7	14.3	0.013	4.9	LOS A	0.1	0.5	0.11	0.18	47.4
Approach		22	14.3	0.013	1.7	NA	0.1	0.5	0.11	0.18	48.2
East: Upper Bylong Road (E)											
7	L2	6	16.7	0.020	4.9	LOS A	0.1	0.6	0.08	0.54	46.2
9	R2	17	31.3	0.020	5.1	LOS A	0.1	0.6	0.08	0.54	45.4
Approach		23	27.3	0.020	5.1	LOS A	0.1	0.6	0.08	0.54	45.6
North: Bylong Valley Way (N)											
10	L2	20	26.3	0.020	4.8	LOS A	0.0	0.0	0.00	0.31	47.5
11	T1	14	7.7	0.020	0.0	LOS A	0.0	0.0	0.00	0.31	48.4
Approach		34	18.8	0.020	2.8	NA	0.0	0.0	0.00	0.31	47.9
All Vehicles		79	20.0	0.020	3.2	NA	0.1	0.6	0.06	0.34	47.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	17	6.3	0.016	0.1	LOS A	0.1	0.5	0.11	0.22	48.4
6	R2	12	0.0	0.016	4.8	LOS A	0.1	0.5	0.11	0.22	47.4
Approach		28	3.7	0.016	2.0	NA	0.1	0.5	0.11	0.22	48.0
East: Upper Bylong Road (E)											
7	L2	12	9.1	0.023	4.8	LOS A	0.1	0.6	0.07	0.53	46.3
9	R2	17	25.0	0.023	5.1	LOS A	0.1	0.6	0.07	0.53	45.5
Approach		28	18.5	0.023	5.0	LOS A	0.1	0.6	0.07	0.53	45.8
North: Bylong Valley Way (N)											
10	L2	18	29.4	0.020	4.8	LOS A	0.0	0.0	0.00	0.29	47.5
11	T1	15	21.4	0.020	0.0	LOS A	0.0	0.0	0.00	0.29	48.4
Approach		33	25.8	0.020	2.6	NA	0.0	0.0	0.00	0.29	47.9
All Vehicles		89	16.5	0.023	3.2	NA	0.1	0.6	0.06	0.35	47.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	3	33.3	0.007	0.2	LOS A	0.0	0.2	0.16	0.40	47.2
6	R2	9	0.0	0.007	4.9	LOS A	0.0	0.2	0.16	0.40	46.2
Approach		13	8.3	0.007	3.7	NA	0.0	0.2	0.16	0.40	46.5
East: Upper Bylong Road (E)											
7	L2	3	0.0	0.045	4.7	LOS A	0.1	1.2	0.03	0.56	46.4
9	R2	47	22.2	0.045	5.0	LOS A	0.1	1.2	0.03	0.56	45.8
Approach		51	20.8	0.045	5.0	LOS A	0.1	1.2	0.03	0.56	45.8
North: Bylong Valley Way (N)											
10	L2	62	16.9	0.038	4.7	LOS A	0.0	0.0	0.00	0.52	46.6
11	T1	1	0.0	0.038	0.0	LOS A	0.0	0.0	0.00	0.52	47.1
Approach		63	16.7	0.038	4.6	NA	0.0	0.0	0.00	0.52	46.6
All Vehicles		126	17.5	0.045	4.7	NA	0.1	1.2	0.03	0.52	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2017 Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2017 Traffic with project
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.002	0.2	LOS A	0.0	0.1	0.15	0.40	47.4
6	R2	3	0.0	0.002	4.8	LOS A	0.0	0.1	0.15	0.40	46.4
Approach		4	0.0	0.002	3.7	NA	0.0	0.1	0.15	0.40	46.6
East: Upper Bylong Road (E)											
7	L2	3	0.0	0.045	4.7	LOS A	0.1	1.2	0.09	0.55	46.4
9	R2	48	21.7	0.045	5.0	LOS A	0.1	1.2	0.09	0.55	45.7
Approach		52	20.4	0.045	5.0	LOS A	0.1	1.2	0.09	0.55	45.7
North: Bylong Valley Way (N)											
10	L2	49	21.3	0.036	4.7	LOS A	0.0	0.0	0.00	0.45	46.8
11	T1	8	37.5	0.036	0.0	LOS A	0.0	0.0	0.00	0.45	47.4
Approach		58	23.6	0.036	4.1	NA	0.0	0.0	0.00	0.45	46.9
All Vehicles		114	21.3	0.045	4.5	NA	0.1	1.2	0.05	0.49	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 background traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	14	0.0	0.015	0.1	LOS A	0.1	0.7	0.09	0.24	96.0
6	R2	8	75.0	0.015	9.7	LOS A	0.1	0.7	0.09	0.24	58.8
Approach		22	28.6	0.015	3.8	NA	0.1	0.7	0.09	0.24	77.4
North: Wollar Road (N)											
7	L2	6	83.3	0.006	10.1	LOS A	0.0	0.2	0.09	0.63	52.1
9	R2	3	33.3	0.006	8.5	LOS A	0.0	0.2	0.09	0.64	62.8
Approach		9	66.7	0.006	9.6	LOS A	0.0	0.2	0.09	0.63	55.2
West: Bylong Valley Way (W)											
10	L2	1	100.0	0.010	9.1	LOS A	0.0	0.0	0.00	0.07	67.4
11	T1	18	5.9	0.010	0.0	LOS A	0.0	0.0	0.00	0.07	98.7
Approach		19	11.1	0.010	1.0	NA	0.0	0.0	0.00	0.07	96.3
All Vehicles		51	29.2	0.015	3.6	NA	0.1	0.7	0.06	0.25	77.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 background traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	18	29.4	0.014	0.1	LOS A	0.1	0.7	0.09	0.09	97.2
6	R2	3	66.7	0.014	9.5	LOS A	0.1	0.7	0.09	0.09	61.3
Approach		21	35.0	0.014	1.5	NA	0.1	0.7	0.09	0.09	89.3
North: Wollar Road (N)											
7	L2	9	44.4	0.007	9.1	LOS A	0.0	0.3	0.07	0.63	60.5
9	R2	3	66.7	0.007	9.4	LOS A	0.0	0.3	0.08	0.64	54.3
Approach		13	50.0	0.007	9.2	LOS A	0.0	0.3	0.07	0.64	58.8
West: Bylong Valley Way (W)											
10	L2	4	0.0	0.010	7.8	LOS A	0.0	0.0	0.00	0.15	84.8
11	T1	15	7.1	0.010	0.0	LOS A	0.0	0.0	0.00	0.15	95.2
Approach		19	5.6	0.010	1.7	NA	0.0	0.0	0.00	0.15	92.7
All Vehicles		53	28.0	0.014	3.4	NA	0.1	0.7	0.05	0.24	80.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

▽ Site: 1. Bylong Valley Way / Wollar Rd 2024 Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 background traffic
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	1	0.0	0.005	0.0	LOS A	0.0	0.2	0.03	0.56	85.4
6	R2	6	33.3	0.005	8.5	LOS A	0.0	0.2	0.03	0.56	65.1
Approach		7	28.6	0.005	7.3	NA	0.0	0.2	0.03	0.56	67.3
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.02	0.65	75.3
9	R2	1	0.0	0.001	7.4	LOS A	0.0	0.0	0.03	0.65	75.1
Approach		2	0.0	0.001	7.6	LOS A	0.0	0.0	0.02	0.65	75.2
West: Bylong Valley Way (W)											
10	L2	2	50.0	0.002	9.1	LOS A	0.0	0.0	0.00	0.45	63.4
11	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.45	90.3
Approach		3	33.3	0.002	6.1	NA	0.0	0.0	0.00	0.45	70.4
All Vehicles		13	25.0	0.005	7.1	NA	0.0	0.2	0.02	0.55	69.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 background traffic
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	6	16.7	0.004	0.0	LOS A	0.0	0.1	0.04	0.09	96.1
6	R2	1	0.0	0.004	7.7	LOS A	0.0	0.1	0.04	0.09	85.4
Approach		7	14.3	0.004	1.1	NA	0.0	0.1	0.04	0.09	94.4
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.03	0.64	75.1
9	R2	3	33.3	0.003	8.4	LOS A	0.0	0.1	0.06	0.65	63.0
Approach		4	25.0	0.003	8.2	LOS A	0.0	0.1	0.05	0.65	65.6
West: Bylong Valley Way (W)											
10	L2	1	0.0	0.004	7.8	LOS A	0.0	0.0	0.00	0.11	85.4
11	T1	5	20.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.11	95.9
Approach		6	16.7	0.004	1.3	NA	0.0	0.0	0.00	0.11	94.0
