



APPENDIX 26





Traffic and
Transport Impact
Assessment

Technical Report

Traffic and Transport Impact Assessment for Glendell Continued Operations Project

PREPARED FOR UMWELT (AUSTRALIA) PTY LTD

DOCUMENT CONTROL

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1 Executive Summary

Puliyapang has been engaged by Umwelt (Australia) Pty Ltd (Umwelt) on behalf of Glendell Tenements Pty Limited (the Proponent) to carry out a study of the traffic and transport impacts of the proposed Glendell Continued Operations Project (the Project). The Project proposes an extension of mining into a new mining area to the immediate north of the existing Glendell Mine which would extend the life of the existing operation until 2044 and provide ongoing employment opportunities for the existing workforce. The purpose of the assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Umwelt to support an application for development consent under Part 4 of the New South Wales (NSW) *Planning and Assessment Act 1979* (EPandA Act). The scope of this report is to identify and assess potential impacts of the proposed Project associated with the local traffic and transport infrastructure.

This report has considered the intersection capacity in terms of Level of Service (LOS), Degree of Saturation (DOS) and 95% Back of Queue length by utilising intersection modelling software Sidra 8.0 to model the six intersections associated with the Project:

- New England Highway / Hebden Road;
- Hebden Road / Glendell Access Road (including future usage as Proposed Ancillary Pad South Access Road);
- Hebden Road / Ravensworth East Access Road;
- Hebden Road / Mount Owen Access Road;
- Hebden Road / Proposed Glendell Access Road; and
- Hebden Road / Proposed Ancillary Pad North Access.

Table 1.1 summarises the results.

Table 1.1 Results Summary

Intersection	Performance Indicator	AM Peak			PM Peak		
		2018 Base	2022 Forecast	2033 Forecast	2018 Base	2022 Forecast	2033 Forecast
New England Highway / Hebden Road	Degree of Saturation (DOS)	0.511	0.554	0.689	0.279	0.514	0.329
	Level of Service (LOS)	A	A	B	A	A	A
	95% Back of Queue (m)	4.5	14.5	14	2.5	26.1	7.2
Hebden Road / Glendell Access Road (including Proposed Ancillary Pad South Access 2022-EOM)	Degree of Saturation (DOS)	0.089	0.210	0.144	0.034	0.210	0.084
	Level of Service (LOS)	A	A	A	A	A	A
	95% Back of Queue (m)	2.1	2.6	0.2	0.5	0.6	0.2
Hebden Road / Ravensworth East Access Road	Degree of Saturation (DOS)	0.066	0.069	N/A	0.028	0.028	N/A
	Level of Service (LOS)	A	A	N/A	A	A	N/A
	95% Back of Queue (m)	1.0	0.5	N/A	0.3	0.3	N/A
Hebden Road / Mount Owen Access Road	Degree of Saturation (DOS)	0.053	0.053	0.053	0.035	0.035	0.035
	Level of Service (LOS)	A	A	A	A	A	A
	95% Back of Queue (m)	2.2	2.2	2.2	1.1	1.1	1.1
Hebden Road / Proposed Glendell Access Road	Degree of Saturation (DOS)	N/A	0.069	0.073	N/A	0.035	0.063
	Level of Service (LOS)	N/A	A	A	N/A	A	A
	95% Back of Queue (m)	N/A	1.8	2.6	N/A	1.2	2.1
Hebden Road / Proposed Ancillary Pad North Access	Degree of Saturation (DOS)	N/A	0.115	0.139	N/A	0.050	0.082
	Level of Service (LOS)	N/A	A	A	N/A	A	A
	95% Back of Queue (m)	N/A	0.2	0.2	N/A	0.3	0.2

The traffic modelling indicated that the construction and operation of the Project will have a negligible impact on intersection capacity due to increased demand as there is adequate latent capacity to accommodate the additional traffic within acceptable thresholds.

It is recommended that consideration be given to upgrading the existing auxiliary right turn “Type AUR” treatments at the Glendell and Ravensworth East access road intersections to short channelised right turn “Type CHR(s)” treatments to improve road safety at each mine access intersection due to the limited sight distances at these intersections. The CHR(s) treatment improves safety performance by removing potentially stationary turning vehicles from the through traffic stream. This treatment is suitable where there are low to moderate through and turning volumes. If a particular turn from a major road is associated with some geometric minima (for example, limited sight distance, steep grade), consideration should be given to the adoption of a turn treatment of a higher order than that indicated by the warrants. For example, if the warrants indicate that a BAR turn treatment is acceptable for the relevant traffic volumes, but limited visibility to the right-turning vehicle is available, consideration should be given to the adoption of a CHR(s) or CHR turn treatment instead.

1.1 Referenced Documents

This Traffic and Transport Impact Assessment (TTIA) was developed using the reference documents in **Table 1.2**.

Table 1.2 Referenced Documents

Reference Document	Version
Austroads Guide to Road Design (Part 1 to Part 8)	2010-2017
Austroads Guide to Traffic Management (Part 1 to Part 13)	2013-2017
RMS (RTA) Guide to Traffic Generating Development	2002
RMS (RTA) Delineation Guide	2008
Transport for NSW (TfNSW) Future Transport Strategy 2056	2018
Transport for NSW (TfNSW) Regional NSW Services and Infrastructure Plan	2018
Transport for NSW (TfNSW) NSW Freight and Ports Plan 2018-2023	2018

1.2 Definitions of Terms and Abbreviations

The terms and abbreviations in **Table 1.3** apply to this TTIA.

Table 1.3 Terms and Abbreviations

Terms and Abbreviations	Definition
AUL	Auxiliary Left Hand Turn
AUR	Auxiliary Right Hand Turn
BAL	Basic Left Hand Turn
BAR	Basic Right Hand Turn
CHL	Channelised Left Hand Turn
CHR	Channelised Right Hand Turn
CHR(s)	Channelised Right Hand Turn (short)
CTMP	Construction Traffic Management Plan
DOS	Degree of saturation – the ratio of arrival (demand) flow rate to capacity during a given flow period
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EOM	End of Mine
EPA	Environmental Protection Authority
ITS	Intelligent Transport System
LOS	Level of Service – An index of the operational performance of traffic on a given lane, roadway or intersection, based on service measures such as delay, degree of saturation, density and speed during a given flow period
MIA	Mine Infrastructure Area
MSC	Muswellbrook Shire Council
NSW	New South Wales
NSW EP and A Act	New South Wales Environmental Planning and Assessment Act
the Proponent	Glendell Tenements Pty Limited
ROM	Run-of-Mine
SEARs	Secretary's Environmental Assessment Requirements
Sidra 8.0	Traffic and Transport Modelling Software
SC	Singleton Council
SISD	Safe Intersection Sight Distance
SSD	Stopping Sight Distance
TfNSW	Transport for New South Wales
TTIA	Traffic and Transport Impact Assessment

2 Background

Puliyapang has been engaged by Umwelt on behalf of the Proponent to carry out a study of the traffic and transport impacts of the proposed Project. The Project proposes an extension of mining into a new mining area to the immediate north of the existing Glendell Mine. The purpose of the assessment is to form part of an EIS being prepared by Umwelt to support an application for development consent under Part 4 of the NSW EP and A Act.

The Project seeks to extend the life of coal mining operations at Glendell Mine until 2044 and provide ongoing employment for the existing workforce and contractors. The Project includes the ongoing use of the Mount Owen Complex and associated coal handling and transport infrastructure (Mount Owen coal handling infrastructure) until approximately 2045. The new development consent being sought for the Project will include the current approved mining operations at the Glendell Mine.

The site is part of the Hunter Valley Coalfields and is located approximately 20 km northwest of Singleton in the Singleton Local Government Area.

The key features of the Project include:

- Extension of open cut mining to the north of the existing Glendell Mine until 2044;
- Extraction of approximately 135 million tonnes of run-of-mine (ROM) coal;
- Continued integration of the mine with the wider Mount Owen Complex, including the use of the Mount Owen coal handling and preparation plant, rail loop and associated infrastructure for ROM coal processing and product coal transport;
- Demolition of the existing Glendell Mine Infrastructure Area (MIA) and the construction of a new MIA;
- Ongoing employment for existing Mount Owen Complex workforce;
- Progressive rehabilitation of the site;
- Realignment of a section of Hebden Road;
- Realignment of Yorks Creek;
- Relocation of Ravensworth Homestead, and
- Other ancillary infrastructure works such as the construction of a heavy vehicle access road.

2.1 Scope

The Project is declared a State Significant Development as defined under the provisions of the NSW State Environmental Planning Policy (State and Regional Development) 2011. The Department of Planning, Industry and Environment (DPIE) has issued the Secretary's Environmental Assessment Requirements (SEARs) relating to the traffic and transport aspects of the Project and require that the EIS must address the following in regard to traffic and transport, these are shown in **Table 2.1**.

Table 2.1 SEARS Requirements

SEARS requirement	Addressed
Assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the road and rail networks, including undertaking a road safety audit	<p>Section 7 of this report addresses the potential impacts of capacity, condition, safety and efficiency of the local road network including:</p> <ul style="list-style-type: none"> • Assessment of future traffic scenarios with expected development demand and compounded population growth, • Assessment of intersection capacity and queue lengths and • Assessment of gap acceptance
Description of the measures that would be implemented to mitigate any impacts	Various treatments and considerations have been identified and discussed in Section 7 of this report.
Assessment of the need to realign Hebden Road, and if so a conceptual design of the Hebden Road realignment, developed in consultation with Singleton Council, including a plan to avoid disruptions to existing traffic, and ensure local traffic requirements are met	Section 7 of this report provides a conceptual arrangement for the proposed intersection based on the intersections currently servicing the Glendell site. Various factors have been discussed in this report focussing on avoiding disruptions to existing traffic.

2.2 Site Location

The Project site is located on Hebden Road, Ravensworth in the Hunter Region of New South Wales, approximately 20 km northwest of Singleton in the Singleton Local Government Area (refer **Figure 2.1**)

Site access is provided via Hebden Road (Local Road) and its intersection with the New England Highway (State Road HW9) (refer **Figure 2.2**). The New England Highway forms part of the National Network providing interstate connectivity between NSW and Queensland for traffic and freight.

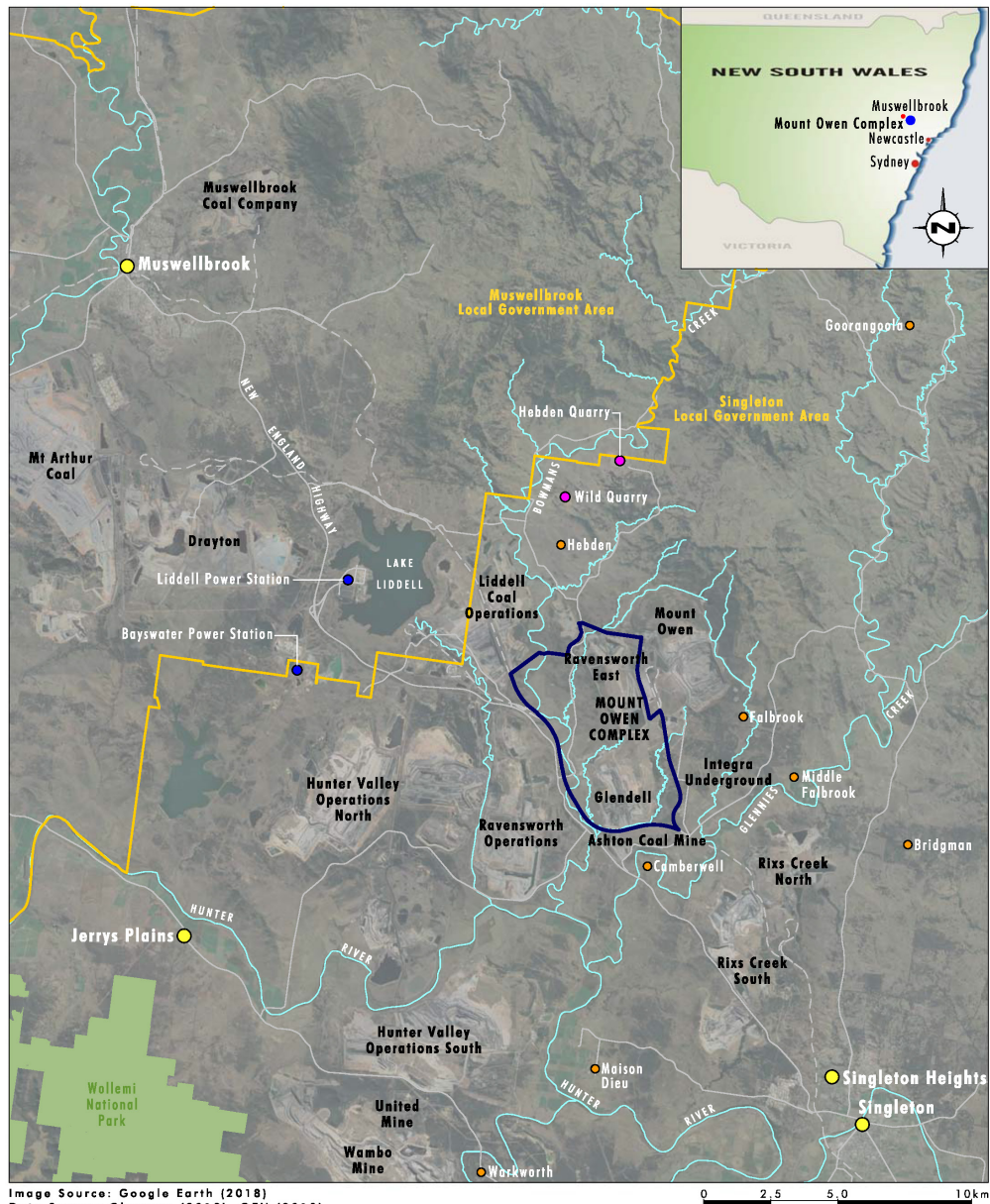


Image Source: Google Earth (2018)
Data Source: Glencore (2019), OEH (2018)

Legend

- Project Area
- Local Government Area Boundary
- National Park
- Road
- Railway
- Drainage Line
- Power Stations
- Quarry
- Towns
- Village/Localities

Project Locality

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Figure 2.1 Locality Plan for the Glendell Continued Operations Project

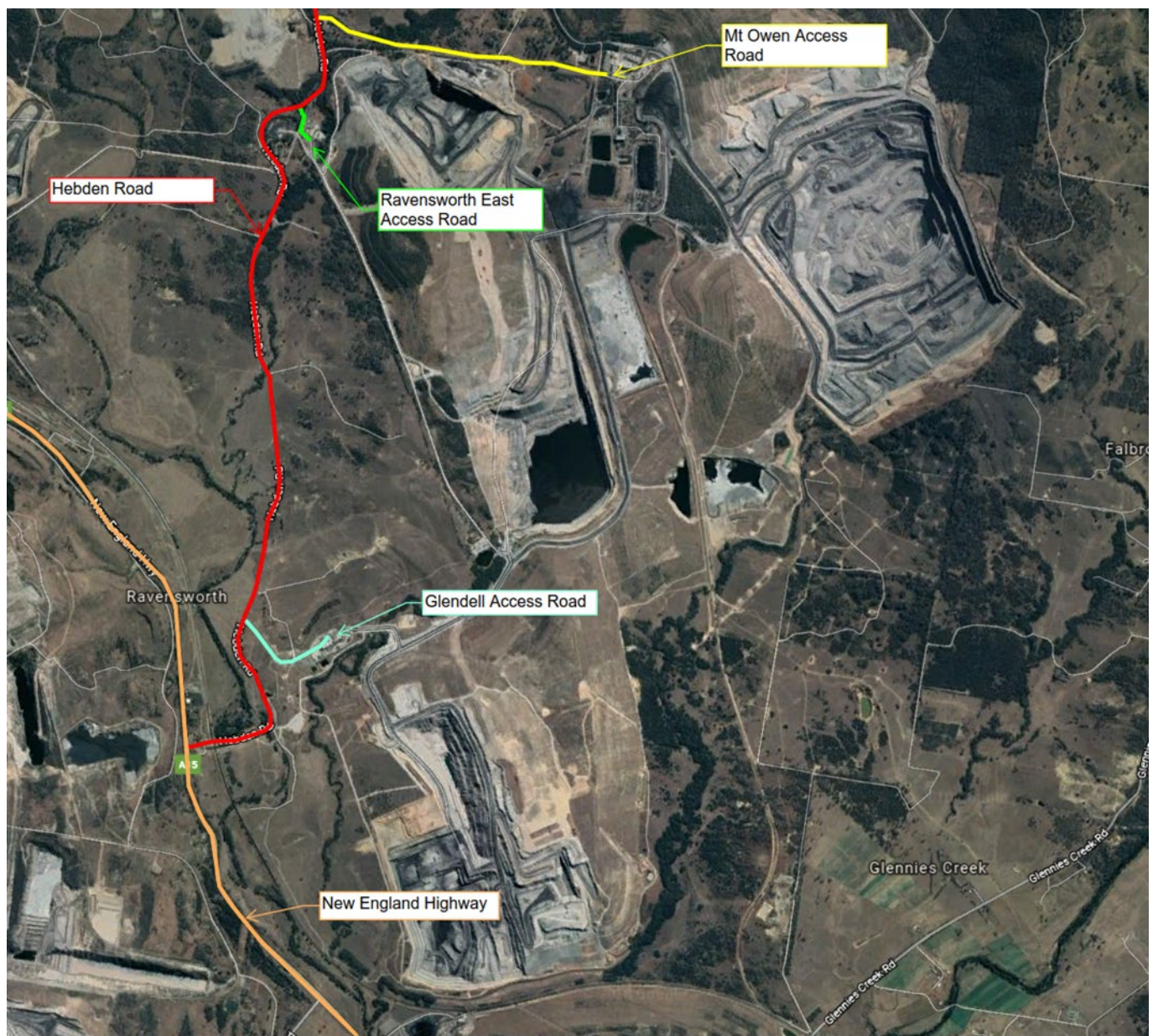


Figure 2.2 Surrounding Road Network and Access Roads

3 Proposed Project

3.1 Development Profile

The Project includes the construction of a Mine Infrastructure Area (MIA) and access road to intersect with the realigned section of Hebden Road. There are currently 3 MIA's in operation in the wider Mount Owen Complex Operations; Glendell, Ravensworth East and Mount Owen. The proposed MIA and access road will replace the existing Glendell MIA when construction is completed in 2021. The use of the Ravensworth East MIA will be scaled down and cease from approximately 2022 when mining is completed in the approved Bayswater North Pit. During construction of the Hebden Road realignment and new Glendell MIA, the existing Glendell MIA will remain in use.