All Vehicles		18	17.6	0.004	2.9	NA	0.0	0.1	0.03	0.23	85.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 background traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	16	13.3	0.013	0.1	LOS A	0.1	0.5	0.08	0.18	48.8
6	R2	7	14.3	0.013	4.9	LOS A	0.1	0.5	0.08	0.18	47.5
Approach		23	13.6	0.013	1.6	NA	0.1	0.5	0.08	0.18	48.4
East: Upper Bylong Road (E)											
7	L2	6	16.7	0.006	4.8	LOS A	0.0	0.2	0.06	0.51	46.2
9	R2	2	50.0	0.006	5.2	LOS A	0.0	0.2	0.06	0.51	45.2
Approach		8	25.0	0.006	4.9	LOS A	0.0	0.2	0.06	0.51	46.0
North: Bylong Valley Way (N)											
10	L2	6	16.7	0.012	4.7	LOS A	0.0	0.0	0.00	0.16	48.4
11	T1	15	7.1	0.012	0.0	LOS A	0.0	0.0	0.00	0.16	49.1
Approach		21	10.0	0.012	1.4	NA	0.0	0.0	0.00	0.16	48.9
All Vehicles		53	14.0	0.013	2.1	NA	0.1	0.5	0.05	0.22	48.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 background traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	19	5.6	0.017	0.1	LOS A	0.1	0.6	0.08	0.22	48.5
6	R2	13	0.0	0.017	4.7	LOS A	0.1	0.6	0.08	0.22	47.5
Approach		32	3.3	0.017	1.9	NA	0.1	0.6	0.08	0.22	48.1
East: Upper Bylong Road (E)											
7	L2	13	8.3	0.010	4.7	LOS A	0.0	0.3	0.07	0.51	46.3
9	R2	2	0.0	0.010	4.7	LOS A	0.0	0.3	0.07	0.51	46.0
Approach		15	7.1	0.010	4.7	LOS A	0.0	0.3	0.07	0.51	46.3
North: Bylong Valley Way (N)											
10	L2	3	33.3	0.012	4.9	LOS A	0.0	0.0	0.00	0.08	48.5
11	T1	17	25.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.08	49.6
Approach		20	26.3	0.012	0.8	NA	0.0	0.0	0.00	0.08	49.4
All Vehicles		66	11.1	0.017	2.2	NA	0.1	0.6	0.05	0.24	48.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 background traffic
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	3	33.3	0.006	0.0	LOS A	0.0	0.2	0.02	0.40	47.6
6	R2	7	0.0	0.006	4.7	LOS A	0.0	0.2	0.02	0.40	46.6
Approach		11	10.0	0.006	3.3	NA	0.0	0.2	0.02	0.40	46.9
East: Upper Bylong Road (E)											
7	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.01	0.55	46.6
9	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.01	0.55	46.1
Approach		2	0.0	0.001	4.6	LOS A	0.0	0.0	0.01	0.55	46.3
North: Bylong Valley Way (N)											
10	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.00	0.27	48.0
11	T1	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.27	48.5
Approach		2	0.0	0.001	2.3	NA	0.0	0.0	0.00	0.27	48.3
All Vehicles		15	7.1	0.006	3.3	NA	0.0	0.2	0.02	0.40	47.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 background traffic
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.06	0.28	48.3
6	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.06	0.28	47.3
Approach		2	0.0	0.001	2.4	NA	0.0	0.0	0.06	0.28	47.8
East: Upper Bylong Road (E)											
7	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.05	0.53	46.5
9	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.05	0.53	46.0
Approach		2	0.0	0.001	4.7	LOS A	0.0	0.0	0.05	0.53	46.2
North: Bylong Valley Way (N)											
10	L2	2	0.0	0.008	4.6	LOS A	0.0	0.0	0.00	0.09	48.8
11	T1	11	40.0	0.008	0.0	LOS A	0.0	0.0	0.00	0.09	49.2
Approach		13	33.3	0.008	0.8	NA	0.0	0.0	0.00	0.09	49.1
All Vehicles		17	25.0	0.008	1.4	NA	0.0	0.0	0.01	0.17	48.6

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Base and Op1)
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	15	0.0	0.016	0.2	LOS A	0.1	0.7	0.12	0.22	95.8
6	R2	8	75.0	0.016	9.8	LOS A	0.1	0.7	0.12	0.22	58.7
Approach		23	27.3	0.016	3.7	NA	0.1	0.7	0.12	0.22	77.9
North: Wollar Road (N)											
7	L2	13	91.7	0.016	10.3	LOS A	0.1	0.5	0.09	0.63	50.6
9	R2	14	15.4	0.016	8.0	LOS A	0.1	0.5	0.11	0.64	68.4
Approach		26	52.0	0.016	9.1	LOS A	0.1	0.5	0.10	0.63	58.5
West: Bylong Valley Way (W)											
10	L2	12	18.2	0.017	8.3	LOS A	0.0	0.0	0.00	0.27	75.2
11	T1	18	5.9	0.017	0.0	LOS A	0.0	0.0	0.00	0.27	92.8
Approach		29	10.7	0.017	3.3	NA	0.0	0.0	0.00	0.27	85.0
All Vehicles		79	29.3	0.017	5.3	NA	0.1	0.7	0.07	0.38	72.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Base & Op1)
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	19	27.8	0.014	0.1	LOS A	0.1	0.7	0.12	0.09	96.9
6	R2	3	66.7	0.014	9.6	LOS A	0.1	0.7	0.12	0.09	61.2
Approach		22	33.3	0.014	1.5	NA	0.1	0.7	0.12	0.09	89.4
North: Wollar Road (N)											
7	L2	16	66.7	0.017	9.7	LOS A	0.1	0.5	0.09	0.63	55.4
9	R2	14	23.1	0.017	8.2	LOS A	0.1	0.5	0.10	0.64	65.8
Approach		29	46.4	0.017	9.0	LOS A	0.1	0.5	0.09	0.63	59.8
West: Bylong Valley Way (W)											
10	L2	14	7.7	0.017	8.0	LOS A	0.0	0.0	0.00	0.30	78.4
11	T1	17	6.3	0.017	0.0	LOS A	0.0	0.0	0.00	0.30	91.3
Approach		31	6.9	0.017	3.6	NA	0.0	0.0	0.00	0.30	85.0
All Vehicles		82	28.2	0.017	5.0	NA	0.1	0.7	0.07	0.36	74.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Base & Op1)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	6	0.0	0.008	0.3	LOS A	0.0	0.3	0.21	0.30	90.0
6	R2	6	33.3	0.008	8.9	LOS A	0.0	0.3	0.21	0.30	67.7
Approach		13	16.7	0.008	4.6	NA	0.0	0.3	0.21	0.30	77.3
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.04	0.64	75.1
9	R2	94	1.1	0.077	7.6	LOS A	0.3	1.8	0.14	0.63	73.6
Approach		95	1.1	0.077	7.7	LOS A	0.3	1.8	0.14	0.63	73.6
West: Bylong Valley Way (W)											
10	L2	86	2.4	0.051	7.9	LOS A	0.0	0.0	0.00	0.62	74.4
11	T1	6	0.0	0.051	0.0	LOS A	0.0	0.0	0.00	0.62	83.4
Approach		93	2.3	0.051	7.4	NA	0.0	0.0	0.00	0.62	75.0
All Vehicles		200	2.6	0.077	7.3	NA	0.3	1.8	0.08	0.61	74.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Base & Op1)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	20	47.4	0.014	0.3	LOS A	0.1	0.5	0.19	0.03	95.5
6	R2	1	0.0	0.014	7.9	LOS A	0.1	0.5	0.19	0.03	84.9
Approach		21	45.0	0.014	0.6	NA	0.1	0.5	0.19	0.03	94.9
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.05	0.63	75.0
9	R2	87	2.4	0.073	7.7	LOS A	0.2	1.7	0.15	0.63	73.0
Approach		88	2.4	0.073	7.7	LOS A	0.2	1.7	0.15	0.63	73.0
West: Bylong Valley Way (W)											
10	L2	84	1.3	0.051	7.9	LOS A	0.0	0.0	0.00	0.60	75.1
11	T1	9	11.1	0.051	0.0	LOS A	0.0	0.0	0.00	0.60	83.7