The Project will include an operational mining stage to 2044 with the bulk of the workforce associated with mining operations at Glendell using the new Glendell MIA. The Project will also utilise the existing Mount Owen coal handling infrastructure. The use of the Mount Owen coal handling infrastructure will extend the operation of these facilities from approximately 2038 to 2045. Traffic associated with the Mount Owen coal handling infrastructure will use the existing Mount Owen MIA access road off Hebden Road. The Project does not extend the life of mining operations at Mount Owen mine and the workforce associated with Mount Owen mining operations will significantly reduce from 2038 consistent with current approvals.

3.2 Access

The Mount Owen complex currently has two primary access points located approximately 2km and 6.5km North East of the intersection of Hebden Road and the New England Highway (State Road HW9) along the Hebden Road alignment (refer **Figure 3.1**).

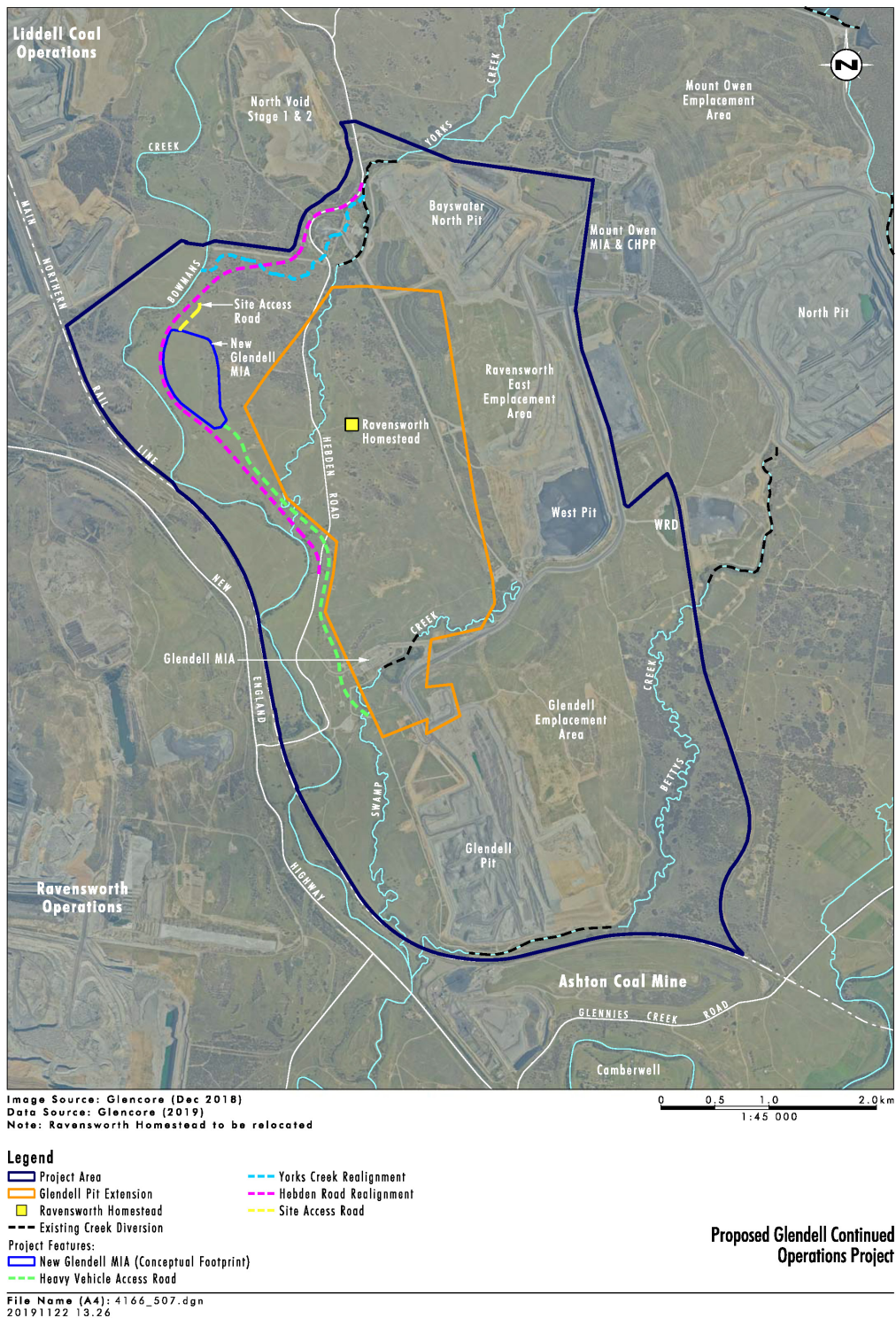
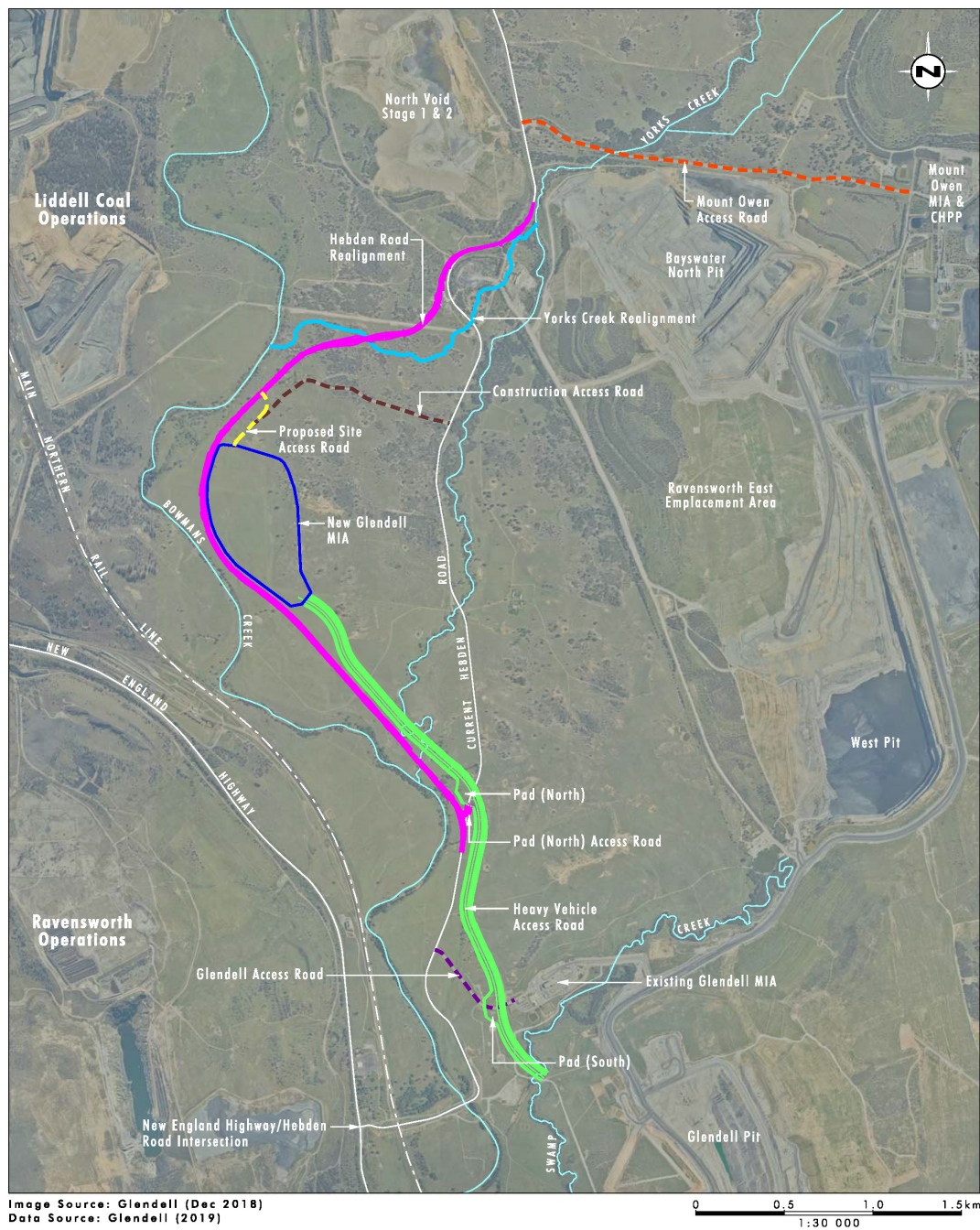


Figure 3.1 Proposed Site Access at the Intersection of Hebden Road

The Project will require realignment of the southern section of Hebden Road further west around the proposed Glendell Pit Extension and includes a crossing of Yorks Creek (both current and future realigned creek path) (refer **Figure 3.2**). The Hebden Road realignment is expected to be approximately 5.3 km long with the final length to be confirmed during detailed design.



Legend

- ▬ MIA
- ▬ Heavy Vehicle Access Road
- ▬ Yorks Creek Realignment
- ▬ Hebden Road Realignment
- ▬ Proposed Site Access Road
- ▬ Construction Access Road
- ▬ Mount Owen Access Road
- ▬ Glendell Access Road

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Figure 3.2 Proposed Glendell Continued Operations Project

Depending on the date of approval, the realignment is expected to be in service by late 2021/early 2022 and construction will be completed prior to the existing section of Hebden Road being decommissioned.

4 Existing Conditions

4.1 The Road Network

The roads in the immediate vicinity of the Project are administered by Singleton Council (SC). To the North, Hebden Road becomes part of the Muswellbrook Shire Council (MSC) and to the west the New England Highway is a Classified State Road under the care and responsibility of Roads and Maritime Services as the State Roads Authority. The New England Highway forms part of the National Network providing interstate connectivity between NSW and Queensland for traffic and freight. Refer **Figure 3.2** for road locations relative to the site. Refer **Table 4.1** for a summary of road hierarchy and characteristics.

The New England Highway is a major highway connecting Hexham near Newcastle in NSW to Yarraman near Toowoomba in Queensland. It carries a mix of local traffic, interregional and interstate traffic and freight and provides local connectivity and services to the towns and communities along its length. The New England Highway near the southern end of Hebden Road is a two lane / two-way rural road with a wide formation and good alignment. The highway generally has an 11.0 m formation including two x 3.5 m through lanes and two x 2.0 m sealed shoulders. Delineation along the highway includes guideposts, centrelines, edgelines and retroreflective raised pavement markers (RRPMs). The highway currently has a 90 km/h posted speed limit in this area and some isolated advisory speed curves. Isolated hazards along the highway are protected with lengths of wire rope safety barrier or W-Beam guardrails. The southern intersection of the New England Highway near Hebden Road was upgraded as part of the NSW State Blackspot Program in 2014 and includes channelised left turn bays and right turn bays on the highway.

Hebden Road provides local access between the New England Highway at Ravensworth in the south to the New England Highway near Muswellbrook in the north and primarily provides access to rural properties, two quarries and Mount Owen Complex mines along its length. Hebden Road is an undivided two lane / two-way rural road with a narrow formation width and sections of poor horizontal and vertical geometry due to the undulating natural terrain. It has a 60 km/h posted speed limit at the southern end near the intersection with the New England Highway, an 80 km/h posted speed limit in the vicinity of the Project and 100 km/h further north. It is proposed that the Hebden Road realignment will have an 80 km/h design speed, matching the existing condition, to the satisfaction of the Singleton Council.

Hebden Road currently crosses the Hunter Valley Rail Corridor approximately 200 m east of the New England Highway intersection. There are two bridges on the Hebden Road alignment affected by traffic movements associated with the Project; a two lane bridge over the Hunter Valley Rail Corridor and a two lane bridge over Bowmans Creek. The Hebden Road crossing of Yorks Creek use a box culvert arrangement. For the purpose of this study, Hebden Road will be considered in three sections;

- Section A from the New England Highway intersection to existing Glendell MIA access road;
- Section B from existing Glendell access road to existing Mount Owen access road; and
- Section C from existing Mount Owen access road to the north.

The delineation arrangement on Hebden Road is variable including lengths marked with centrelines and edgelines, lengths marked with centrelines only and lengths without any line marking. The edge of the road formation is generally identified with guideposts however, the lanes are not generally identified with RRPMs.

Table 4.1 Surrounding Road Hierarchy

Road Name	Speed Limit (km/h)	Lanes	Classification
New England Highway	90/100	2 (divided/undivided)	State Road
Hebden Road – Section A	60/80	2 (undivided)	Local Road
Hebden Road – Section B	80	2 (undivided)	Local Road
Hebden Road – Section C	80/100	2 (undivided)	Local Road

4.2 Road Safety

During the five year period from 2013 to 2017 there were ten crashes in the New England Highway and Hebden Road vicinity according to Transport for New South Wales (TfNSW) Crash and Casualty Statistics (refer **Figure 4.1**). Note only finalised data for the five-year period from 2013 to 2017 is available from TfNSW. Two of these crashes occurred on Hebden Road and the remaining crashes all occurred on the New England Highway.

These crashes included three tow-away crashes, six injury crashes and one fatal crash. The dominant crash types were run off road and head on crashes, typical of an undivided two lane / two-way road in a rural environment. Five of the crashes occurred during daylight hours and the remaining five of the crashes occurred during periods with limited amounts of natural light either at dawn or at night (refer **Figure 4.1** and **Table 4.2**).

A 1.2 km upgrade of the New England Highway near Hebden Road was carried out during 2014. The road works were carried out under the NSW State Blackspot program and included the installation of a 1.0 m wide centreline treatment for the 600 m north of Hebden Road and a 1.8 m wide centreline treatment for the remaining length of the upgrade area.

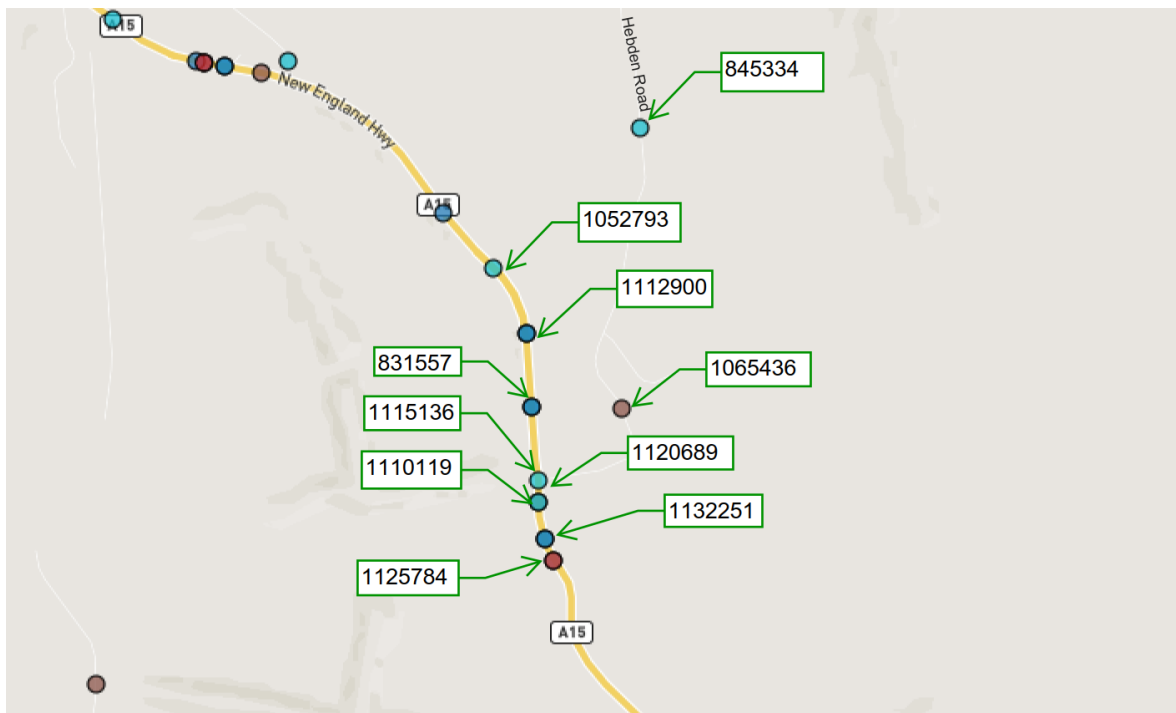


Figure 4.1 Road Crash Locations between 2013 and 2017 on the New England Highway and Hebden Road near the Glendell Mine (Transport for New South Wales Crash and Casualty Statistics 2013 -2017)

Table 4.2 Road Crash Data from 2013 to 2017 on the New England Highway and Hebden Road near the Glendell Mine (Transport for New South Wales Crash and Casualty Statistics 2013-2017)

Year	Crash ID No.	Road	Severity	RUM Code	RUM Description	Type of Location	Natural Lighting
2013	845334	Hebden Road	Injury	71	Left off carriageway into object or parked vehicle	Two-way Undivided	Daylight
2013	831557	New England Hwy	Injury	70	Off carriageway to the left	Two-way Undivided	Darkness
2014	1052793	New England Hwy	Tow-away	73	Right off carriageway into object or parked vehicle	Two-way Undivided	Darkness
2015	1065436	Hebden Road	Injury	87	Off carriageway left on left bend into object or parked vehicle	Two-way Undivided	Daylight
2016	1120689	New England Hwy	Injury	20	Head on (not overtaking)	T-Junction	Daylight
2016	1115136	New England Hwy	Tow-away	70	Off carriageway to the left	T-Junction	Daylight
2016	1112900	New England Hwy	Injury	70	Off carriageway to the left	Two-way Undivided	Darkness
2016	1110119	New England Hwy	Injury	20	Head on (not overtaking)	Two-way Undivided	Dawn
2017	1132251	New England Hwy	Tow-away	71	Left off carriageway into object or parked vehicle	Two-way Undivided	Darkness
2017	1125784	New England Hwy	Fatal	20	Head on (not overtaking)	Two-way Undivided	Daylight

5 Existing Traffic Volumes

To identify current traffic flows within the road network, traffic counts were undertaken on 21 August 2018 (refer to **Appendix A**). The traffic counts were conducted using roadside cameras over a 24 hour period and captured vehicle movements from two locations (see **Figure 5.1**) to determine traffic movements northbound and southbound from the existing Hebden Road alignment. The traffic movements were further analysed and tabulated into 15-minute periods and separated into light and heavy vehicle movements.