Approach		94	2.2	0.051	7.1	NA	0.0	0.0	0.00	0.60	75.9
All Vehicles		203	6.7	0.073	6.7	NA	0.2	1.7	0.09	0.56	76.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Base and Op1)
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	15	0.0	0.016	0.2	LOS A	0.1	0.7	0.12	0.22	95.8
6	R2	8	75.0	0.016	9.8	LOS A	0.1	0.7	0.12	0.22	58.7
Approach		23	27.3	0.016	3.7	NA	0.1	0.7	0.12	0.22	77.9
North: Wollar Road (N)											
7	L2	13	91.7	0.016	10.3	LOS A	0.1	0.5	0.09	0.63	50.6
9	R2	14	15.4	0.016	8.0	LOS A	0.1	0.5	0.11	0.64	68.4
Approach		26	52.0	0.016	9.1	LOS A	0.1	0.5	0.10	0.63	58.5
West: Bylong Valley Way (W)											
10	L2	12	18.2	0.017	8.3	LOS A	0.0	0.0	0.00	0.27	75.2
11	T1	18	5.9	0.017	0.0	LOS A	0.0	0.0	0.00	0.27	92.8
Approach		29	10.7	0.017	3.3	NA	0.0	0.0	0.00	0.27	85.0
All Vehicles		79	29.3	0.017	5.3	NA	0.1	0.7	0.07	0.38	72.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Base & Op1)
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	19	5.6	0.018	0.1	LOS A	0.1	0.6	0.11	0.23	48.4
6	R2	14	0.0	0.018	4.8	LOS A	0.1	0.6	0.11	0.23	47.4
Approach		33	3.2	0.018	2.1	NA	0.1	0.6	0.11	0.23	48.0
East: Upper Bylong Road (E)											
7	L2	13	8.3	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.3
9	R2	14	7.7	0.020	4.9	LOS A	0.1	0.5	0.08	0.53	45.8
Approach		26	8.0	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.0
North: Bylong Valley Way (N)											
10	L2	15	14.3	0.019	4.7	LOS A	0.0	0.0	0.00	0.25	47.8
11	T1	17	25.0	0.019	0.0	LOS A	0.0	0.0	0.00	0.25	48.5
Approach		32	20.0	0.019	2.2	NA	0.0	0.0	0.00	0.25	48.2
All Vehicles		91	10.5	0.020	2.9	NA	0.1	0.6	0.06	0.32	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Base & Op1)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	3	33.3	0.010	0.3	LOS A	0.0	0.3	0.22	0.43	46.9
6	R2	13	0.0	0.010	5.0	LOS A	0.0	0.3	0.22	0.43	46.0
Approach		16	6.7	0.010	4.1	NA	0.0	0.3	0.22	0.43	46.2
East: Upper Bylong Road (E)											
7	L2	6	0.0	0.082	4.8	LOS A	0.3	1.9	0.03	0.57	46.4
9	R2	94	1.1	0.082	4.9	LOS A	0.3	1.9	0.03	0.57	45.9
Approach		100	1.1	0.082	4.9	LOS A	0.3	1.9	0.03	0.57	45.9
North: Bylong Valley Way (N)											
10	L2	114	8.3	0.065	4.6	LOS A	0.0	0.0	0.00	0.52	46.6
11	T1	1	0.0	0.065	0.0	LOS A	0.0	0.0	0.00	0.52	47.1
Approach		115	8.3	0.065	4.6	NA	0.0	0.0	0.00	0.52	46.6
All Vehicles		231	5.0	0.082	4.7	NA	0.3	1.9	0.03	0.53	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Base & Op1)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.004	0.3	LOS A	0.0	0.1	0.21	0.45	46.9
6	R2	6	0.0	0.004	5.0	LOS A	0.0	0.1	0.21	0.45	46.0
Approach		7	0.0	0.004	4.3	NA	0.0	0.1	0.21	0.45	46.1
East: Upper Bylong Road (E)											
7	L2	6	0.0	0.083	4.8	LOS A	0.3	2.0	0.12	0.55	46.3
9	R2	96	1.1	0.083	4.9	LOS A	0.3	2.0	0.12	0.55	45.8
Approach		102	1.0	0.083	4.9	LOS A	0.3	2.0	0.12	0.55	45.8
North: Bylong Valley Way (N)											
10	L2	97	1.1	0.059	4.6	LOS A	0.0	0.0	0.00	0.48	46.8
11	T1	11	40.0	0.059	0.0	LOS A	0.0	0.0	0.00	0.48	47.2
Approach		107	4.9	0.059	4.1	NA	0.0	0.0	0.00	0.48	46.8
All Vehicles		217	2.9	0.083	4.5	NA	0.3	2.0	0.06	0.51	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op2 Local AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op2)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	15	0.0	0.016	0.2	LOS A	0.1	0.7	0.12	0.22	95.8
6	R2	8	75.0	0.016	9.8	LOS A	0.1	0.7	0.12	0.22	58.7
Approach		23	27.3	0.016	3.7	NA	0.1	0.7	0.12	0.22	77.9
North: Wollar Road (N)											
7	L2	14	84.6	0.016	10.2	LOS A	0.1	0.5	0.09	0.63	51.8
9	R2	14	15.4	0.016	8.0	LOS A	0.1	0.5	0.11	0.64	68.4
Approach		27	50.0	0.016	9.1	LOS A	0.1	0.5	0.10	0.63	59.0
West: Bylong Valley Way (W)											
10	L2	12	18.2	0.017	8.3	LOS A	0.0	0.0	0.00	0.27	75.2
11	T1	18	5.9	0.017	0.0	LOS A	0.0	0.0	0.00	0.27	92.8
Approach		29	10.7	0.017	3.3	NA	0.0	0.0	0.00	0.27	85.0
All Vehicles		80	28.9	0.017	5.4	NA	0.1	0.7	0.07	0.38	72.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op2 Local PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op2)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	19	27.8	0.014	0.1	LOS A	0.1	0.7	0.12	0.09	96.9
6	R2	3	66.7	0.014	9.6	LOS A	0.1	0.7	0.12	0.09	61.2
Approach		22	33.3	0.014	1.5	NA	0.1	0.7	0.12	0.09	89.4
North: Wollar Road (N)											
7	L2	16	66.7	0.017	9.7	LOS A	0.1	0.5	0.09	0.63	55.4
9	R2	14	23.1	0.017	8.2	LOS A	0.1	0.5	0.10	0.64	65.8
Approach		29	46.4	0.017	9.0	LOS A	0.1	0.5	0.09	0.63	59.8
West: Bylong Valley Way (W)											
10	L2	14	7.7	0.017	8.0	LOS A	0.0	0.0	0.00	0.30	78.4
11	T1	17	6.3	0.017	0.0	LOS A	0.0	0.0	0.00	0.30	91.3
Approach		31	6.9	0.017	3.6	NA	0.0	0.0	0.00	0.30	85.0
All Vehicles		82	28.2	0.017	5.0	NA	0.1	0.7	0.07	0.36	74.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op2 Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op2)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	7	28.6	0.009	0.3	LOS A	0.0	0.4	0.18	0.28	89.6
6	R2	6	33.3	0.009	8.8	LOS A	0.0	0.4	0.18	0.28	68.5
Approach		14	30.8	0.009	4.2	NA	0.0	0.4	0.18	0.28	78.5
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.04	0.63	75.0
9	R2	69	1.5	0.057	7.6	LOS A	0.2	1.3	0.12	0.63	73.5
Approach		71	1.5	0.057	7.6	LOS A	0.2	1.3	0.12	0.63	73.5
West: Bylong Valley Way (W)											
10	L2	62	3.4	0.039	7.9	LOS A	0.0	0.0	0.00	0.60	74.3
11	T1	7	28.6	0.039	0.0	LOS A	0.0	0.0	0.00	0.60	83.5
Approach		69	6.1	0.039	7.1	NA	0.0	0.0	0.00	0.60	75.2
All Vehicles		154	6.2	0.057	7.1	NA	0.2	1.3	0.07	0.58	74.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op2 Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op2)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	12	27.3	0.008	0.2	LOS A	0.0	0.3	0.16	0.05	95.5
6	R2	1	0.0	0.008	7.8	LOS A	0.0	0.3	0.16	0.05	84.9
Approach		13	25.0	0.008	0.8	NA	0.0	0.3	0.16	0.05	94.5
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.05	0.63	75.0
9	R2	64	3.3	0.053	7.7	LOS A	0.2	1.2	0.13	0.63	72.8
Approach		65	3.2	0.053	7.7	LOS A	0.2	1.2	0.12	0.63	72.8
West: Bylong Valley Way (W)											
10	L2	60	1.8	0.039	7.9	LOS A	0.0	0.0	0.00	0.57	75.2
11	T1	11	30.0	0.039	0.0	LOS A	0.0	0.0	0.00	0.57	84.0
Approach		71	6.0	0.039	6.7	NA	0.0	0.0	0.00	0.57	76.4
All Vehicles		148	6.4	0.053	6.6	NA	0.2	1.2	0.07	0.55	76.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op2 Local AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op2)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	16	13.3	0.014	0.1	LOS A	0.1	0.5	0.11	0.19	48.6
6	R2	8	12.5	0.014	4.9	LOS A	0.1	0.5	0.11	0.19	47.4
Approach		24	13.0	0.014	1.8	NA	0.1	0.5	0.11	0.19	48.2
East: Upper Bylong Road (E)											
7	L2	6	16.7	0.016	4.8	LOS A	0.1	0.4	0.08	0.54	46.2
9	R2	14	15.4	0.016	5.0	LOS A	0.1	0.4	0.08	0.54	45.7
Approach		20	15.8	0.016	4.9	LOS A	0.1	0.4	0.08	0.54	45.8
North: Bylong Valley Way (N)											
10	L2	17	12.5	0.018	4.7	LOS A	0.0	0.0	0.00	0.29	47.8
11	T1	15	7.1	0.018	0.0	LOS A	0.0	0.0	0.00	0.29	48.4
Approach		32	10.0	0.018	2.5	NA	0.0	0.0	0.00	0.29	48.1
All Vehicles		76	12.5	0.018	2.9	NA	0.1	0.5	0.05	0.32	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op2 Local PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op2)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	19	5.6	0.018	0.1	LOS A	0.1	0.6	0.11	0.23	48.4
6	R2	14	0.0	0.018	4.8	LOS A	0.1	0.6	0.11	0.23	47.4
Approach		33	3.2	0.018	2.1	NA	0.1	0.6	0.11	0.23	48.0
East: Upper Bylong Road (E)											
7	L2	13	8.3	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.3
9	R2	14	7.7	0.020	4.9	LOS A	0.1	0.5	0.08	0.53	45.8
Approach		26	8.0	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.0
North: Bylong Valley Way (N)											
10	L2	15	14.3	0.019	4.7	LOS A	0.0	0.0	0.00	0.25	47.8
11	T1	17	25.0	0.019	0.0	LOS A	0.0	0.0	0.00	0.25	48.5
Approach		32	20.0	0.019	2.2	NA	0.0	0.0	0.00	0.25	48.2
All Vehicles		91	10.5	0.020	2.9	NA	0.1	0.6	0.06	0.32	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op2 Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op2)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	3	33.3	0.009	0.2	LOS A	0.0	0.3	0.18	0.42	47.0
6	R2	12	0.0	0.009	4.9	LOS A	0.0	0.3	0.18	0.42	46.1
Approach		15	7.1	0.009	3.9	NA	0.0	0.3	0.18	0.42	46.3
East: Upper Bylong Road (E)											
7	L2	5	0.0	0.061	4.7	LOS A	0.2	1.5	0.03	0.56	46.4
9	R2	69	4.5	0.061	4.9	LOS A	0.2	1.5	0.03	0.56	45.9
Approach		75	4.2	0.061	4.9	LOS A	0.2	1.5	0.03	0.56	46.0
North: Bylong Valley Way (N)											
10	L2	80	3.9	0.045	4.6	LOS A	0.0	0.0	0.00	0.52	46.6
11	T1	1	0.0	0.045	0.0	LOS A	0.0	0.0	0.00	0.52	47.1
Approach		81	3.9	0.045	4.5	NA	0.0	0.0	0.00	0.52	46.6
All Vehicles		171	4.3	0.061	4.6	NA	0.2	1.5	0.03	0.53	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op2 Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op2)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.004	0.2	LOS A	0.0	0.1	0.18	0.44	47.1
6	R2	5	0.0	0.004	4.9	LOS A	0.0	0.1	0.18	0.44	46.1
Approach		6	0.0	0.004	4.1	NA	0.0	0.1	0.18	0.44	46.3
East: Upper Bylong Road (E)											
7	L2	5	0.0	0.062	4.7	LOS A	0.2	1.5	0.10	0.55	46.3
9	R2	71	4.5	0.062	4.9	LOS A	0.2	1.5	0.10	0.55	45.8
Approach		76	4.2	0.062	4.9	LOS A	0.2	1.5	0.10	0.55	45.8
North: Bylong Valley Way (N)											
10	L2	72	4.4	0.047	4.6	LOS A	0.0	0.0	0.00	0.46	46.8
11	T1	11	40.0	0.047	0.0	LOS A	0.0	0.0	0.00	0.46	47.3
Approach		82	9.0	0.047	4.0	NA	0.0	0.0	0.00	0.46	46.9
All Vehicles		164	6.4	0.062	4.4	NA	0.2	1.5	0.06	0.50	46.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op3 Local AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	15	0.0	0.016	0.2	LOS A	0.1	0.7	0.12	0.22	95.8
6	R2	8	75.0	0.016	9.8	LOS A	0.1	0.7	0.12	0.22	58.7
Approach		23	27.3	0.016	3.7	NA	0.1	0.7	0.12	0.22	77.9
North: Wollar Road (N)											
7	L2	14	84.6	0.016	10.2	LOS A	0.1	0.5	0.09	0.63	51.8
9	R2	14	15.4	0.016	8.0	LOS A	0.1	0.5	0.11	0.64	68.4
Approach		27	50.0	0.016	9.1	LOS A	0.1	0.5	0.10	0.63	59.0
West: Bylong Valley Way (W)											
10	L2	12	18.2	0.017	8.3	LOS A	0.0	0.0	0.00	0.27	75.2
11	T1	18	5.9	0.017	0.0	LOS A	0.0	0.0	0.00	0.27	92.8
Approach		29	10.7	0.017	3.3	NA	0.0	0.0	0.00	0.27	85.0
All Vehicles		80	28.9	0.017	5.4	NA	0.1	0.7	0.07	0.38	72.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op3 Local PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	21	35.0	0.016	0.2	LOS A	0.1	0.8	0.13	0.08	96.8
6	R2	3	66.7	0.016	9.6	LOS A	0.1	0.8	0.13	0.08	61.9
Approach		24	39.1	0.016	1.4	NA	0.1	0.8	0.13	0.08	90.1
North: Wollar Road (N)											
7	L2	16	66.7	0.017	9.7	LOS A	0.1	0.5	0.09	0.63	55.3
9	R2	14	23.1	0.017	8.2	LOS A	0.1	0.5	0.11	0.64	65.8
Approach		29	46.4	0.017	9.0	LOS A	0.1	0.5	0.10	0.63	59.7
West: Bylong Valley Way (W)											
10	L2	14	7.7	0.019	8.0	LOS A	0.0	0.0	0.00	0.28	78.4
11	T1	19	16.7	0.019	0.0	LOS A	0.0	0.0	0.00	0.28	91.3
Approach		33	12.9	0.019	3.4	NA	0.0	0.0	0.00	0.28	85.4
All Vehicles		86	31.7	0.019	4.7	NA	0.1	0.8	0.07	0.35	75.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op3 Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	7	57.1	0.009	0.1	LOS A	0.0	0.4	0.12	0.29	88.2
6	R2	6	33.3	0.009	8.6	LOS A	0.0	0.4	0.12	0.29	68.0
Approach		14	46.2	0.009	4.0	NA	0.0	0.4	0.12	0.29	77.6
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.04	0.63	75.0
9	R2	34	3.1	0.027	7.6	LOS A	0.1	0.6	0.10	0.64	73.0
Approach		35	3.0	0.027	7.6	LOS A	0.1	0.6	0.10	0.64	73.0
West: Bylong Valley Way (W)											
10	L2	25	8.3	0.019	8.0	LOS A	0.0	0.0	0.00	0.54	72.8
11	T1	6	66.7	0.019	0.0	LOS A	0.0	0.0	0.00	0.54	83.6
Approach		32	20.0	0.019	6.4	NA	0.0	0.0	0.00	0.54	74.7