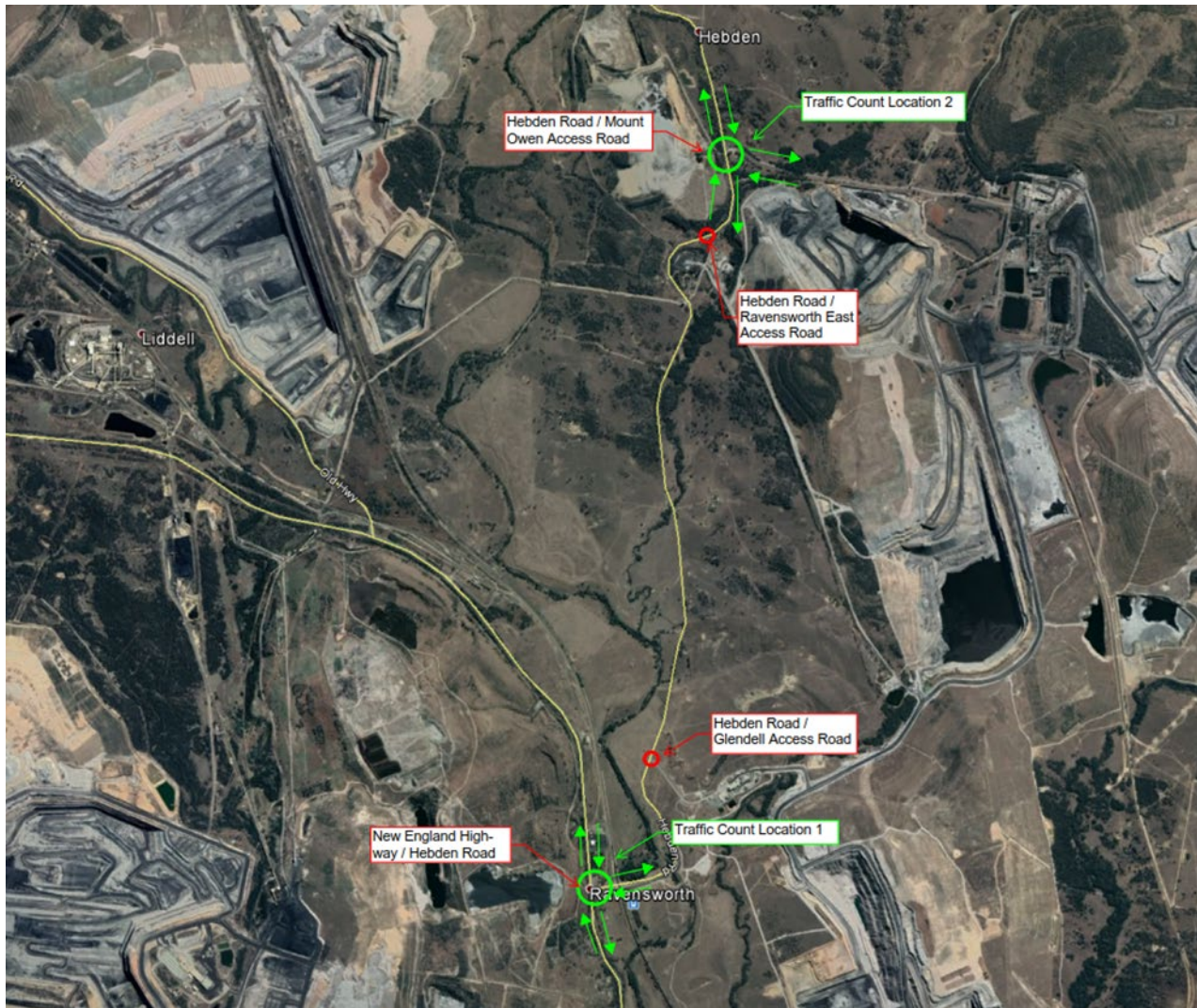


Figure 5.1 Traffic Count Locations

The traffic count data was used to inform the base (i.e. background) traffic volumes. The traffic counts successfully gathered data on vehicle movements at the Mount Owen access road as well as vehicles entering and exiting the existing Hebden Road alignment to the north at the Mt Owen access road intersection and south at the New England Highway. An assumed 70/30 distribution of ingress and egress traffic from the Glendell and Ravensworth East MIA's was assumed. It is noted that there are several other traffic generating developments in the surrounding area including the Hebden Quarry that contribute to the number of vehicles identified in the base traffic volumes.

The traffic counts at the two intersections identified different peak times. The New England Highway / Hebden Road intersection indicated 05:45 to 06:45 am peak and 17:00 to 18:00 pm peak, however these peak times have been considered to occur during the network peak times and are not indicative of peak traffic for the Glendell site. The traffic count at the Hebden Road / Mount Owen access road intersection identified peak times of 05:30 – 06:30 and 18:15 – 19:15, these peak hours were adopted for the Project's traffic and transport impact assessment.

See **Figure 5.2** and **Figure 5.3** below indicating ingress and egress traffic for Hebden Road over the 24 hour traffic study period.

VEHICLES ENTERING HEBDEN RD FROM NEW ENGLAND HIGHWAY (24 HOURS)

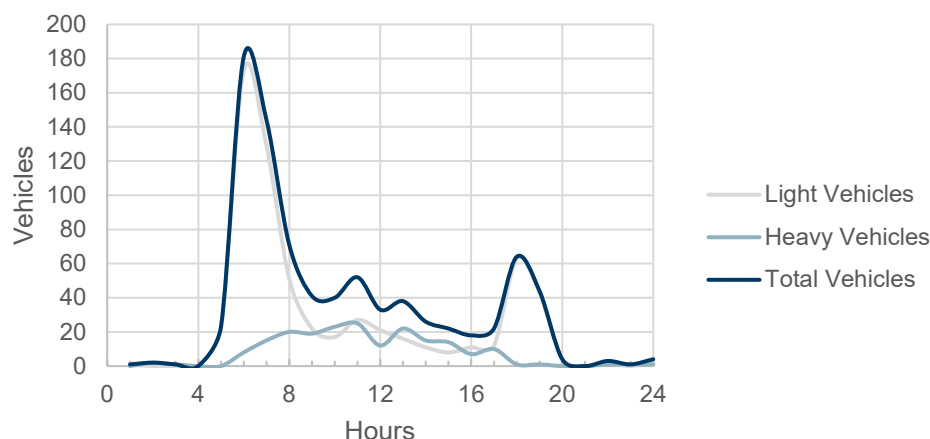


Figure 5.2 Total Vehicles Entering Hebden Road from New England Highway (24 hours)

VEHICLES EXITING HEBDEN RD TO NEW ENGLAND HIGHWAY (24 HOURS)

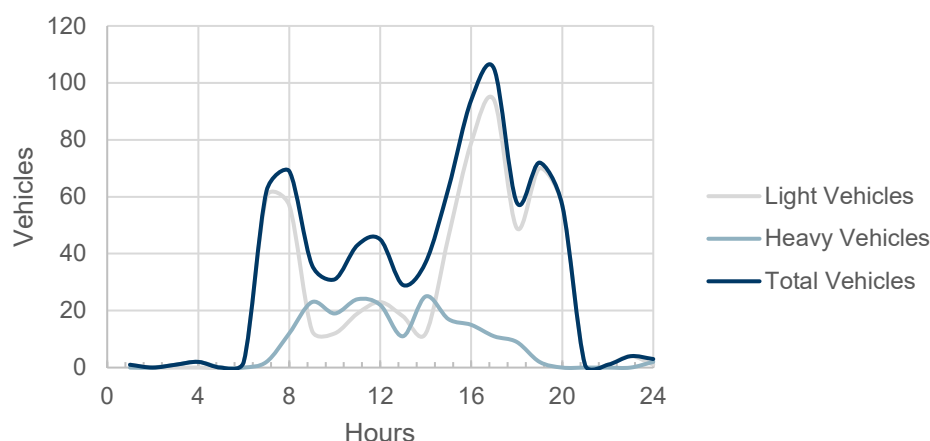


Figure 5.3 Total Vehicles Exiting Hebden Road onto New England Highway (24 Hours)

The majority of traffic entering and exiting Hebden Road is associated with the Mount Owen Complex, however there are quarries and private properties upstream of the Mount Owen Complex that are serviced through the New England Highway / Hebden Road intersection. Based on traffic counts from 21 August 2018, 182 vehicles exited the analysed section of the Hebden Road alignment to the north (i.e. towards Hebden) during the 24 hour traffic count. This included 51 light vehicles and 131 heavy vehicles. This traffic will be classed as background traffic and a conservative annual compound growth rate of 2.0% will be applied to background traffic to inform the base for the proposed year of opening (2022) and thereafter for the operational life of the development until its expected closure (2044).

NEW ENGLAND HIGHWAY BACKGROUND TRAFFIC (24 HOURS)

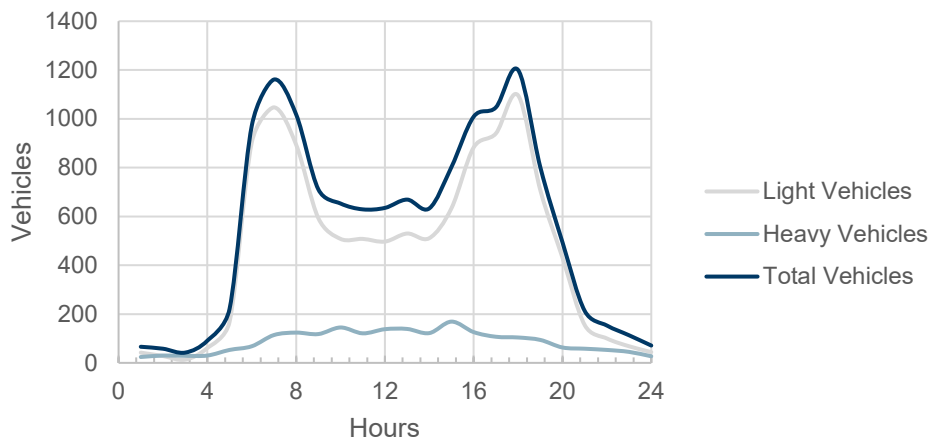


Figure 5.4 New England Highway Background Traffic (24 Hours)

From the data recorded in the traffic counts, calculations (shown in **Appendix HH**) were developed using existing and future personnel numbers to develop expected ingress and egress traffic volumes that were used to inform the models for the future construction and peak operation scenarios as discussed in **Section 6**.

6 Forecast Traffic Demand

6.1 Development Scenarios

For the purpose of assessing future traffic demands, background traffic volumes discussed in **Section 5** have been adopted with an annual growth rate of 2.0% to reflect population growth in the surrounding area. The assessment compared background forecast traffic demands without the Project against that of forecast traffic demands with the Project. The assessment periods applicable to the scope of this assessment are shown in **Table 6.1**. The intersection performance criteria are identified and discussed in **Section 7** of this report.

Table 6.1 Assessment Period Breakdown

Assessment Period	Description
2018 Base Traffic	This scenario models the background traffic volumes combined with existing development volumes, considering both the AM and PM peak periods by way of a traffic study conducted on 21 August 2018
2022 Forecast	This scenario models the background traffic volumes combined with expected traffic generation by the Project in the year of opening and traffic generated by the construction of the proposed MIA, considering both the AM and PM peak periods
2033 Forecast	This scenario models the background traffic volumes combined with traffic generated by the Project in the peak year of operation, considering both the AM and PM peak periods

6.2 Trip Distribution

A review of traffic distribution as recorded on 21 August 2018 traffic counts, coupled with an assumed traffic distribution of 70/30 for existing Ravensworth East MIA and existing Glendell MIA have been used to assess the existing demand traffic for the Mount Owen Complex at peak times.

As identified in the traffic counts, the peak periods on Hebden Road were identified as 05:30-06:30 and 18:15-19:15. The numbers generated in the traffic counts were used to determine numbers for expected vehicle movements per worker, which was then adopted to assume the traffic generation for the forecast scenarios.

It has been determined that in the AM peak, 80.2% of the trips will be into the development (ingress) and 19.8% of will be out of the development (egress). In the PM peak, 43.9% of the trips as ingress and 56.1% of will be as egress. The density of properties, including quarries immediately surrounding the Project is low and not expected to influence the traffic distribution.

6.3 Assumptions

Table 6.2 identifies the assumptions made in the analysis of data and results shown in this report and the potential impacts and justification associated with these assumptions.

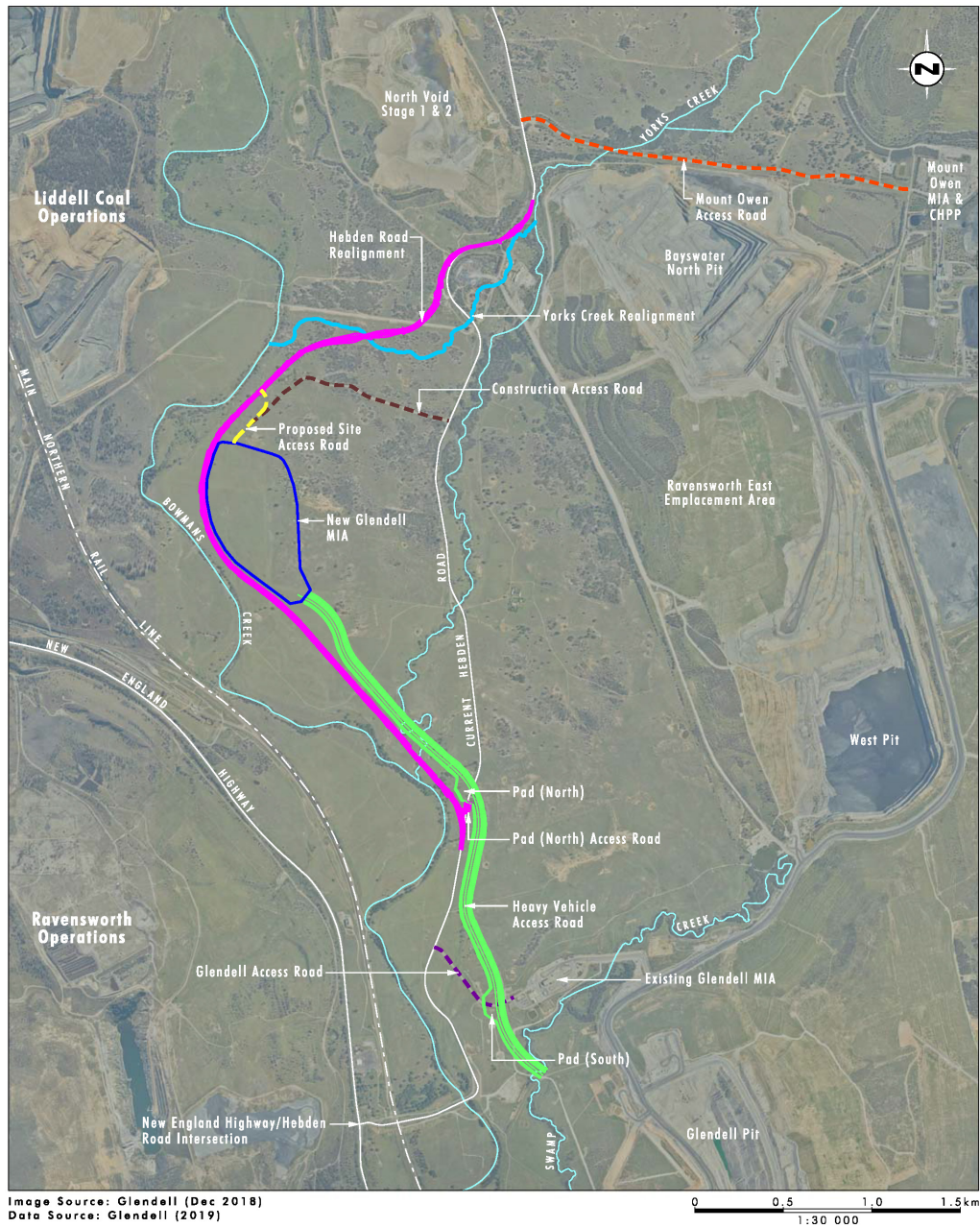
Table 6.2 Table of Assumptions

Assumption	Impact / Justification
70/30 breakdown of all egress and ingress traffic entering Glendell and Ravensworth East MIA's	A 70/30 (Glendell/Ravensworth East) split has been adopted based on employee numbers at each MIA at the time of data collection.
Vehicle movements per employee for proposed access have been assumed using vehicle movements and employee numbers from Glendell MIA	This will provide an indicative expectation of Project traffic.
Construction traffic	Construction vehicle movements taken conservatively as 1 vehicle for each construction employee including 80% light vehicles and 20% heavy vehicles.
2% background traffic growth	This is a standard regional traffic growth rate that will be adopted to background traffic. It is expected that while this growth rate is conservative it will provide a negligible impact on the intersection performance analyses as there is only a small amount of background traffic due to the locality of the Project.