All Vehicles		80	17.1	0.027	6.5	NA	0.1	0.6	0.06	0.54	74.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2024 Op3 Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2024 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	12	45.5	0.008	0.1	LOS A	0.0	0.3	0.11	0.05	95.7
6	R2	1	0.0	0.008	7.7	LOS A	0.0	0.3	0.11	0.05	85.0
Approach		13	41.7	0.008	0.7	NA	0.0	0.3	0.11	0.05	94.7
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.05	0.63	75.0
9	R2	27	7.7	0.023	7.7	LOS A	0.1	0.5	0.10	0.64	71.2
Approach		28	7.4	0.023	7.7	LOS A	0.1	0.5	0.10	0.64	71.3
West: Bylong Valley Way (W)											
10	L2	23	4.5	0.020	7.9	LOS A	0.0	0.0	0.00	0.46	75.3
11	T1	11	50.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.46	85.2
Approach		34	18.8	0.020	5.5	NA	0.0	0.0	0.00	0.46	78.1
All Vehicles		75	18.3	0.023	5.5	NA	0.1	0.5	0.06	0.46	77.6

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op3 Local AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	16	13.3	0.014	0.1	LOS A	0.1	0.5	0.11	0.19	48.6
6	R2	8	12.5	0.014	4.9	LOS A	0.1	0.5	0.11	0.19	47.4
Approach		24	13.0	0.014	1.8	NA	0.1	0.5	0.11	0.19	48.2
East: Upper Bylong Road (E)											
7	L2	6	16.7	0.016	4.8	LOS A	0.1	0.4	0.08	0.54	46.2
9	R2	14	15.4	0.016	5.0	LOS A	0.1	0.4	0.08	0.54	45.7
Approach		20	15.8	0.016	4.9	LOS A	0.1	0.4	0.08	0.54	45.8
North: Bylong Valley Way (N)											
10	L2	17	12.5	0.018	4.7	LOS A	0.0	0.0	0.00	0.29	47.8
11	T1	15	7.1	0.018	0.0	LOS A	0.0	0.0	0.00	0.29	48.4
Approach		32	10.0	0.018	2.5	NA	0.0	0.0	0.00	0.29	48.1
All Vehicles		76	12.5	0.018	2.9	NA	0.1	0.5	0.05	0.32	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op3 Local PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	19	5.6	0.018	0.1	LOS A	0.1	0.6	0.11	0.23	48.4
6	R2	14	0.0	0.018	4.8	LOS A	0.1	0.6	0.11	0.23	47.4
Approach		33	3.2	0.018	2.1	NA	0.1	0.6	0.11	0.23	48.0
East: Upper Bylong Road (E)											
7	L2	13	8.3	0.049	4.9	LOS A	0.2	1.7	0.10	0.53	46.3
9	R2	37	65.7	0.049	5.5	LOS A	0.2	1.7	0.10	0.53	45.5
Approach		49	51.1	0.049	5.3	LOS A	0.2	1.7	0.10	0.53	45.7
North: Bylong Valley Way (N)											
10	L2	15	14.3	0.019	4.7	LOS A	0.0	0.0	0.00	0.25	47.8
11	T1	17	25.0	0.019	0.0	LOS A	0.0	0.0	0.00	0.25	48.5
Approach		32	20.0	0.019	2.2	NA	0.0	0.0	0.00	0.25	48.2
All Vehicles		114	28.7	0.049	3.5	NA	0.2	1.7	0.08	0.37	47.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op3 Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	3	33.3	0.007	0.1	LOS A	0.0	0.2	0.12	0.41	47.2
6	R2	9	0.0	0.007	4.8	LOS A	0.0	0.2	0.12	0.41	46.3
Approach		13	8.3	0.007	3.6	NA	0.0	0.2	0.12	0.41	46.5
East: Upper Bylong Road (E)											
7	L2	2	0.0	0.028	4.7	LOS A	0.1	0.7	0.03	0.56	46.5
9	R2	31	17.2	0.028	4.9	LOS A	0.1	0.7	0.03	0.56	45.9
Approach		33	16.1	0.028	4.9	LOS A	0.1	0.7	0.03	0.56	45.9
North: Bylong Valley Way (N)											
10	L2	41	12.8	0.025	4.7	LOS A	0.0	0.0	0.00	0.51	46.6
11	T1	1	0.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.51	47.1
Approach		42	12.5	0.025	4.5	NA	0.0	0.0	0.00	0.51	46.7
All Vehicles		87	13.3	0.028	4.6	NA	0.1	0.7	0.03	0.52	46.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2024 Op3 Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2024 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.002	0.1	LOS A	0.0	0.1	0.13	0.36	47.7
6	R2	2	0.0	0.002	4.8	LOS A	0.0	0.1	0.13	0.36	46.7
Approach		3	0.0	0.002	3.2	NA	0.0	0.1	0.13	0.36	47.0
East: Upper Bylong Road (E)											
7	L2	2	0.0	0.029	4.7	LOS A	0.1	0.7	0.09	0.54	46.4
9	R2	32	16.7	0.029	4.9	LOS A	0.1	0.7	0.09	0.54	45.8
Approach		34	15.6	0.029	4.9	LOS A	0.1	0.7	0.09	0.54	45.8
North: Bylong Valley Way (N)											
10	L2	33	16.1	0.026	4.7	LOS A	0.0	0.0	0.00	0.40	47.0
11	T1	11	40.0	0.026	0.0	LOS A	0.0	0.0	0.00	0.40	47.6
Approach		43	22.0	0.026	3.6	NA	0.0	0.0	0.00	0.40	47.1
All Vehicles		80	18.4	0.029	4.1	NA	0.1	0.7	0.04	0.46	46.6

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Base AM Peak Hour

Bylong Valley Way and Wollar Rd
2028 Background traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	15	0.0	0.016	0.1	LOS A	0.1	0.7	0.09	0.25	95.2
6	R2	9	66.7	0.016	9.5	LOS A	0.1	0.7	0.09	0.25	60.5
Approach		24	26.1	0.016	3.8	NA	0.1	0.7	0.09	0.25	77.8
North: Wollar Road (N)											
7	L2	6	83.3	0.006	10.1	LOS A	0.0	0.2	0.09	0.63	52.1
9	R2	4	25.0	0.006	8.2	LOS A	0.0	0.2	0.09	0.64	65.3
Approach		11	60.0	0.006	9.4	LOS A	0.0	0.2	0.09	0.63	56.7
West: Bylong Valley Way (W)											
10	L2	1	100.0	0.011	9.1	LOS A	0.0	0.0	0.00	0.07	67.4
11	T1	19	5.6	0.011	0.0	LOS A	0.0	0.0	0.00	0.07	98.8
Approach		20	10.5	0.011	0.9	NA	0.0	0.0	0.00	0.07	96.5
All Vehicles		55	26.9	0.016	3.7	NA	0.1	0.7	0.06	0.26	77.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Base PM Peak Hour

Bylong Valley Way and Wollar Rd
2028 Background traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	19	27.8	0.016	0.1	LOS A	0.1	0.8	0.09	0.11	97.2
6	R2	4	75.0	0.016	9.7	LOS A	0.1	0.8	0.09	0.11	59.2
Approach		23	36.4	0.016	1.9	NA	0.1	0.8	0.09	0.11	87.1
North: Wollar Road (N)											
7	L2	9	44.4	0.008	9.1	LOS A	0.0	0.3	0.08	0.63	60.5
9	R2	4	75.0	0.008	9.6	LOS A	0.0	0.3	0.08	0.64	52.6
Approach		14	53.8	0.008	9.3	LOS A	0.0	0.3	0.08	0.64	57.8
West: Bylong Valley Way (W)											
10	L2	4	0.0	0.011	7.8	LOS A	0.0	0.0	0.00	0.14	85.1
11	T1	16	6.7	0.011	0.0	LOS A	0.0	0.0	0.00	0.14	95.4
Approach		20	5.3	0.011	1.7	NA	0.0	0.0	0.00	0.14	93.0
All Vehicles		57	29.6	0.016	3.6	NA	0.1	0.8	0.06	0.25	79.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Base Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2028 Background traffic
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	1	0.0	0.006	0.0	LOS A	0.0	0.2	0.03	0.58	85.4
6	R2	7	42.9	0.006	8.8	LOS A	0.0	0.2	0.03	0.58	62.3
Approach		8	37.5	0.006	7.7	NA	0.0	0.2	0.03	0.58	64.5
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.02	0.65	75.3