7 Intersection Performance

Based on review of the forecast traffic demand discussed in **Section 6**, the following intersections were identified for performance assessment (refer to **Figure 7.1**):

- New England Highway / Hebden Road (Intersection 1);
- Hebden Road / Glendell Access Road (including Ancillary Pad South Access) (Intersection 2);
- Hebden Road / Ravensworth East Access Road (Intersection 3);
- Hebden Road / Mount Owen Access Road (Intersection 4);
- Hebden Road / Proposed Glendell Access Road (Intersection 5) and
- Hebden Road / Ancillary Pad North Access (Intersection 6).



Legend

- MIA
- Heavy Vehicle Access Road
- Yorks Creek Realignment
- Hebden Road Realignment
- Proposed Site Access Road
- Construction Access Road
- Mount Owen Access Road
- Glendell Access Road

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Figure 7.1 Intersection Proximity Overview

Each intersection was assessed against the performance criteria shown in **Table 7.1** using the traffic modelling program SIDRA INTERSECTION 8.0 (Sidra).

Table 7.1 Intersection Performance Criteria

Design Criteria	Description
Degree of Saturation (DOS)	Is a ratio of volume to capacity measured from close to zero (very low flows) to >1 (saturated flows exceed capacity)
Level of Service (LOS)	Provides the intersection with a grade from A (Free Flow Conditions) to F (Forced Flow Conditions) using criteria including delay, degree of saturation, density and speed.
95% Back of Queue	Assesses the value below which 95 percent of all observed queue lengths fall.

Each intersection has been assessed for warrants for turn treatments, where each turning movement is assessed based on the volume of turning traffic and the volume of major traffic that it interfaces with. Assessment of turn treatment defines the minimum turn treatment required to safely accommodate the turning traffic.

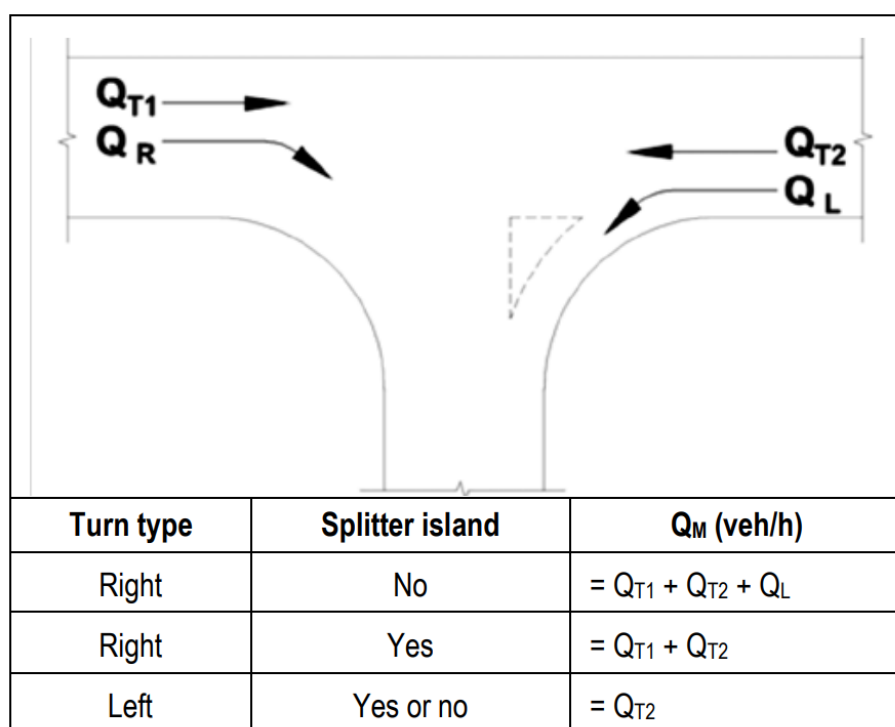


Figure 7.2 Turn Treatment Warrant Assessment Diagram

The intersections have also been assessed for Safe Intersection Sight Distance (SISD) which is the minimum sight distance which should be provided on the major road at any intersection. If the minimum SISD is not achieved, then further treatment or a reduction in posted speed may be required at intersections to assist in preventing vehicle interaction and improve road safety.

It is noted that the warrants for minimum turn treatments in Austroads consider road safety elements in unconstrained environments, based on through traffic and turn traffic volumes. In constrained locations and brownfield areas, additional consideration of other road safety aspects including sight distance, acceleration distance and deceleration distance helps to inform selection of an appropriate intersection treatment and maintain safety for all road users. If a particular turn from a major road is associated with some geometric minima (for example, limited sight distance, steep grade), consideration should be given to the adoption of a turn treatment of a higher order than that indicated by the warrants. For example, if the warrants indicate that a BAR turn treatment is acceptable for the relevant traffic volumes, but limited visibility to the right-turning vehicle is available, consideration should be given to the adoption of a CHR(s) or CHR turn treatment instead.

These considerations are important to make sure that through traffic can sight slow moving or stopped vehicles that are entering or leaving a roadway and slow or pass safely. They are also important to make sure that turning traffic can select appropriate gaps in traffic streams to safely enter or leave a roadway.

The undulating terrain, horizontal alignment, and roadside environment on Hebden Road restricts sight distance at some locations and could create a risk of crashes near the Project area. Safe Intersection Sight Distance (SISD) and Stopping Sight Distance (SSD) have been considered in this assessment for existing intersection treatments. SISD is the distance required for the driver of a vehicle on the non-terminating approach to observe a vehicle entering from a side street, decelerate and stop prior to a point of conflict. SSD is the minimum distance that allows for a driver to react to a hazard and completely stop prior to the hazard.

Horizontal sight distance has been checked using aerial imagery for the intersections of Hebden Road and Glendell Access Road, Hebden Road and Ravensworth East Access Road and Hebden Road and Mount Owen Access Road. It is noted however that some other limitations including earth mounds / bunds and dense vegetation near some accesses further restricts the available sight distance.

All new intersection treatments proposed as part of the Hebden Road realignment will be designed by others and constructed in accordance with relevant road design guidelines and Singleton Council standards and have regard to SISD and SSD requirements based on design speed and traffic volumes. Further, the SISD and SSD of existing intersections of Hebden Road and Glendell Access Road, Hebden Road and Ravensworth East Access Road and Hebden Road and Mount Owen Access Road will be assessed as part of a Road Safety Audit, to be completed during the development of the Hebden Road realignment works to ensure that there is no net worsening of road safety conditions.

7.1 New England Highway / Hebden Road – Intersection 1

The New England Highway / Hebden Road intersection as modelled in Sidra is shown in **Figure 7.3**. This layout is consistent with the existing intersection featuring a Channelised Right (CHR) turn from the Southern approach and a Channelised Left (CHL) turn from the Northern approach of the New England Highway.

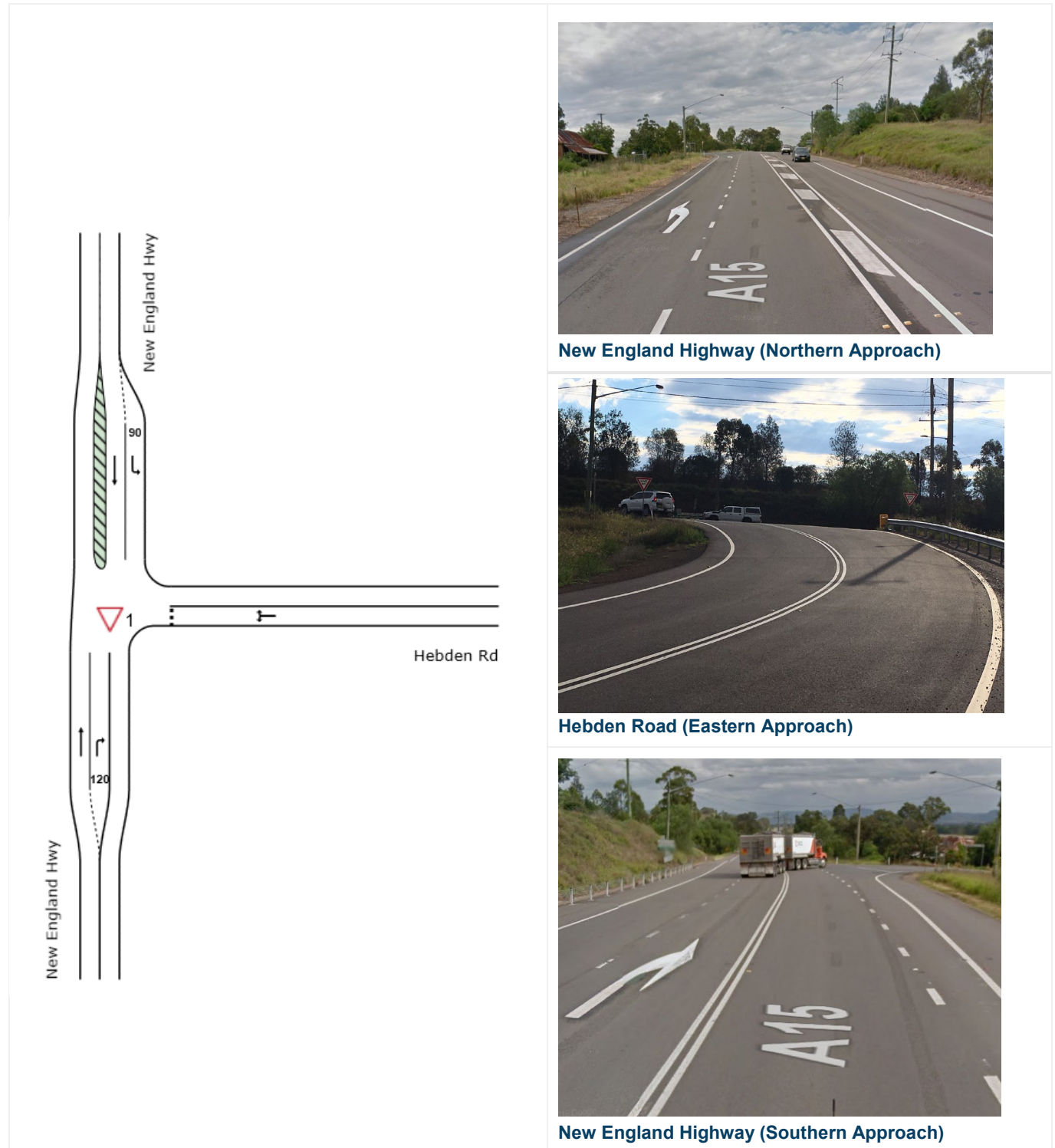


Figure 7.3 New England Highway / Hebden Road Intersection Layout

After detailed assessment of the intersection in Sidra. A breakdown of the performance criteria can be seen in **Table 7.2**. A maximum forecast saturation of 0.689 occurs during the peak of operation (2033) during the am peak. This shows that the intersection still has significant capacity during its most saturated period. The LOS assessment provided an intersection summary of LOS A for the majority of current and forecast periods, however analysis of the LOS of the intersection during the 2033 forecast am peak indicated a LOS B for the Hebden Road approach lane. As the Hebden Road approach lane is only a single lane the overall LOS B is an accumulation of a LOS A for left turning traffic and a LOS F for right turning traffic. It is noted that the right turn is the minor movement from this lane with only four vehicles expected to turn right from Hebden Road during the 2033 am peak in comparison to 26 vehicles turning left. This reduction in LOS is on the minor leg of the intersection and is created due to the increase in background through traffic on the New England Highway rather than any impact from Project traffic. This LOS on the minor leg of a regional highway intersection and the negligible impact on the overall intersection performance is deemed acceptable.

A further sensitivity analysis was conducted using only background traffic exiting Hebden Road to determine that the reduced LOS for right turn movements directly correlates with the background through traffic on the New England Highway. This analysis demonstrated that the Project does not significantly affect the wait time and subsequent LOS of the Hebden Road approach lane and the net result of LOS B for the lane is acceptable. The assessment of 95% Back of Queue indicated a maximum of 26.1 m during the 2022 forecast period in the PM peak, which both Hebden Road and the New England Highway can safely accommodate.

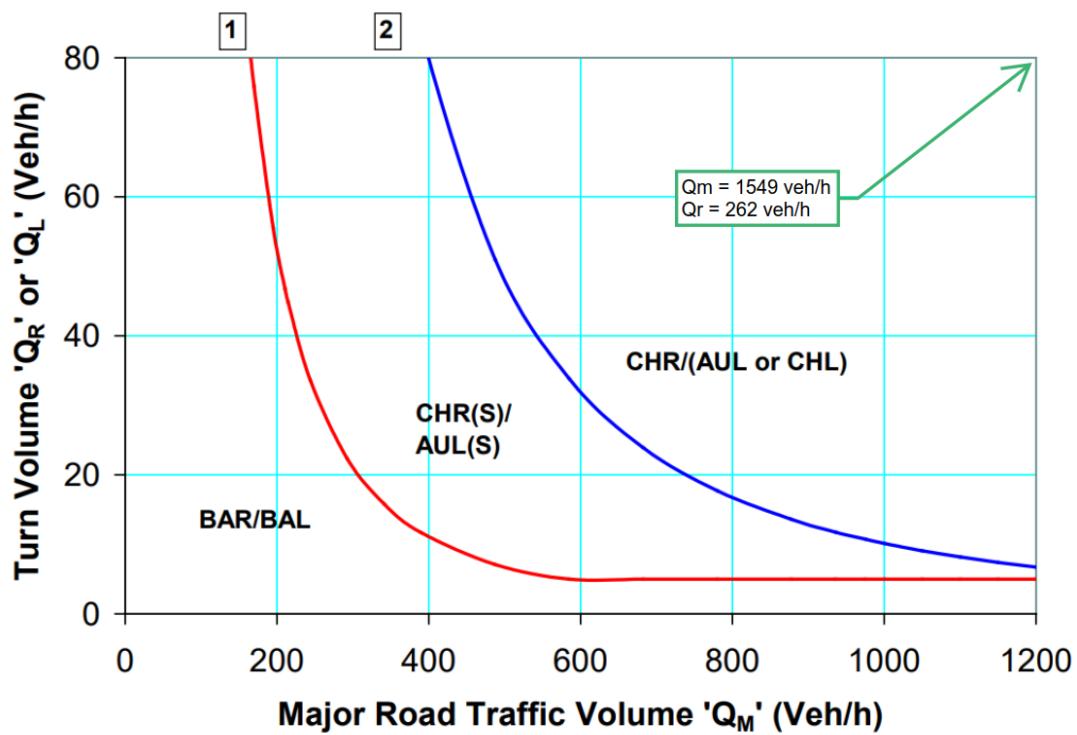
Table 7.2 Performance Assessment New England Highway / Hebden Road

Performance Indicator	AM Peak			PM Peak		
	2018 Base	2022 Forecast	2033 Forecast	2018 Base	2022 Forecast	2033 Forecast
Degree of Saturation (DOS)	0.511	0.554	0.689	0.279	0.514	0.329
Level of Service (LOS)	A	A	B	A	A	A
95% Back of Queue (m)	4.5	14.5	14	2.5	26.1	7.2

Once traffic movements were analysed, warrants for turn treatments were assessed. As per Austroads Guide to Road Design Part 4: Intersections and Crossings – General, Section A.8, the graphs shown in **Figure 7.4** and **Figure 7.5** have been used to determine acceptable turn treatments by assessing turning traffic volumes and major traffic volumes.

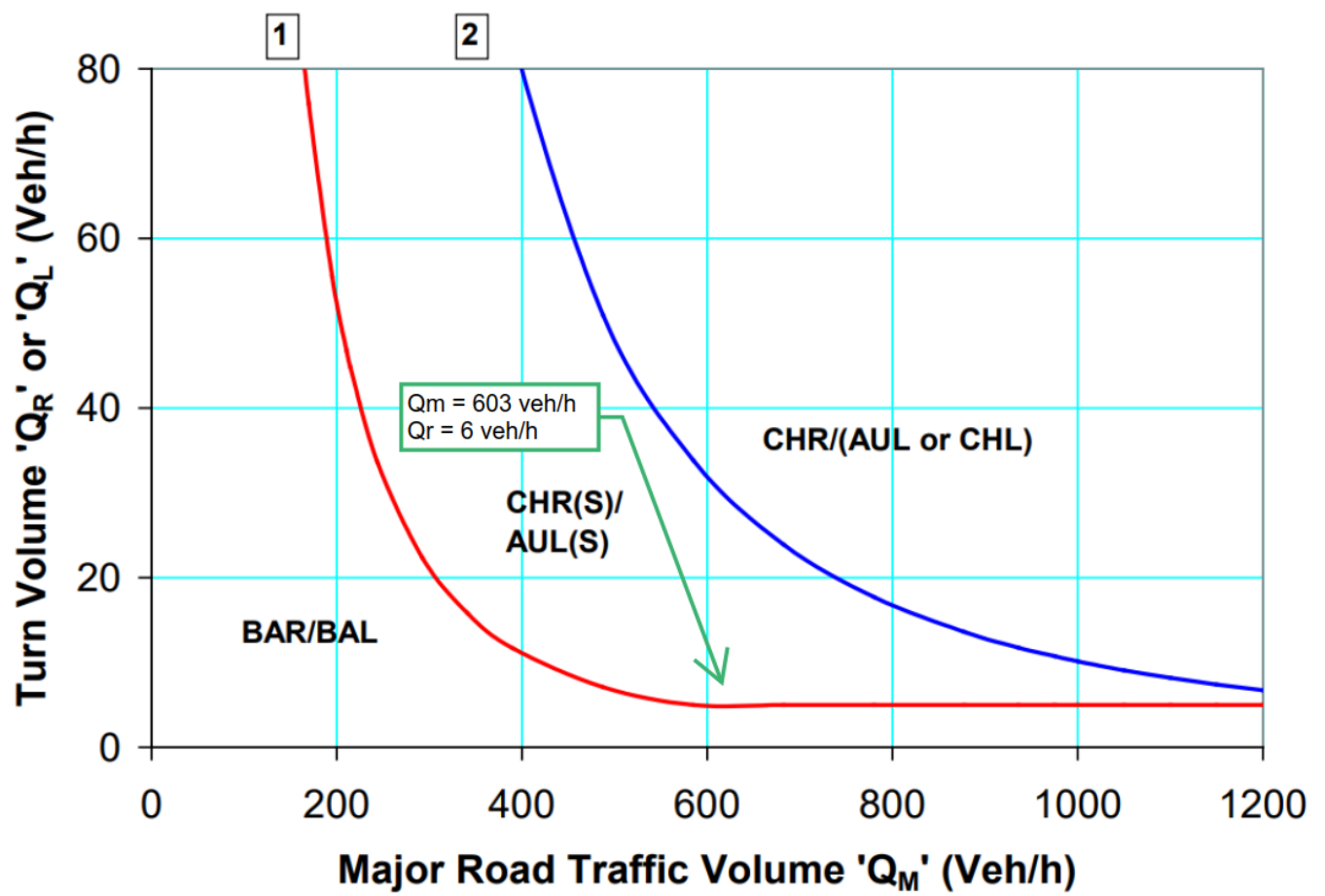
As displayed in **Figure 7.4** the right turning traffic (Qr) during the 2033 am peak of this intersection is 262 vehicles per hour and the major traffic (Qm) is 1,549 vehicles per hour. As per the graph the minimum turn treatment for this intersection is a Channelised Right Hand Turn (CHR), which matches the existing turn treatment.