9	R2	1	0.0	0.001	7.4	LOS A	0.0	0.0	0.03	0.65	75.1
Approach		2	0.0	0.001	7.6	LOS A	0.0	0.0	0.02	0.65	75.2
West: Bylong Valley Way (W)											
10	L2	2	50.0	0.002	9.1	LOS A	0.0	0.0	0.00	0.45	63.4
11	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.45	90.3
Approach		3	33.3	0.002	6.1	NA	0.0	0.0	0.00	0.45	70.4
All Vehicles		14	30.8	0.006	7.3	NA	0.0	0.2	0.02	0.56	67.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Base Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2028 Background traffic
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	6	16.7	0.004	0.0	LOS A	0.0	0.1	0.04	0.09	96.1
6	R2	1	0.0	0.004	7.7	LOS A	0.0	0.1	0.04	0.09	85.4
Approach		7	14.3	0.004	1.1	NA	0.0	0.1	0.04	0.09	94.4
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.03	0.64	75.1
9	R2	4	25.0	0.004	8.1	LOS A	0.0	0.1	0.06	0.65	65.5
Approach		5	20.0	0.004	8.1	LOS A	0.0	0.1	0.05	0.65	67.2
West: Bylong Valley Way (W)											
10	L2	1	0.0	0.004	7.8	LOS A	0.0	0.0	0.00	0.11	85.4
11	T1	5	20.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.11	95.9
Approach		6	16.7	0.004	1.3	NA	0.0	0.0	0.00	0.11	94.0
All Vehicles		19	16.7	0.004	3.1	NA	0.0	0.1	0.03	0.26	84.8

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Base AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 Background traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	18	17.6	0.015	0.1	LOS A	0.1	0.6	0.09	0.16	48.8
6	R2	7	14.3	0.015	4.9	LOS A	0.1	0.6	0.09	0.16	47.6
Approach		25	16.7	0.015	1.5	NA	0.1	0.6	0.09	0.16	48.5
East: Upper Bylong Road (E)											
7	L2	6	16.7	0.006	4.8	LOS A	0.0	0.2	0.06	0.51	46.2
9	R2	2	50.0	0.006	5.2	LOS A	0.0	0.2	0.06	0.51	45.1
Approach		8	25.0	0.006	4.9	LOS A	0.0	0.2	0.06	0.51	45.9
North: Bylong Valley Way (N)											
10	L2	6	16.7	0.012	4.7	LOS A	0.0	0.0	0.00	0.15	48.4
11	T1	16	6.7	0.012	0.0	LOS A	0.0	0.0	0.00	0.15	49.2
Approach		22	9.5	0.012	1.3	NA	0.0	0.0	0.00	0.15	49.0
All Vehicles		56	15.1	0.015	1.9	NA	0.1	0.6	0.05	0.21	48.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Base PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 Background traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	20	5.3	0.018	0.1	LOS A	0.1	0.6	0.09	0.23	48.5
6	R2	14	0.0	0.018	4.7	LOS A	0.1	0.6	0.09	0.23	47.5
Approach		34	3.1	0.018	2.0	NA	0.1	0.6	0.09	0.23	48.1
East: Upper Bylong Road (E)											
7	L2	14	7.7	0.011	4.7	LOS A	0.0	0.3	0.07	0.51	46.3
9	R2	3	0.0	0.011	4.7	LOS A	0.0	0.3	0.07	0.51	46.0
Approach		17	6.3	0.011	4.7	LOS A	0.0	0.3	0.07	0.51	46.3
North: Bylong Valley Way (N)											
10	L2	4	25.0	0.013	4.8	LOS A	0.0	0.0	0.00	0.10	48.5
11	T1	18	23.5	0.013	0.0	LOS A	0.0	0.0	0.00	0.10	49.4
Approach		22	23.8	0.013	0.9	NA	0.0	0.0	0.00	0.10	49.2
All Vehicles		73	10.1	0.018	2.3	NA	0.1	0.6	0.06	0.25	48.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Base Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 Background traffic
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	4	25.0	0.007	0.0	LOS A	0.0	0.2	0.02	0.38	47.7
6	R2	8	0.0	0.007	4.7	LOS A	0.0	0.2	0.02	0.38	46.8
Approach		13	8.3	0.007	3.1	NA	0.0	0.2	0.02	0.38	47.1
East: Upper Bylong Road (E)											
7	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.01	0.55	46.6
9	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.01	0.55	46.1
Approach		2	0.0	0.001	4.6	LOS A	0.0	0.0	0.01	0.55	46.3
North: Bylong Valley Way (N)											
10	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.00	0.27	48.0
11	T1	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.27	48.5
Approach		2	0.0	0.001	2.3	NA	0.0	0.0	0.00	0.27	48.3
All Vehicles		17	6.3	0.007	3.2	NA	0.0	0.2	0.02	0.39	47.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Base Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 Background traffic
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.07	0.28	48.3
6	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.07	0.28	47.3
Approach		2	0.0	0.001	2.4	NA	0.0	0.0	0.07	0.28	47.8
East: Upper Bylong Road (E)											
7	L2	1	0.0	0.001	4.6	LOS A	0.0	0.0	0.05	0.53	46.5
9	R2	1	0.0	0.001	4.7	LOS A	0.0	0.0	0.05	0.53	46.0
Approach		2	0.0	0.001	4.7	LOS A	0.0	0.0	0.05	0.53	46.2
North: Bylong Valley Way (N)											
10	L2	3	0.0	0.009	4.6	LOS A	0.0	0.0	0.00	0.13	48.5
11	T1	11	40.0	0.009	0.0	LOS A	0.0	0.0	0.00	0.13	49.0
Approach		14	30.8	0.009	1.1	NA	0.0	0.0	0.00	0.13	48.9
All Vehicles		18	23.5	0.009	1.6	NA	0.0	0.0	0.01	0.19	48.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Base, Op1, Op2 - AM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Base, Op1, Op2)
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	16	0.0	0.017	0.2	LOS A	0.1	0.7	0.12	0.23	95.1
6	R2	9	66.7	0.017	9.6	LOS A	0.1	0.7	0.12	0.23	60.5
Approach		25	25.0	0.017	3.7	NA	0.1	0.7	0.12	0.23	78.3
North: Wollar Road (N)											
7	L2	13	91.7	0.016	10.3	LOS A	0.1	0.5	0.09	0.63	50.6
9	R2	14	15.4	0.016	8.0	LOS A	0.1	0.5	0.11	0.64	68.4
Approach		26	52.0	0.016	9.1	LOS A	0.1	0.5	0.10	0.63	58.5
West: Bylong Valley Way (W)											
10	L2	12	18.2	0.017	8.3	LOS A	0.0	0.0	0.00	0.26	75.3
11	T1	19	5.6	0.017	0.0	LOS A	0.0	0.0	0.00	0.26	93.1
Approach		31	10.3	0.017	3.2	NA	0.0	0.0	0.00	0.26	85.5
All Vehicles		82	28.2	0.017	5.2	NA	0.1	0.7	0.07	0.37	72.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Base, Op1, Op2 - PM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Base, Op1, Op2)
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	20	26.3	0.016	0.2	LOS A	0.1	0.8	0.12	0.11	96.9
6	R2	4	75.0	0.016	9.8	LOS A	0.1	0.8	0.12	0.11	59.1
Approach		24	34.8	0.016	1.8	NA	0.1	0.8	0.12	0.11	87.2
North: Wollar Road (N)											
7	L2	16	66.7	0.018	9.7	LOS A	0.1	0.6	0.09	0.63	55.4
9	R2	15	28.6	0.018	8.4	LOS A	0.1	0.6	0.11	0.64	64.1
Approach		31	48.3	0.018	9.1	LOS A	0.1	0.6	0.10	0.63	59.3
West: Bylong Valley Way (W)											
10	L2	14	7.7	0.017	8.0	LOS A	0.0	0.0	0.00	0.30	78.4
11	T1	17	6.3	0.017	0.0	LOS A	0.0	0.0	0.00	0.30	91.3
Approach		31	6.9	0.017	3.6	NA	0.0	0.0	0.00	0.30	85.0
All Vehicles		85	29.6	0.018	5.1	NA	0.1	0.8	0.07	0.37	74.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Project Base, Op1, Op2 - AM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Base, Op1, Op2)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	5	0.0	0.009	0.3	LOS A	0.0	0.3	0.17	0.35	89.7
6	R2	7	42.9	0.009	9.0	LOS A	0.0	0.3	0.17	0.35	64.6
Approach		13	25.0	0.009	5.4	NA	0.0	0.3	0.17	0.35	73.1
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.03	0.64	75.1
9	R2	67	1.6	0.055	7.6	LOS A	0.2	1.3	0.11	0.63	73.5
Approach		68	1.5	0.055	7.6	LOS A	0.2	1.3	0.11	0.63	73.5
West: Bylong Valley Way (W)											
10	L2	60	3.5	0.035	7.9	LOS A	0.0	0.0	0.00	0.62	74.0
11	T1	4	0.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.62	83.3
Approach		64	3.3	0.035	7.4	NA	0.0	0.0	0.00	0.62	74.5
All Vehicles		145	4.3	0.055	7.3	NA	0.2	1.3	0.07	0.60	73.9

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Project Base, Op1, Op2 - PM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Base, Op1, Op2)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	9	11.1	0.006	0.2	LOS A	0.0	0.2	0.16	0.06	95.6
6	R2	1	0.0	0.006	7.8	LOS A	0.0	0.2	0.16	0.06	85.0
Approach		11	10.0	0.006	0.9	NA	0.0	0.2	0.16	0.06	94.4
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.04	0.63	75.0
9	R2	61	3.4	0.050	7.7	LOS A	0.2	1.2	0.12	0.63	72.8
Approach		62	3.4	0.050	7.7	LOS A	0.2	1.2	0.11	0.63	72.8
West: Bylong Valley Way (W)											
10	L2	58	1.8	0.036	7.9	LOS A	0.0	0.0	0.00	0.58	75.2
11	T1	8	12.5	0.036	0.0	LOS A	0.0	0.0	0.00	0.58	84.0
Approach		66	3.2	0.036	6.9	NA	0.0	0.0	0.00	0.58	76.2
All Vehicles		139	3.8	0.050	6.8	NA	0.2	1.2	0.06	0.57	75.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Base, Op1, Op2 - AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Base, Op1, Op2)
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	18	17.6	0.015	0.1	LOS A	0.1	0.6	0.11	0.18	48.7
6	R2	8	12.5	0.015	4.9	LOS A	0.1	0.6	0.11	0.18	47.4
Approach		26	16.0	0.015	1.6	NA	0.1	0.6	0.11	0.18	48.3
East: Upper Bylong Road (E)											
7	L2	7	14.3	0.017	4.8	LOS A	0.1	0.5	0.08	0.53	46.2
9	R2	14	15.4	0.017	5.0	LOS A	0.1	0.5	0.08	0.53	45.7
Approach		21	15.0	0.017	4.9	LOS A	0.1	0.5	0.08	0.53	45.8
North: Bylong Valley Way (N)											
10	L2	18	11.8	0.019	4.7	LOS A	0.0	0.0	0.00	0.28	47.8
11	T1	16	6.7	0.019	0.0	LOS A	0.0	0.0	0.00	0.28	48.4
Approach		34	9.4	0.019	2.5	NA	0.0	0.0	0.00	0.28	48.1
All Vehicles		81	13.0	0.019	2.8	NA	0.1	0.6	0.06	0.31	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Base, Op1, Op2 - PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Base, Op1, Op2)
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	20	5.3	0.019	0.1	LOS A	0.1	0.6	0.11	0.22	48.4
6	R2	14	0.0	0.019	4.8	LOS A	0.1	0.6	0.11	0.22	47.4
Approach		34	3.1	0.019	2.0	NA	0.1	0.6	0.11	0.22	48.0
East: Upper Bylong Road (E)											
7	L2	14	7.7	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.3
9	R2	14	7.7	0.020	4.9	LOS A	0.1	0.5	0.08	0.53	45.8
Approach		27	7.7	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.0
North: Bylong Valley Way (N)											
10	L2	15	14.3	0.019	4.7	LOS A	0.0	0.0	0.00	0.24	47.9
11	T1	18	23.5	0.019	0.0	LOS A	0.0	0.0	0.00	0.24	48.5
Approach		33	19.4	0.019	2.1	NA	0.0	0.0	0.00	0.24	48.2
All Vehicles		94	10.1	0.020	2.9	NA	0.1	0.6	0.06	0.32	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Project Base, Op1, Op2 - AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Base, Op1, Op2)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	4	25.0	0.009	0.2	LOS A	0.0	0.3	0.17	0.39	47.2
6	R2	12	0.0	0.009	4.9	LOS A	0.0	0.3	0.17	0.39	46.3
Approach		16	6.7	0.009	3.6	NA	0.0	0.3	0.17	0.39	46.5
East: Upper Bylong Road (E)											
7	L2	4	0.0	0.055	4.7	LOS A	0.2	1.3	0.03	0.56	46.5
9	R2	64	1.6	0.055	4.9	LOS A	0.2	1.3	0.03	0.56	45.9
Approach		68	1.5	0.055	4.9	LOS A	0.2	1.3	0.03	0.56	46.0
North: Bylong Valley Way (N)											
10	L2	75	1.4	0.041	4.6	LOS A	0.0	0.0	0.00	0.52	46.6
11	T1	1	0.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.52	47.1
Approach		76	1.4	0.041	4.5	NA	0.0	0.0	0.00	0.52	46.7
All Vehicles		160	2.0	0.055	4.6	NA	0.2	1.3	0.03	0.53	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Project Base, Op1, Op2 - PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Base, Op1, Op2)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.003	0.2	LOS A	0.0	0.1	0.17	0.42	47.2
6	R2	4	0.0	0.003	4.9	LOS A	0.0	0.1	0.17	0.42	46.2
Approach		5	0.0	0.003	3.9	NA	0.0	0.1	0.17	0.42	46.4
East: Upper Bylong Road (E)											
7	L2	4	0.0	0.056	4.7	LOS A	0.2	1.3	0.10	0.55	46.3
9	R2	65	1.6	0.056	4.9	LOS A	0.2	1.3	0.10	0.55	45.8
Approach		69	1.5	0.056	4.8	LOS A	0.2	1.3	0.10	0.55	45.8
North: Bylong Valley Way (N)											
10	L2	66	1.6	0.043	4.6	LOS A	0.0	0.0	0.00	0.46	46.8
11	T1	11	40.0	0.043	0.0	LOS A	0.0	0.0	0.00	0.46	47.3
Approach		77	6.8	0.043	4.0	NA	0.0	0.0	0.00	0.46	46.9
All Vehicles		152	4.2	0.056	4.4	NA	0.2	1.3	0.05	0.50	46.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Op3 - Local AM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	16	0.0	0.017	0.2	LOS A	0.1	0.7	0.12	0.23	95.1
6	R2	9	66.7	0.017	9.6	LOS A	0.1	0.7	0.12	0.23	60.5
Approach		25	25.0	0.017	3.7	NA	0.1	0.7	0.12	0.23	78.3
North: Wollar Road (N)											
7	L2	14	84.6	0.016	10.2	LOS A	0.1	0.5	0.09	0.63	51.8
9	R2	14	15.4	0.016	8.0	LOS A	0.1	0.5	0.11	0.64	68.4
Approach		27	50.0	0.016	9.1	LOS A	0.1	0.5	0.10	0.63	59.0
West: Bylong Valley Way (W)											
10	L2	12	18.2	0.017	8.3	LOS A	0.0	0.0	0.00	0.26	75.3
11	T1	19	5.6	0.017	0.0	LOS A	0.0	0.0	0.00	0.26	93.1