As displayed in **Figure 7.5** the left turning traffic (Ql) during the 2033 pm peak of this intersection is 6 vehicles per hour and the major traffic (Qm) is 603 vehicles per hour. As per the graph the minimum turn treatment for this intersection is a Channelised Left Hand Turn (CHL), which matches the existing turn treatment. A review of the results show that the proposed intersection has sufficient capacity to accommodate the development traffic without impacting upon the flow of the background traffic.



(b) Design speed < 100 km/h

Figure 7.4 Warrants for Turn Treatments Right Hand Turn – New England Highway / Hebden Road Intersection



(b) Design speed < 100 km/h

Figure 7.5 Warrants for Turn Treatments Left Hand Turn – New England Highway / Hebden Road Intersection

7.2 Hebden Road / Glendell (Ancillary Pad South) Access Road – Intersection 2

The Hebden Road / Glendell Access Road intersection as modelled in Sidra is shown in **Figure 7.6**. This layout is consistent with the existing intersection, featuring an Auxiliary Right Hand (AUR) turn from the Southern approach and no left-hand turn treatment from the Northern approach on Hebden Road.

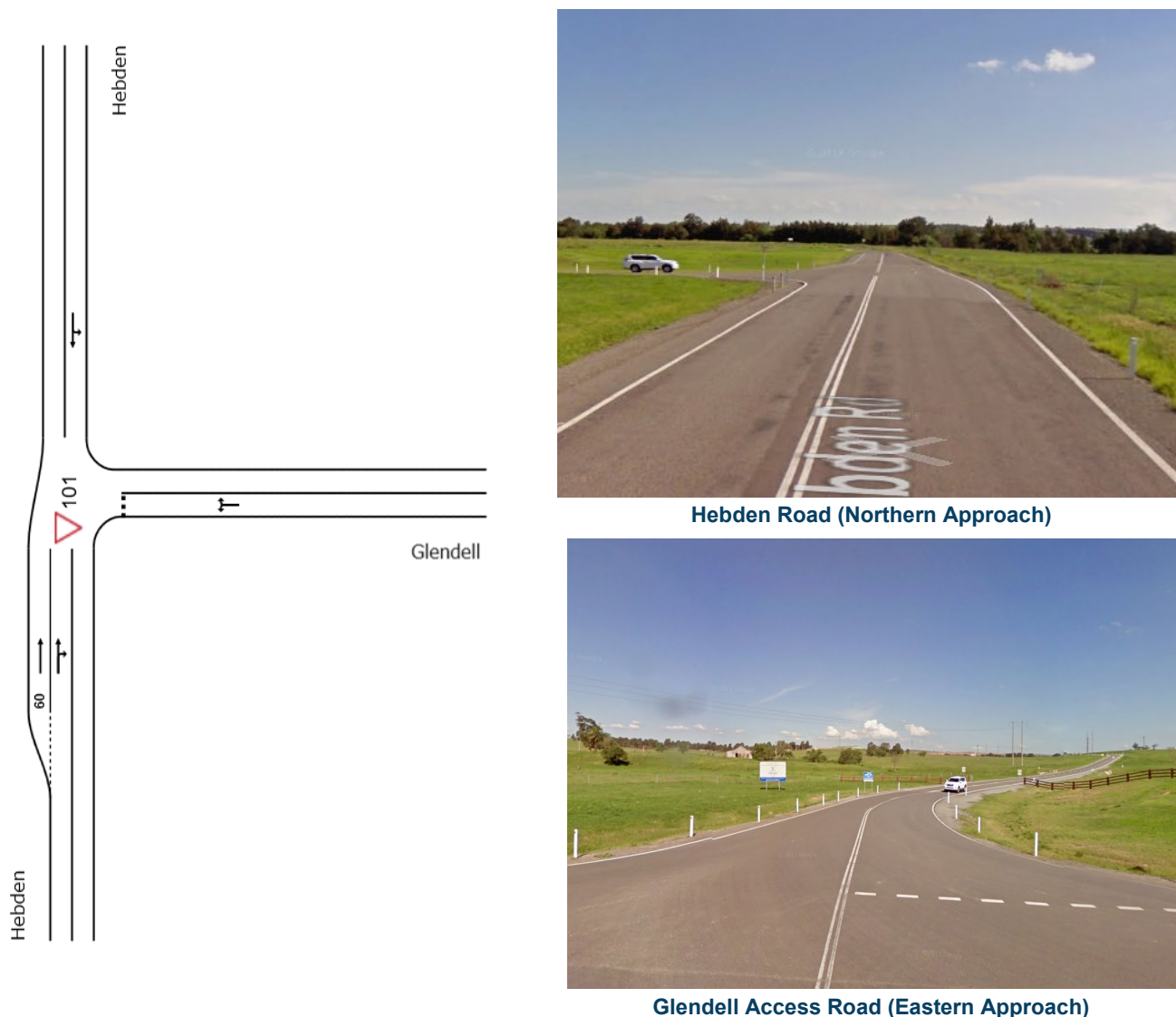


Figure 7.6 Hebden Road / Glendell Access Road Intersection Layout

The Hebden Road / Glendell Access Road intersection has been assessed for the existing 2018 and the forecast 2022 scenarios in addition to the forecast 2033 scenario when the Glendell MIA will transition to be used as an Ancillary pad, where significantly lower traffic volumes are expected.

After detailed assessment of the intersection in Sidra, a breakdown of the performance criteria can be seen in **Table 7.3**. A maximum DOS of 0.210 occurs during the peak construction period (2022) during both the am and pm peak, which correlates to a maximum queue length of 2.6m in the 2022 am forecast. This shows that the intersection still has significant latent capacity during peak operations. The Hebden Road / Glendell Access Road intersection achieved LOS A for all approach lanes. Following the commissioning of the new MIA, traffic using this intersection will be limited to employees associated with the demolition of the old MIA (2022 only) and traffic entering the Ancillary pad area.

Table 7.3 Performance Assessment Hebden Road / Glendell Access Road

Performance Indicator	AM Peak			PM Peak		
	2018 Base	2022 Forecast	2033 Forecast	2018 Base	2022 Forecast	2033 Forecast
Degree of Saturation (DOS)	0.089	0.210	0.144	0.034	0.210	0.084
Level of Service (LOS)	A	A	A	A	A	A
95% Back of Queue (m)	2.1	2.6	0.2	0.5	0.6	0.2

Once traffic movements were analysed, warrants for turn treatments were assessed. As per Austroads Guide to Road Design Part 4: Intersections and Crossings – General, Section A.8, the graph shown in **Figure 7.7** has been used to determine acceptable right turn treatment by assessing turning traffic volumes and major traffic volumes. As displayed in **Figure 7.7** the right turning traffic (Q_r) during the 2022 am peak of this intersection is 57 vehicles per hour and the major traffic (Q_m) is 419 vehicles per hour. As per the graph the minimum turn treatment for this intersection is a Channelised Right Hand Short (CHR(s)) turn.

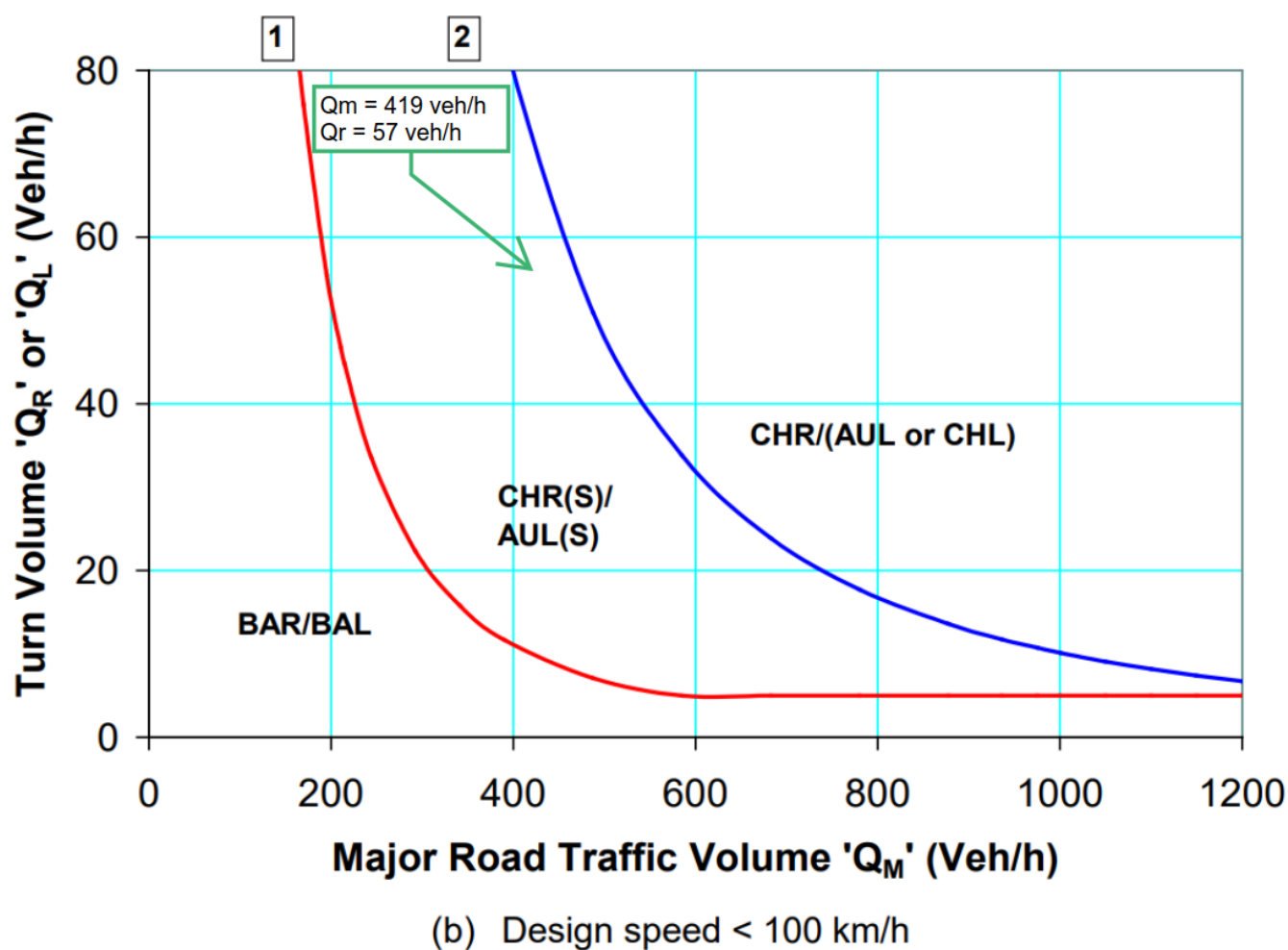


Figure 7.7 Warrants for Turn Treatments Right Hand Turn – Hebden Road / Glendell Access Road Intersection

Safe Intersection Sight Distance (SISD) is the distance required for the driver of a vehicle on the non-terminating approach to observe a vehicle entering from a side street, decelerate and stop prior to a point of conflict. As per Austroads Guide to Road Design Part 4A: *Unsignalised and Signalised Intersections Table 3.2*, shown in **Figure 7.8**, the minimum SISD for the Hebden Road / Glendell Access Road intersection is 226m.

Design speed (km/h)	Based on safe intersection sight distance for cars ⁽¹⁾ $h_1 = 1.1$; $h_2 = 1.25$, $d = 0.36$ ⁽²⁾ ; Observation time = 3 sec					
	$R_T = 1.5$ sec ⁽³⁾		$R_T = 2.0$ sec		$R_T = 2.5$ sec	
	SISD (m)	K	SISD (m)	K	SISD (m)	K
40	67	4.9	73	6	–	–
50	90	8.6	97	10	–	–
60	114	14	123	16	–	–
70	141	22	151	25	–	–
80	170	31	181	35	–	–
90	201	43	214	49	226	55
100	234	59	248	66	262	74
110	–	–	285	87	300	97
120	–	–	324	112	341	124
130	–	–	365	143	383	157

Figure 7.8 Austroads Guide to Road Design Part 4A: *Unsignalised and Signalised Intersections Table 3.2 - Minimum Safe Intersection Sight Distance*

Truck Stopping Sight Distance (SSD) is the minimum distance that allows for a driver to react to a hazard and completely stop prior to the hazard. Hebden Road is an approved B-Double route (Per RMS Restricted Access Vehicles Map) therefore the truck SSD of 175m can be determined from Austroads Guide to Road Design Part 3: *Geometric Design Table 5.6*, shown in **Figure 7.9**.

Operating speed (km/h)	Single unit trucks, semi-trailers and B-doubles Based on $d = 0.29$ ⁽¹⁾							
	$R_T = 1.5$ s ⁽²⁾					$R_T = 2.0$ s	$R_T = 2.5$ s	
40	38					44	49	
50	55					62	69	
60	74					82	91	
70	96					105	115	
80	120					131	142	
90	147					160	172	
100	–					191	205	
110	–					225	241	
Corrections due to grade ^{(3) (4)}	–8%	–6%	–4%	–2%	2%	4%	6%	8%
40	8	6	3	2	–1	–3	–4	–5
50	13	9	5	3	–2	–4	–6	–7
60	19	13	8	4	–3	–6	–8	–11
70	25	17	11	5	–4	–8	–11	–14
80	33	23	14	6	–6	–11	–15	–19
90	42	29	18	8	–7	–13	–19	–24
100	52	35	22	10	–9	–16	–23	–29
110	63	43	26	12	–11	–20	–28	–36

1 On any horizontal curve with a side friction factor greater than the desirable maximum value for trucks, the stopping sight distance values given should be based on a coefficient of deceleration that is reduced by 0.5.

2 Reaction times of 1.5 s cannot be used in Western Australia. A 1.5 s reaction time is only to be used in constrained situations where drivers will be alert. Typical situations are given in Table 5.2. The general minimum reaction time is 2.0 s.

3 If the roadway is on a grade, designers shall adjust stopping sight distance values by applying these grade corrections derived with $d = 0.29$. Downhill grades are shown as negative, with uphill listed as positive. The grade adopted is determined using the average grade over the braking length.

4 Corrected stopping sight distances should be rounded conservatively to the nearest 5 m.

Figure 7.9 Truck Stopping Sight Distance (SSD) Table

As measured in aerial plan view, the Hebden Road / Glendell Access Road intersection does not achieve the minimum SISD or SSD (Figure 7.10) and therefore presents a risk of vehicle interaction.



Figure 7.10 Sight Distance Check Hebden Road / Glendell Access Road Intersection

Due to the failure of the intersection to achieve minimum SSD and SISD, it is recommended that line marking be updated at the intersection to CHR(s), as per the current Austroads best practice. As the CHR(s) treatment has now superseded the AUR treatment in Austroads, this is the proposed treatment at the intersection.

7.3 Hebden Road / Ravensworth East Access Road – Intersection 3

The Hebden Road / Ravensworth East Access Road intersection as modelled in Sidra is shown in **Figure 7.11**. Whilst the existing linemarking does not show an AUR and is non-complying with Austroads intersection designs, the layout shown in **Figure 7.11** is consistent with the how the existing intersection is most likely used, featuring an AUR turn from the southern approach and no left-hand turn treatment from the Northern approach on Hebden Road.

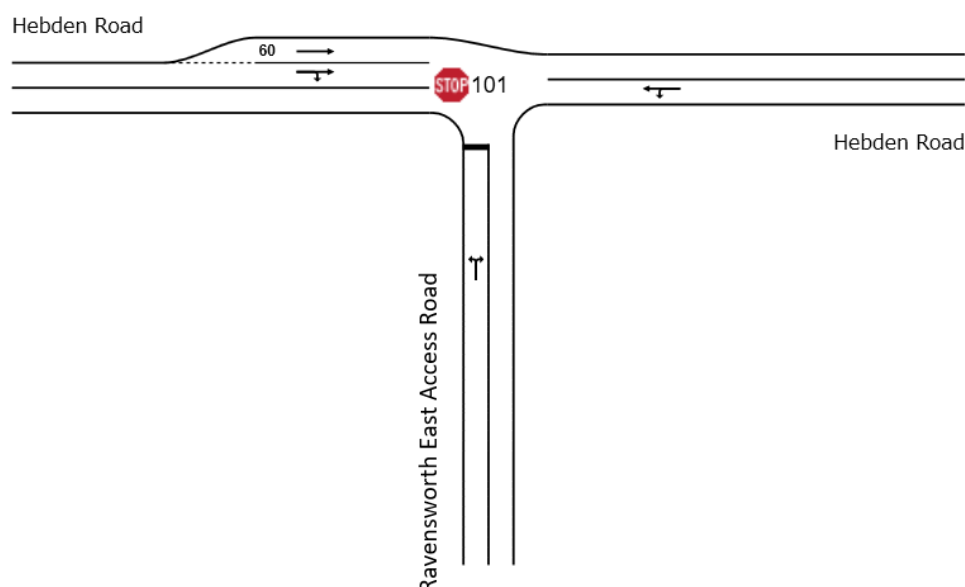


Figure 7.11 Hebden Road / Ravensworth East Access Road Intersection Layout

The Hebden Road / Ravensworth East Access Road intersection has been assessed for 2018 and forecast 2022 scenarios.