Approach		31	10.3	0.017	3.2	NA	0.0	0.0	0.00	0.26	85.5
All Vehicles		83	27.8	0.017	5.3	NA	0.1	0.7	0.07	0.37	72.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Op3 - Local PM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	20	26.3	0.016	0.2	LOS A	0.1	0.8	0.12	0.11	96.9
6	R2	4	75.0	0.016	9.8	LOS A	0.1	0.8	0.12	0.11	59.1
Approach		24	34.8	0.016	1.8	NA	0.1	0.8	0.12	0.11	87.2
North: Wollar Road (N)											
7	L2	16	66.7	0.018	9.7	LOS A	0.1	0.6	0.09	0.63	55.4
9	R2	15	28.6	0.018	8.4	LOS A	0.1	0.6	0.11	0.64	64.1
Approach		31	48.3	0.018	9.1	LOS A	0.1	0.6	0.10	0.63	59.3
West: Bylong Valley Way (W)											
10	L2	14	7.7	0.017	8.0	LOS A	0.0	0.0	0.00	0.30	78.4
11	T1	17	6.3	0.017	0.0	LOS A	0.0	0.0	0.00	0.30	91.3
Approach		31	6.9	0.017	3.6	NA	0.0	0.0	0.00	0.30	85.0
All Vehicles		85	29.6	0.018	5.1	NA	0.1	0.8	0.07	0.37	74.0

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Op3 - Project AM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	5	40.0	0.009	0.1	LOS A	0.0	0.4	0.11	0.37	88.3
6	R2	7	42.9	0.009	8.9	LOS A	0.0	0.4	0.11	0.37	64.8
Approach		13	41.7	0.009	5.2	NA	0.0	0.4	0.11	0.37	72.9
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.03	0.64	75.1
9	R2	29	3.6	0.024	7.6	LOS A	0.1	0.5	0.09	0.64	72.9
Approach		31	3.4	0.024	7.6	LOS A	0.1	0.5	0.09	0.64	72.9
West: Bylong Valley Way (W)											
10	L2	22	9.5	0.016	8.1	LOS A	0.0	0.0	0.00	0.56	72.4
11	T1	4	50.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.56	83.8
Approach		26	16.0	0.016	6.8	NA	0.0	0.0	0.00	0.56	74.0
All Vehicles		69	15.2	0.024	6.9	NA	0.1	0.5	0.06	0.56	73.3

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1. Bylong Valley Way / Wollar Rd 2028 Op3 - Project PM Peak Hour

Bylong Valley Way and Wollar Rd
2028 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Bylong Valley Way (E)											
5	T1	9	33.3	0.006	0.1	LOS A	0.0	0.2	0.10	0.06	95.8
6	R2	1	0.0	0.006	7.7	LOS A	0.0	0.2	0.10	0.06	85.1
Approach		11	30.0	0.006	0.8	NA	0.0	0.2	0.10	0.06	94.6
North: Wollar Road (N)											
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.05	0.63	75.0
9	R2	23	9.1	0.019	7.8	LOS A	0.1	0.5	0.09	0.64	70.8
Approach		24	8.7	0.019	7.8	LOS A	0.1	0.5	0.09	0.64	70.9
West: Bylong Valley Way (W)											
10	L2	20	5.3	0.017	8.0	LOS A	0.0	0.0	0.00	0.47	75.3
11	T1	8	37.5	0.017	0.0	LOS A	0.0	0.0	0.00	0.47	85.6
Approach		28	14.8	0.017	5.6	NA	0.0	0.0	0.00	0.47	78.1
All Vehicles		63	15.0	0.019	5.6	NA	0.1	0.5	0.05	0.47	77.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Op3 - Local AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	18	17.6	0.015	0.1	LOS A	0.1	0.6	0.11	0.18	48.7
6	R2	8	12.5	0.015	4.9	LOS A	0.1	0.6	0.11	0.18	47.4
Approach		26	16.0	0.015	1.6	NA	0.1	0.6	0.11	0.18	48.3
East: Upper Bylong Road (E)											
7	L2	7	14.3	0.017	4.8	LOS A	0.1	0.5	0.08	0.53	46.2
9	R2	14	15.4	0.017	5.0	LOS A	0.1	0.5	0.08	0.53	45.7
Approach		21	15.0	0.017	4.9	LOS A	0.1	0.5	0.08	0.53	45.8
North: Bylong Valley Way (N)											
10	L2	18	11.8	0.019	4.7	LOS A	0.0	0.0	0.00	0.28	47.8
11	T1	16	6.7	0.019	0.0	LOS A	0.0	0.0	0.00	0.28	48.4
Approach		34	9.4	0.019	2.5	NA	0.0	0.0	0.00	0.28	48.1
All Vehicles		81	13.0	0.019	2.8	NA	0.1	0.6	0.06	0.31	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Op3 - Local PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	20	5.3	0.019	0.1	LOS A	0.1	0.6	0.11	0.22	48.4
6	R2	14	0.0	0.019	4.8	LOS A	0.1	0.6	0.11	0.22	47.4
Approach		34	3.1	0.019	2.0	NA	0.1	0.6	0.11	0.22	48.0
East: Upper Bylong Road (E)											
7	L2	14	7.7	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.3
9	R2	14	7.7	0.020	4.9	LOS A	0.1	0.5	0.08	0.53	45.8
Approach		27	7.7	0.020	4.8	LOS A	0.1	0.5	0.08	0.53	46.0
North: Bylong Valley Way (N)											
10	L2	15	14.3	0.019	4.7	LOS A	0.0	0.0	0.00	0.24	47.9
11	T1	18	23.5	0.019	0.0	LOS A	0.0	0.0	0.00	0.24	48.5
Approach		33	19.4	0.019	2.1	NA	0.0	0.0	0.00	0.24	48.2
All Vehicles		94	10.1	0.020	2.9	NA	0.1	0.6	0.06	0.32	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Op3 - Project AM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Op3)
Project AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	4	25.0	0.008	0.1	LOS A	0.0	0.3	0.11	0.38	47.5
6	R2	9	0.0	0.008	4.8	LOS A	0.0	0.3	0.11	0.38	46.5
Approach		14	7.7	0.008	3.3	NA	0.0	0.3	0.11	0.38	46.8
East: Upper Bylong Road (E)											
7	L2	2	0.0	0.022	4.7	LOS A	0.1	0.5	0.03	0.56	46.5
9	R2	24	13.0	0.022	4.9	LOS A	0.1	0.5	0.03	0.56	45.9
Approach		26	12.0	0.022	4.9	LOS A	0.1	0.5	0.03	0.56	45.9
North: Bylong Valley Way (N)											
10	L2	35	9.1	0.020	4.6	LOS A	0.0	0.0	0.00	0.51	46.7
11	T1	1	0.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.51	47.2
Approach		36	8.8	0.020	4.5	NA	0.0	0.0	0.00	0.51	46.7
All Vehicles		76	9.7	0.022	4.4	NA	0.1	0.5	0.03	0.50	46.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2. Bylong Valley Way / Upper Bylong Rd 2028 Op3 - Project PM Peak Hour

Bylong Valley Way and Upper Bylong Rd
2028 with project traffic (Op3)
Project PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bylong Valley Way (S)											
5	T1	1	0.0	0.002	0.1	LOS A	0.0	0.1	0.12	0.36	47.7
6	R2	2	0.0	0.002	4.8	LOS A	0.0	0.1	0.12	0.36	46.7
Approach		3	0.0	0.002	3.2	NA	0.0	0.1	0.12	0.36	47.0
East: Upper Bylong Road (E)											
7	L2	2	0.0	0.023	4.7	LOS A	0.1	0.6	0.08	0.54	46.4
9	R2	25	12.5	0.023	4.9	LOS A	0.1	0.6	0.08	0.54	45.8
Approach		27	11.5	0.023	4.9	LOS A	0.1	0.6	0.08	0.54	45.9
North: Bylong Valley Way (N)											
10	L2	27	11.5	0.023	4.7	LOS A	0.0	0.0	0.00	0.38	47.1
11	T1	11	40.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.38	47.6
Approach		38	19.4	0.023	3.4	NA	0.0	0.0	0.00	0.38	47.2
All Vehicles		68	15.4	0.023	4.0	NA	0.1	0.6	0.04	0.45	46.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.