After detailed assessment of the intersection in Sidra, a breakdown of the performance criteria can be seen in Table 7.4. A maximum forecast volume on capacity ratio or degree of saturation (DOS) of 0.069 occurs during the peak construction period (2022) during the am peak. The maximum queue length of 1m occurs in the 2018 base scenario. This shows that the intersection still has significant latent capacity during peak operations. The LOS assessment measures the average vehicle delay and provides a summary of A to F depending on the intersection performance. The Hebden Road / Ravensworth East Access Road intersection achieved LOS A for all approach lanes.

Table 7.4 Performance Assessment Hebden Road / Ravensworth East Access Road

Performance Indicator	AM Peak		PM Peak	
	2018 Base	2022 Forecast	2018 Base	2022 Forecast
Degree of Saturation (DOS)	0.066	0.069	0.028	0.028
Level of Service (LOS)	A	A	A	A
95% Back of Queue – Worst Lane (m)	1.0	0.5	0.3	0.3

Once traffic movements were analysed, warrants for turn treatments were assessed. As per Austroads Guide to Road Design Part 4: Intersections and Crossings – General, Section A.8, the graph shown in **Figure 7.12** has been used to determine acceptable right hand turn treatment by assessing turning traffic volumes and major traffic volumes. As displayed in **Figure 7.12** the right turning traffic (Qr) during the 2022 am peak of this intersection is 26 vehicles per hour and the major traffic (Qm) is 134 vehicles per hour. As per the graph the minimum required turn treatment for this intersection is a BAR turn.

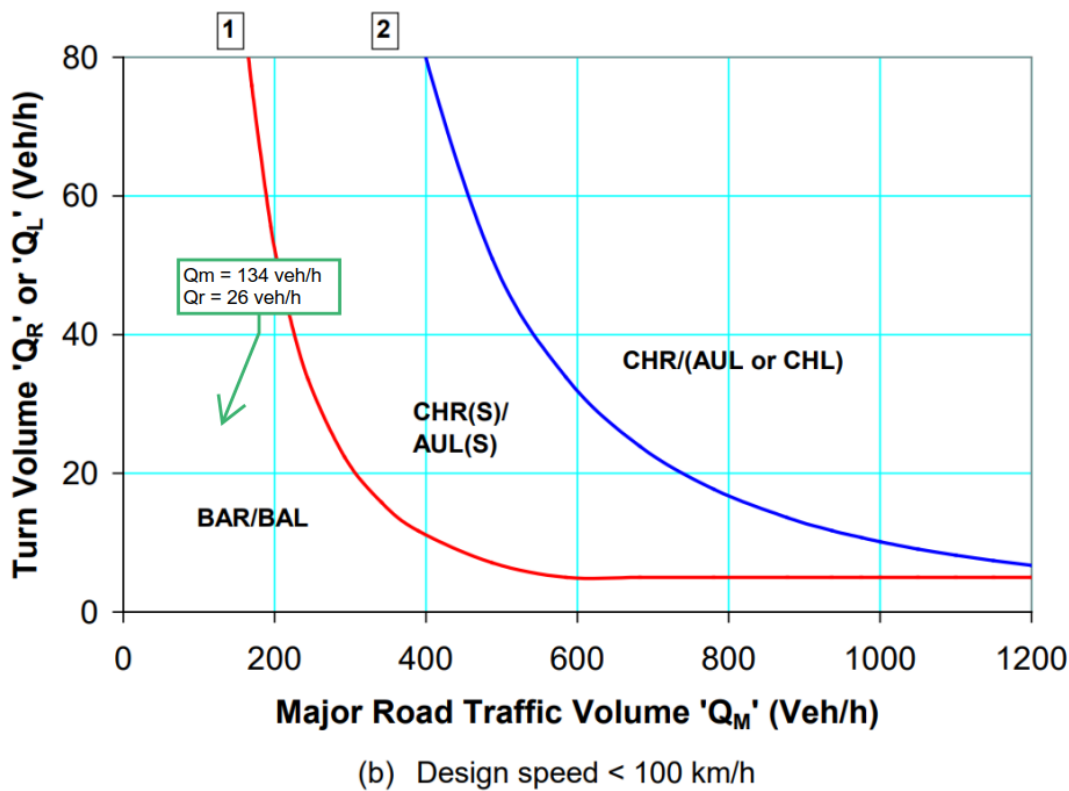


Figure 7.12 Warrants for Turn Treatments Right Hand Turn – Hebden Road / Glendell Access Road Intersection

As measured in aerial plan view, the Hebden Road / Ravensworth East Access Road intersection achieves the minimum SSD but does not achieve the minimum SISD (**Figure 7.13**) as there is an embankment to the left of the stop point for vehicles entering Hebden Road from the Ravensworth East Access Road that significantly impacts sight distance (**Figure 7.14**).



Figure 7.13 Sight Distance Check Hebden Road / Ravensworth East Access Road Intersection

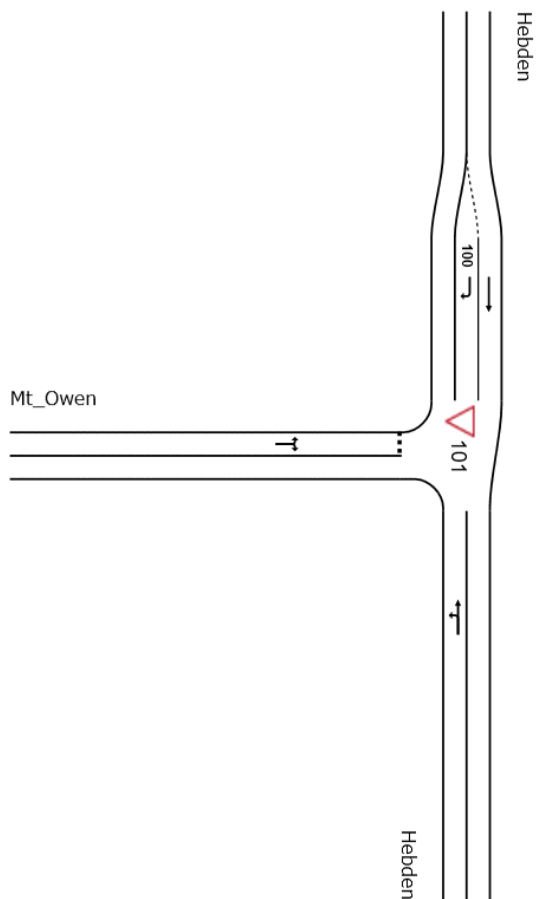


Figure 7.14 Photograph of Hebden Road / Ravensworth East Intersection (Taken from Google Maps)

Due to sight distance requirements it is recommended that the intersection linemarking be amended to adopt CHR(s) turn treatment due to the failure to achieve minimum SISD.

7.4 Hebden Road / Mount Owen Access Road – Intersection 4

The Hebden Road / Mount Owen Access Road intersection as modelled in Sidra is shown in **Figure 7.15**. This layout is consistent with the existing intersection, featuring a Channelised Right (CHR) turn from the Southern approach and no left-hand turn treatment from the Northern approach on Hebden Road.



Hebden Road (Southern Approach)



Mount Owen Access Road (Eastern Approach)

Figure 7.15 Hebden Road / Mount Owen Access Road Intersection Layout

The Hebden Road / Mount Owen Access Road intersection has been assessed for the existing 2018 and forecast 2022 and 2033 scenarios.

After detailed assessment of the intersection in Sidra, a breakdown of the performance criteria can be seen in **Table 7.5**. As the manning numbers of the Mount Owen MIA are expected to remain consistent throughout its operation until it is decommissioned, and due to the low volumes of background traffic, no variation in the performance criteria are observed during the am and pm peaks. The maximum DOS of 0.053 and the maximum queue length of 2.2m were observed during the am peak, indicating that the intersection still has significant latent capacity during peak operations. The Hebden Road / Mount Owen Access Road intersection achieved LOS A for all approach lanes.

Table 7.5 Performance Assessment Hebden Road / Mount Owen Access Road

Performance Indicator	AM Peak			PM Peak		
	2018 Base	2022 Forecast	2033 Forecast	2018 Base	2022 Forecast	2033 Forecast
Degree of Saturation (DOS)	0.053	0.053	0.053	0.035	0.035	0.035
Level of Service (LOS)	A	A	A	A	A	A
95% Back of Queue (m)	2.2	2.2	2.2	1.1	1.1	1.1

Once traffic movements were analysed, warrants for turn treatments were assessed. As per Austroads Guide to Road Design Part 4: Intersections and Crossings – General, Section A.8, the graph shown in **Figure 7.16** has been used to determine the acceptable right turn treatment by assessing turning traffic volumes and major volumes. As displayed in **Figure 7.16** the right turning traffic (Q_r) during the 2033 am peak of this intersection is 120 vehicles per hour and the major traffic (Q_m) is 49 vehicles per hour. It is assumed that the conservative treatment should be adopted when the traffic volumes exceed the extents of the graph, therefore the minimum turn treatment is a CHR(s) which is lower than the existing turn treatment.

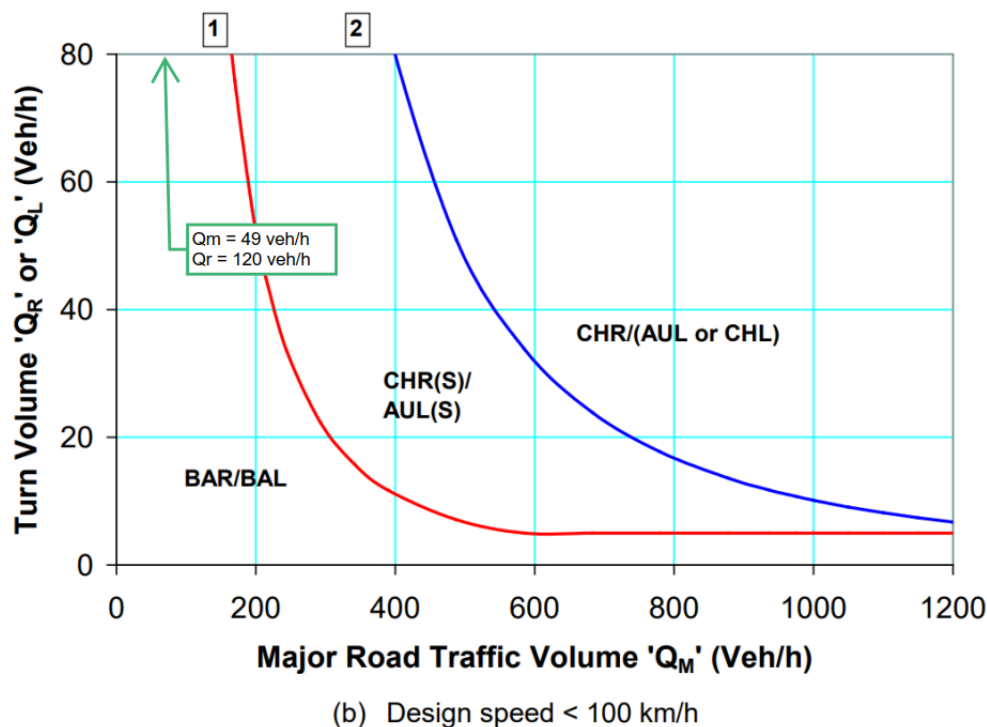


Figure 7.16 Warrants for Turn Treatments Right Hand Turn – Hebden Road / Mount Owen Intersection

As measured in aerial plan view in **Figure 7.17**, the Hebden Road / Mount Owen Access Road intersection achieves the minimum SSD and SISD, therefore further treatment is not required.



Figure 7.17 Sight Distance Check Hebden Road / Mount Owen Access Road Intersection

7.5 Hebden Road / Proposed Glendell Access Road – Intersection 5

The Hebden Road / Proposed Glendell Access Road intersection as modelled in Sidra is shown in **Figure 7.18**. This layout has been adopted based off existing intersection layouts that service the Mount Owen Complex.

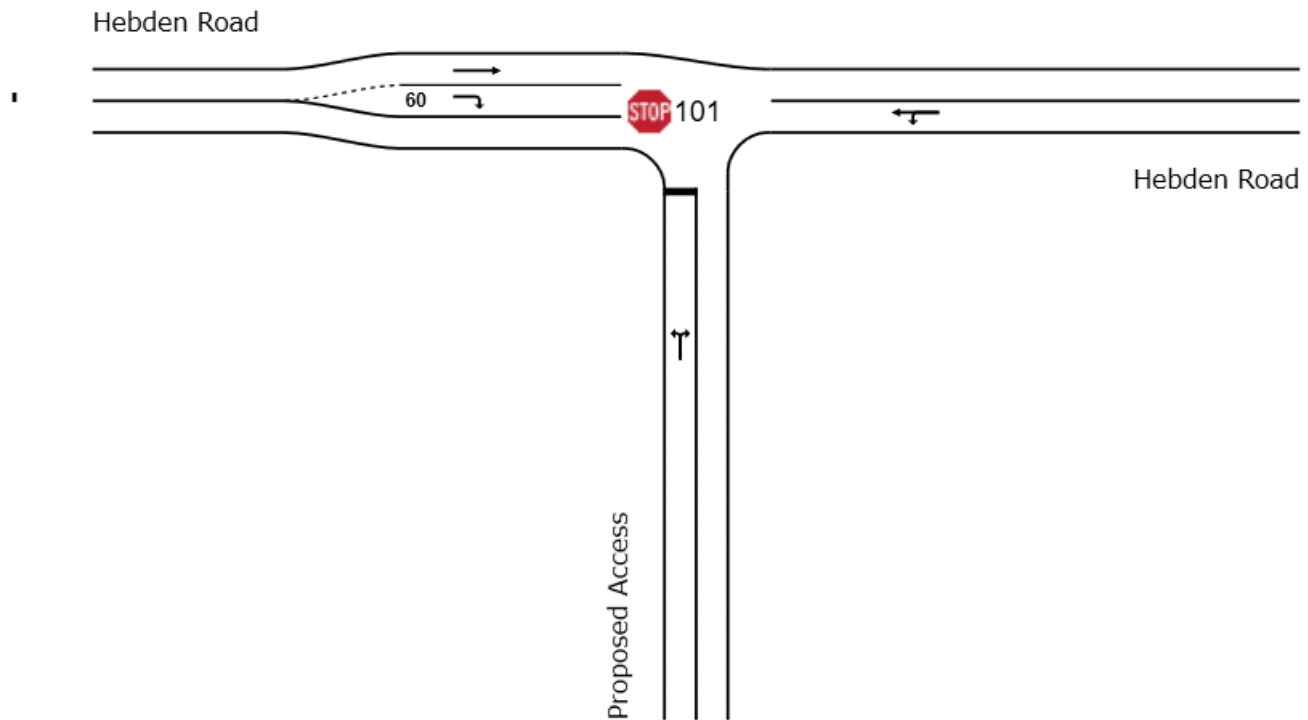


Figure 7.18 Hebden Road / Proposed Glendell Access Road Intersection Layout

The Hebden Road / Proposed Glendell Access Road intersection has been assessed for the forecast 2022 and 2033 scenarios.

After detailed assessment of the intersection in Sidra, a breakdown of the performance criteria can be seen in **Table 7.6**. A maximum DOS of 0.073 occurs in the 2033 am forecast which correlates to a maximum queue length of 2.6m. This shows that the intersection still has significant latent capacity during peak operations. The Hebden Road / Proposed Access Road intersection achieved LOS A for all approach lanes.

Table 7.6 Performance Assessment Hebden Road / Proposed Glendell Access Road

Performance Indicator	AM Peak		PM Peak	
	2022 Forecast	2033 Forecast	2022 Forecast	2033 Forecast
Degree of Saturation (DOS)	0.069	0.073	0.035	0.063
Level of Service (LOS)	A	A	A	A
95% Back of Queue – Worst Lane (m)	1.8	2.6	1.2	2.1

Once traffic movements were analysed, warrants for turn treatments were assessed. As per Austroads Guide to Road Design Part 4: Intersections and Crossings – General, Section A.8, the graph shown in **Figure 7.19**.

has been used to determine the acceptable right turn treatment by assessing turning traffic volumes and major volumes. As displayed in **Figure 7.19**, the right turning traffic (Q_r) during the 2033 am peak of this intersection is 126 vehicles per hour and the major traffic (Q_m) is 138 vehicles per hour. As per the graph the minimum turn treatment for this intersection is a CHR(s).

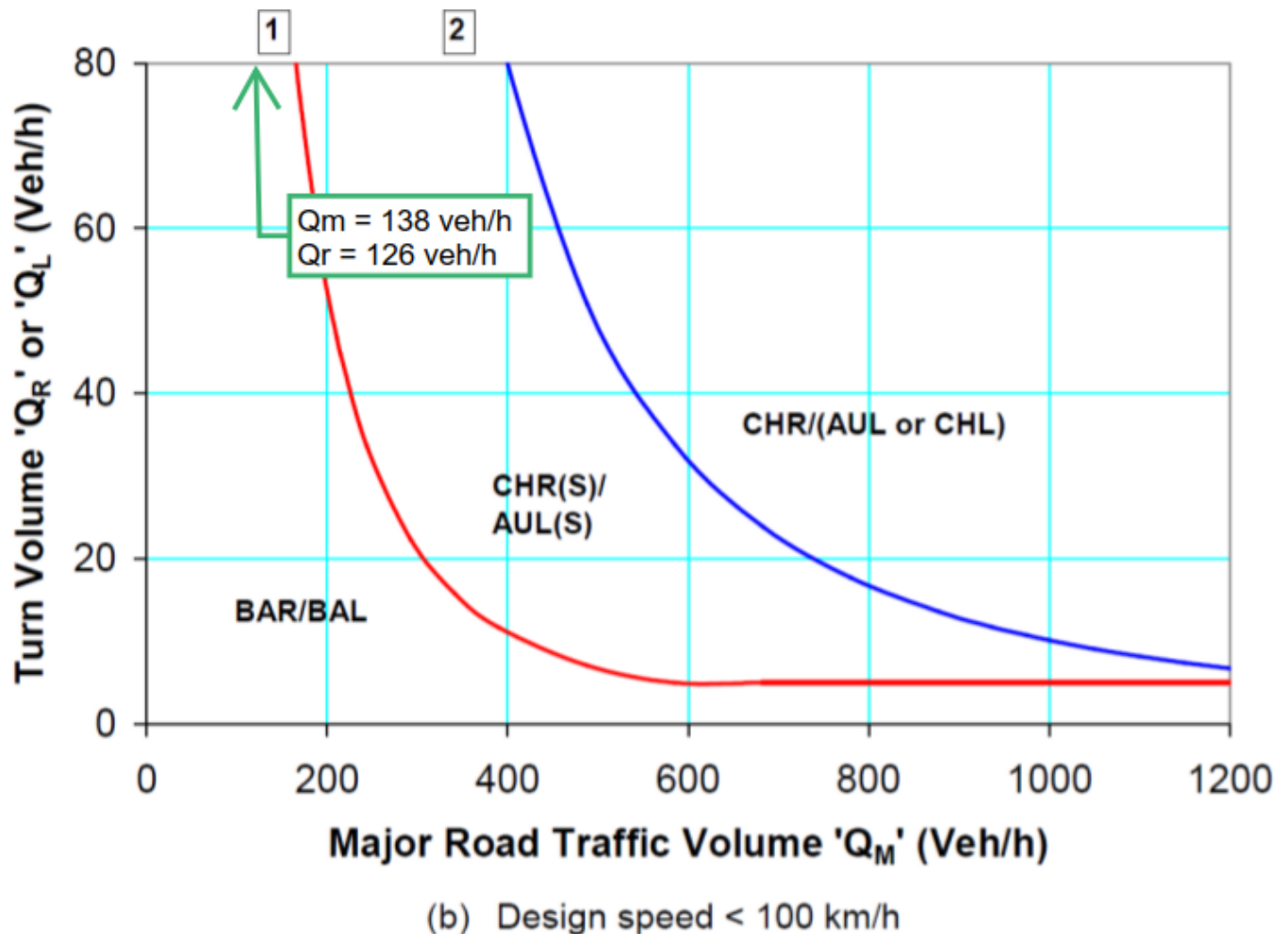


Figure 7.19 Warrants for Turn Treatments Right Hand Turn – Hebden Road / Proposed Glendell Access Road Intersection

The proposed Hebden Road / Glendell Access Road intersection will be designed by others and constructed in accordance with relevant road design guidelines and Singleton Council standards and have regard to SISD and SSD requirements based on design speed and traffic volumes.

7.6 Hebden Road / Proposed Ancillary Pad North Access Road – Intersection 6

The Proposed Hebden Road / Proposed Ancillary Pad North Access Road intersection as modelled in Sidra is shown in **Figure 7.20**. This layout has been adopted based off existing intersection layouts that service the Mount Owen Complex.

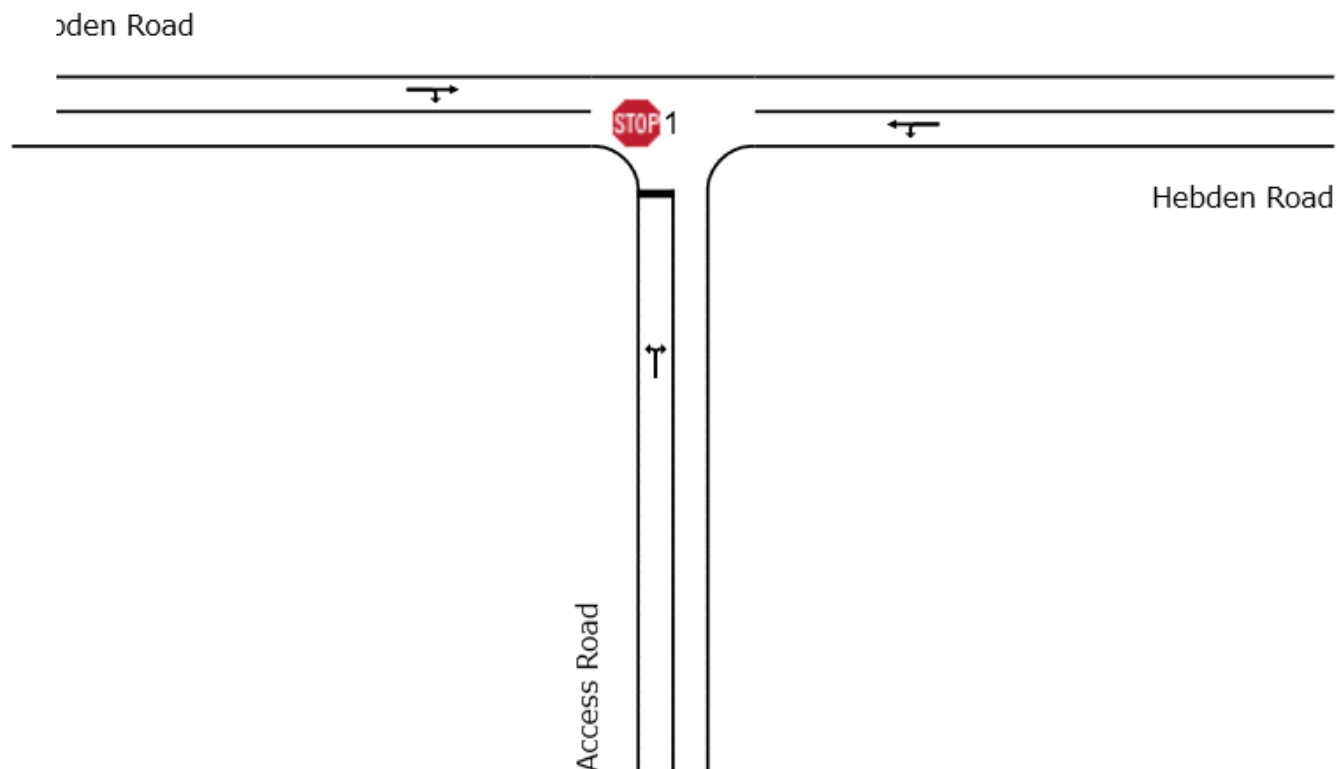


Figure 7.20 Hebden Road / Proposed Ancillary Pad North Access Road Intersection Layout

The Hebden Road / Proposed Ancillary Pad North Access Road intersection has been assessed for the forecast 2022 and 2033 scenarios. After detailed assessment of the intersection in Sidra, a breakdown of the performance criteria can be seen in **Table 7.7**. A maximum DOS of 0.139 occurs in the 2022 am forecast. The maximum queue length of 0.3m occurs in the 2022 pm forecast. This shows that the intersection still has significant latent capacity during peak operations. The Hebden Road / Proposed Ancillary Pad North Access Road intersection achieved LOS A for all approach lanes.

Table 7.7 Performance Assessment Hebden Road / Proposed Ancillary Pad North Access Road

Performance Indicator	AM Peak		PM Peak	
	2022 Forecast	2033 Forecast	2022 Forecast	2033 Forecast
Degree of Saturation (DOS)	0.115	0.139	0.050	0.082
Level of Service (LOS)	A	A	A	A
95% Back of Queue – Worst Lane (m)	0.2	0.2	0.3	0.2

Once traffic movements were analysed, warrants for turn treatments were assessed. As per Austroads Guide to Road Design Part 4: Intersections and Crossings – General, Section A.8, the graph shown in **Figure 7.21**

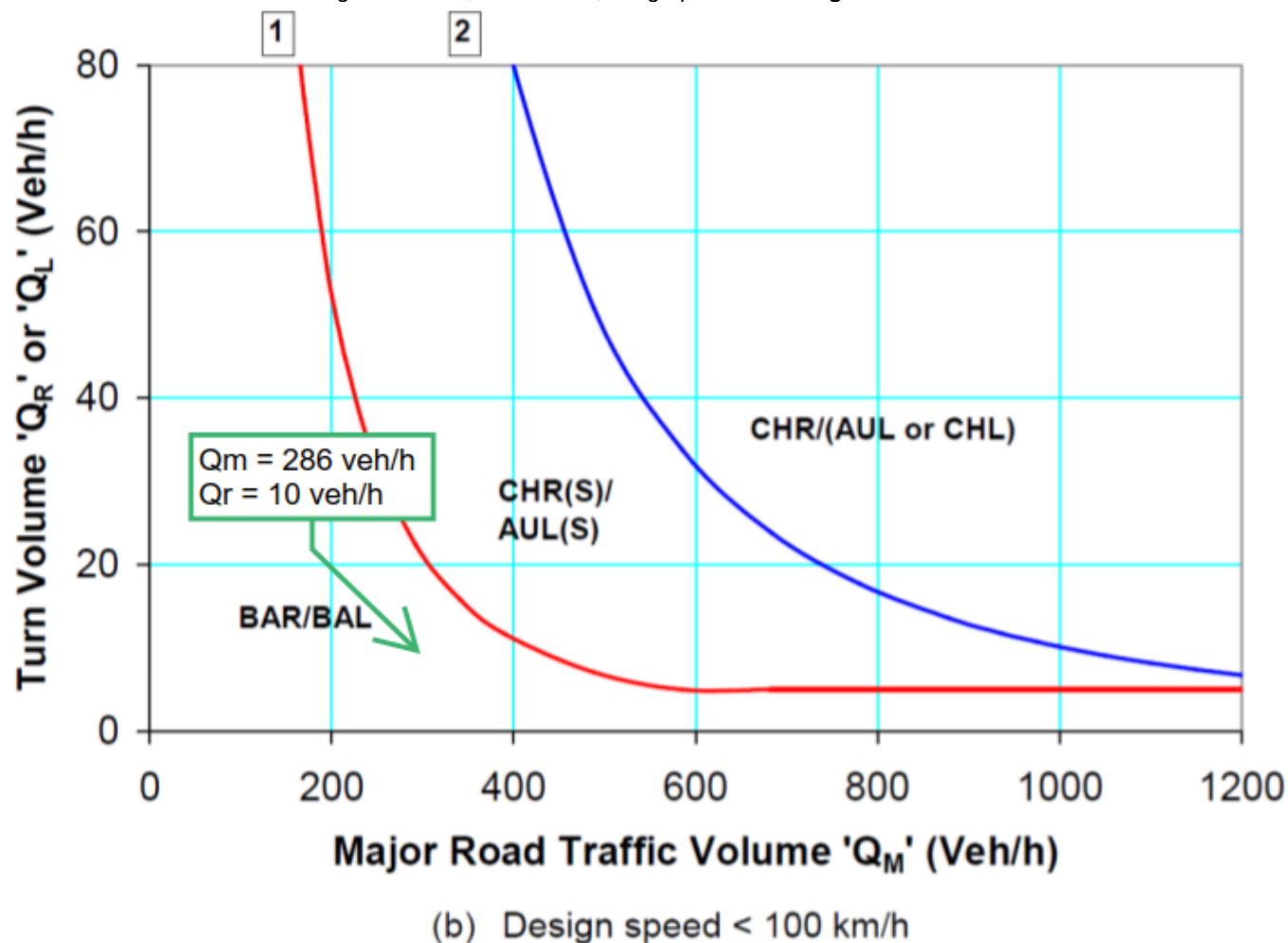
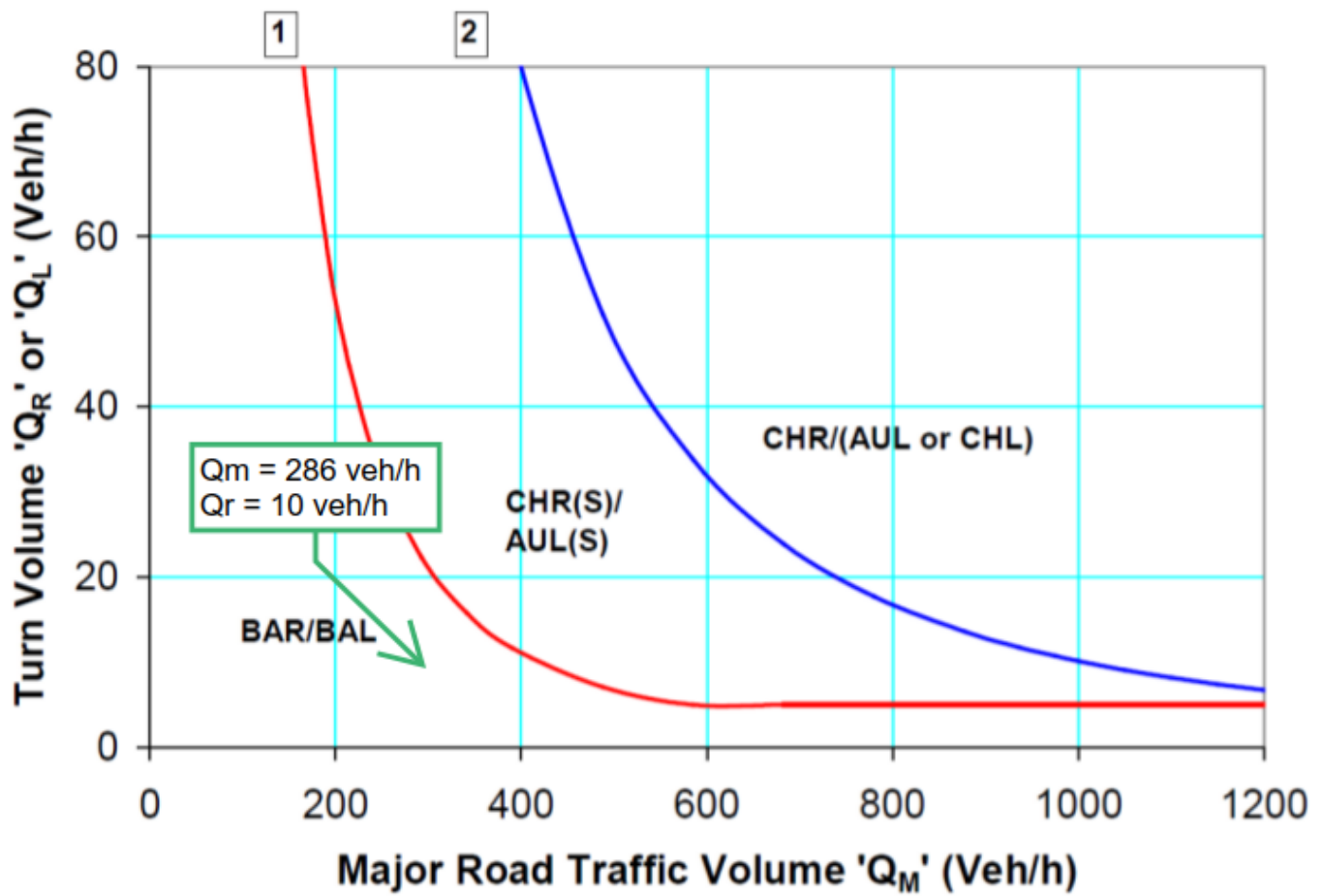


Figure 7.21 has been used to determine the acceptable right turn treatment by assessing turning traffic volumes and major volumes. As displayed in **Figure 7.21**, the right turning traffic (Q_r) during the 2033 am peak of this intersection is 10 vehicles per hour and the major traffic (Q_m) is 286 vehicles per hour. As per the graph the minimum turn treatment for this intersection is a BAR.



(b) Design speed < 100 km/h

Figure 7.21 Warrants for Turn Treatments Right Hand Turn – Hebden Road / Proposed Ancillary Pad North Access Road Intersection

The proposed Hebden Road / Ancillary Pad North Access Road intersection will be designed by others and constructed in accordance with relevant road design guidelines and Singleton Council standards and have regard to SISD and SSD requirements based on design speed and traffic volumes.

8 Construction and Operations Phase

The bulk of construction activity will take place approximately within the first five years of the Project. The proposed construction activities, timing and duration are shown in **Table 8.1** below.

Table 8.1 Proposed Construction Activities

Feature	Indicative Construction Period	Potential Impacts on Traffic Flow
Construction of new Glendell MIA	2021-2022 (approximately 12 months)	Built during same time period as Hebden Road realignment – no operational traffic until opening of Hebden Road. Limited construction related traffic after Hebden Road opening.
Construction of heavy vehicle access road	2021-2022 (approximately 12 months)	Built during same time period as Hebden Road realignment – no operational traffic until opening of Hebden Road. Limited construction related traffic after Hebden Road opening.
Construction of Hebden Road realignment	2021-2022 (approximately 12 months)	Road not commissioned until completed. Minor detours and speed limits required for construction of section around existing Ravensworth East MIA. Minor delays expected during commission. Construction traffic on Hebden Road following commissioning limited to traffic associated with construction of Yorks Creek realignment.
Demolition of Glendell MIA	2022 (approximately 6 months)	Occurs after commissioning of Hebden Road Realignment. Demolition related traffic numbers less than current Glendell MIA operational workforce.
Demolition of Ravensworth East MIA	2024 (approximately 6 months)	Occurs after commissioning of Hebden Road Realignment. Demolition related traffic numbers less than current Ravensworth East MIA operational workforce.
Relocation of Ravensworth Homestead	By 2023-2025 (approximately 36 months)	Relocation activities managed to minimise road traffic impacts.
Construction of Yorks Creek realignment	2025-2026 but works associated with western sections may commence as early as 2020-2021. Full commissioning by approximately 2026	Some additional construction related traffic on realigned section of Hebden Road. Construction traffic will affect new Glendell MIA intersection.

Construction activities will generally be undertaken within standard construction hours (7.00 am to 6.00 pm Monday to Friday, 8.00 am to 1.00 pm Saturday). However, it is noted that some works may be required outside of these standard periods. Construction of the MIA and ancillary works including portions of Hebden Road construction may be undertaken 24 hours per day, 7 days per week as required. Blasting activities with potential to impact traffic using Hebden Road will be carried out in periods to avoid school bus movements along the road and Mount Owen Complex shift change-over periods.

The construction workforce on site at any one time will vary depending on the timing of the various construction components of the Project. The construction workforce is estimated to peak at approximately 300 employees in 2022. This includes the construction of the heavy vehicle access road, new MIA, and the Hebden Road realignment.

8.1 Safety

The construction and operation of the Project will have a negligible impact on road safety conditions on the New England Highway and Hebden Road due to the minor increase in traffic volumes associated with the Project. Recently completed road safety projects have improved conditions in the area and the proposed Hebden Road realignment will provide a new higher standard alignment that is more compatible with regulatory posted speed limits. It is noted that half of the crashes in the area have occurred while natural lighting is restricted (e.g. at night time, dawn or dusk). Road safety for workers travelling to and from the Project will be managed as part of the organisation's Work Health Safety system and internal operating procedures.

8.2 Hebden Road Realignment

The Project will require realignment of the southern section of Hebden Road further west around the proposed Glendell Pit Extension and includes a crossing of Yorks Creek (both current and future realigned creek path). The realignment of Hebden Road is expected to be approximately 5.3 km long with the final length to be confirmed during detailed design. It is expected to take approximately 12 months to construct the realignment with construction complete and the new road in service by 2022. Construction will be completed prior to the existing section of Hebden Road being decommissioned.

The Hebden Road realignment will remain classified as a Local Road vested in Singleton Council. The new section of Hebden Road will improve the existing standard and will be a two lane / two way rural road formation with a 9.0 m wide pavement including two x 3.5 m through lanes and two x 1.5 m sealed shoulders. The new section of road will be designed to an 80 km/h posted speed limit consistent with the existing Hebden Road speed limit.

8.3 Intermittent Road Closures

Due to the proximity of the existing Hebden Road alignment and proposed Hebden Road realignment to the Glendell Pit Extension it is expected that blasting operations will cause road closures in accordance with blasting procedures in place at the Mount Owen Complex.

Road closures along the existing Hebden Road and proposed Hebden Road realignment for the purposes of blasting in the Glendell Pit Extension would delay traffic by up to 15 minutes. An analysis of measured traffic data (15 minute increments) for Hebden Road indicates that at worst up to 15 vehicles would be queued in either direction as a result of these road closures.

Blasting operations have been assessed as part of the comprehensive Blast Impact Assessment (ESC 2019) for the Project to make sure that operations comply with the relevant ANZECC Guidelines. It is recommended that blasts are not conducted during the observed peak traffic times discussed in this report and during periods when school traffic is expected.

8.4 Pedestrians

Considered but not applicable due to rural location and lack of supporting infrastructure, pedestrian demand and connectivity.

8.5 On-street Parking

Considered but not applicable due to rural location and lack of supporting infrastructure.

9 Impact Assessment

9.1 Construction Phase

Construction considerations and impacts are presented in **Table 9.1**.

Table 9.1 Construction Considerations and Impacts

Requirement	Consideration	Impact
Intersection capacity	<p>This report has considered the intersection capacity in terms of Level of Service (LOS), Degree of Saturation (DOS) and 95% Back of Queue length by modelling the six intersections associated with the Project in SIDRA including:</p> <ol style="list-style-type: none"> 1. New England Highway / Hebden Road 2. Hebden Road / Glendell Access Road (later Ancillary Pad South Access Road) 3. Hebden Road / Ravensworth East Access Road 4. Hebden Road / Mount Owen Access Road 5. Hebden Road / Proposed Glendell Access Road 6. Hebden Road / Ancillary Pad North Access Road 	<p>The construction of the Project will have a negligible impact on intersection capacity due to the presence of construction traffic, however intersection modelling has demonstrated that there is enough latent capacity to accommodate the additional traffic within acceptable thresholds.</p>
Road conditions	<p>This report has considered the road conditions for the New England Highway and Hebden Road including:</p> <ol style="list-style-type: none"> 1. Formation 2. Alignment and Geometry 3. Regulatory Posted Speed Limit 4. Delineation 5. Features 6. Intermittent Road Closures 	<p>The primary road condition impact associated with the Project will be the intermittent road closures on Hebden Road. Intermittent road closures due to blasting are considered a medium impact due to the potential for delays up to 15 minutes for through traffic on Hebden Road.</p>
Road safety	<p>This report has considered the road safety aspects associated with the Project. It is noted that there were 10 crashes on the New England Highway and Hebden Road in the vicinity of the Project from 2013 to 2017. The installation of wide centreline treatment on the New England Highway has reduced the risk of head on crashes, and the upgrade of the intersection of Hebden Road and the New England Highway has reduced the risk of intersection crash types at this site.</p>	<p>The construction of the Project will have a negligible impact on road safety conditions on the New England Highway and Hebden Road due to the minor increase in traffic volumes associated with the Project. Recently completed road safety projects have improved conditions in the area and the proposed Hebden Road realignment will provide a new higher standard alignment that is more compatible with regulatory posted speed limits.</p>

Requirement	Consideration	Impact
Network efficiency	<p>This report has considered the network efficiency aspects of the Project. Due to the rural nature of the Project site and surrounding area there are no nearby signalised intersections or Intelligent Transport System (ITS) assets that will be affected by the Project. Hebden Road is a rural two lane / two way road with intermittent priority controlled intersections that are expected to perform within acceptable limits in all existing and development scenarios. The New England Highway is an interstate route that carries a mix of local traffic, regional traffic and freight but is currently operating within capacity and acceptable limits. Network efficiency in terms of percent following is managed on the New England Highway by the provision of intermittent overtaking lanes, passing lanes and overtaking opportunities.</p>	<p>There are no anticipated network efficiency impacts associated with the construction of the Project.</p>
Road safety audit	<p>The preparation of a road safety audit is beyond the scope of this transport impact assessment and will be prepared as part of the broader suite of engineering documents and approvals for the Project as the design progresses for the proposed Hebden Road realignment.</p>	<p>The preparation of a road safety audit during the development of the Hebden Road realignment will ensure that there is no net worsening of road safety conditions associated with the proposed realignment.</p>
Mitigation measures and treatment options	<p>This report has considered the need for potential mitigation measures and treatment options to minimise the traffic and transport impacts of the proposed Project.</p>	<p>Based on environmental conditions that are common in the Hunter Valley region and existing crash and traffic data it is recommended that improved delineation be considered on Hebden Road including consistent application of guide posts, and centreline and edgeline pavement marking to improve visibility and road safety during periods with low levels of visibility. It is also recommended that existing AUR treatments be converted to CHR(s) treatments by changing the line marking arrangements at the intersection of Hebden Road and the mine access roads. Newly constructed intersections as part of the Hebden Road realignment works should use CHR treatments.</p>

Requirement	Consideration	Impact
Concept development of Hebden Road realignment	This report has considered the need for the proposed realignment of Hebden Road to enable the construction and operation of the Project and recommends the proposed realignment progresses to a project development and project delivery phase. The concept and detail design of the proposed realignment is beyond the scope of this transport impact assessment and will be prepared as part of the broader suite of engineering documents and approvals for the Project.	The traffic and transport impact of the proposed Hebden Road realignment is expected to be minor during the construction phase and negligible during operation. The realignment will be designed and delivered in accordance with Australian Standards, Austroads Guidelines, Singleton Council DCP, RMS Traffic Control at Worksites Manual, Project Specific Traffic Management Plan and Traffic Control Plans to ensure the safety of workers, safety of road users and efficiency of the road network is maintained during construction. The adoption of an 80 km/h standard will ensure that the new alignment caters for safe travel at the regulatory posted speed limits.

9.2 Operational Phase

Operational considerations and impacts are presented in **Table 9.2**.

Table 9.2 Operational Considerations and Impacts

Requirement	Consideration	Impact
Intersection capacity	<p>This report has considered the intersection capacity in terms of Level of Service (LOS), Degree of Saturation (DOS) and 95% Back of Queue length by modelling the six intersections associated with the Project in SIDRA including:</p> <ol style="list-style-type: none"> 1. New England Highway / Hebden Road 2. Hebden Road / Glendell Access Road (later Ancillary Pad South Access Road) 3. Hebden Road / Ravensworth East Access Road 4. Hebden Road / Mount Owen Access Road 5. Hebden Road / Proposed Glendell Access Road 6. Hebden Road / Ancillary Pad North Access Road 	The operation of the Project will have a minor impact on intersection capacity due to increased demand, however intersection modelling has demonstrated that there is enough latent capacity to accommodate the additional traffic within acceptable thresholds.
Road conditions	<p>This report has considered the road conditions for the New England Highway and Hebden Road including:</p> <ol style="list-style-type: none"> 1. Formation 2. Alignment and Geometry 3. Regulatory Posted Speed Limit 4. Delineation 5. Features 6. Intermittent Road Closures 	The primary road condition impact associated with the Project will be the intermittent road closures on Hebden Road. Intermittent road closures due to blasting are considered a medium impact due to the potential for delays up to 15 minutes for through traffic on Hebden Road.

Requirement	Consideration	Impact
Road safety	<p>This report has considered the road safety aspects associated with the Project. It is noted that there were 10 crashes on the New England Highway and Hebden Road in the vicinity of the proposal site from 2013 to 2017. The installation of wide centreline treatment on the New England Highway has reduced the risk of head on crashes, and the upgrade of the intersection of Hebden Road and the New England Highway has reduced the risk of intersection crash types at this site.</p>	<p>The operation of the Project will have a negligible impact on road safety conditions on the New England Highway and Hebden Road due to the minor increase in traffic volumes associated with the Project. Recently completed road safety projects have improved conditions in the area and the proposed Hebden Road realignment will provide a new higher standard alignment that is more compatible with regulatory posted speed limits.</p>
Network efficiency	<p>This report has considered the network efficiency aspects of the Project. Due to the rural nature of the Project site and surrounding area there are no nearby signalised intersections or ITS assets that will be affected by the Project. Hebden Road is a rural two lane / two-way road with intermittent priority controlled intersections that are expected to perform within acceptable limits in all existing and development scenarios. The New England Highway is an interstate route that carries a mix of local traffic, regional traffic and freight but is currently operating within capacity and acceptable limits. Network efficiency in terms of percent following is managed on the New England Highway by the provision of intermittent overtaking lanes, passing lanes and overtaking opportunities.</p>	<p>There are no anticipated network efficiency impacts associated with the operation of the Project.</p>
Mitigation measures and treatment options	<p>This report has considered the need for potential mitigation measures and treatment options to minimise the traffic and transport impacts of the proposed Project.</p>	<p>It is recommended that improved delineation be provided on Hebden Road including consistent application of guide posts, and centreline and edgeline pavement marking be considered to improve visibility and road safety during periods with low levels of natural light. It is also recommended that newly constructed intersections as part of the Hebden Road realignment works should use CHR / CHR(S) treatments.</p>

10 Conclusion

The traffic and transport impact assessment has outlined the technical details and assumptions with regards to traffic generated by the Project and has considered the potential traffic and transport impacts as per the Secretary's Environmental Assessment Requirements extracted below:

- An assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the road network and rail networks including undertaking a road safety audit;
- A description of the measures that would be implemented to mitigate any impacts; and
- An assessment of the need to realign Hebden Road, and if so a conceptual design of the Hebden Road realignment, developed in consultation with Singleton Council, including a plan to avoid disruptions to existing traffic, and ensure local traffic requirements are met.

The impact assessment has considered the intersection capacity in terms of LOS, DOS and 95% Back of Queue length by modelling the six intersections associated with the Project in SIDRA including:

- New England Highway / Hebden Road;
- Hebden Road / Glendell Access Road (including Ancillary Pad South Access Road);
- Hebden Road / Ravensworth East Access Road;
- Hebden Road / Mount Owen Access Road;
- Hebden Road / Proposed Glendell Access Road; and
- Hebden Road / Ancillary Pad North Access Road.

The traffic modelling indicated that the construction and operation of the Project will have a minor impact on intersection capacity at the New England Highway / Hebden Road, Hebden Road / Glendell Access Road (Including Ancillary Pad South Access Road) and Hebden Road / Ravensworth East Access Road intersections due to increased demand, however there is adequate latent capacity to accommodate the additional traffic within acceptable thresholds. The remaining intersections that were modelled indicated negligible impacts on intersection capacity as they are largely unaffected by the construction traffic.

The proposed Hebden Road realignment impact is expected to be minor during the construction phase and negligible during operation. The realignment will be designed and delivered in accordance with Australian Standards, Austroads Guidelines, Singleton Council DCP, RMS Traffic Control at Worksites Manual, Project Specific Traffic Management Plan and Traffic Control Plans to ensure the safety of workers, safety of road users and efficiency of the road network is maintained during construction. The Hebden Road realignment will be designed to an 80 km/h standard.

11 Recommendations and Improvements

In **Section 7** of this report, it has been determined that the current alignment of the four existing intersections and the adopted alignment of the proposed intersections, offer sufficient capacity to facilitate required traffic flows. In addition to this, some recommendations for improvement are offered in **Table 11.1**.

Table 11.1 Recommendations

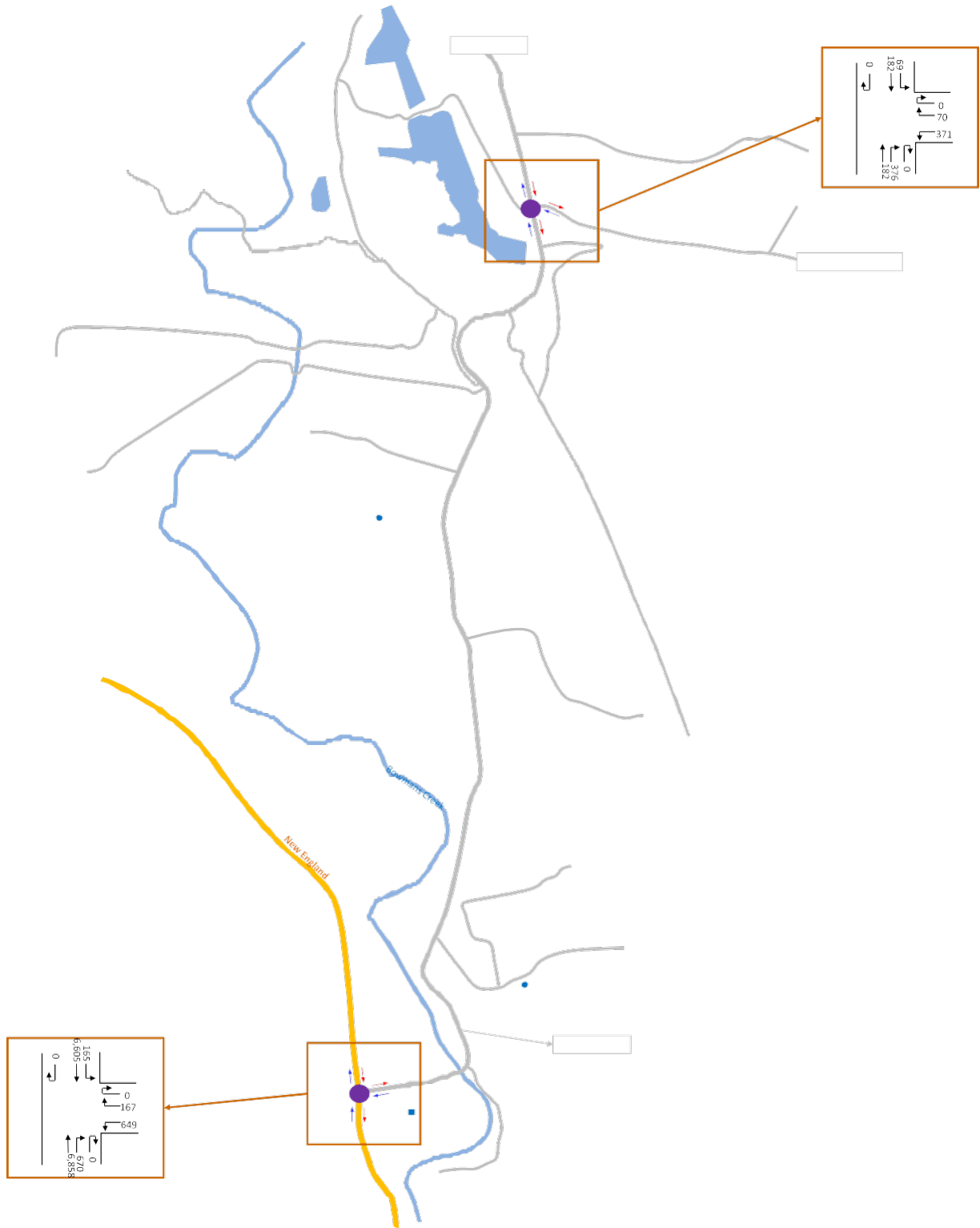
Recommendations	Improvement / Justification
Change line marking at current access road intersections from Auxiliary Right Hand (AUR) to Channelised Right Hand Short (CHR(s)).	Austroads has updated their methodology to replace AUR treatments with CHR(s) treatments. (As per Austroads Guide to Road Design – Part 4).
Implement Construction Traffic Management Plan.	To minimise construction traffic impacts of the Project on background traffic flows, particularly during peak times.
It is recommended that improved delineation be considered on Hebden Road including consistent application of guide posts and centreline and edgeline pavement marking.	To indicate the alignment and formation, improve visibility and improve road safety on Hebden Road. Improved delineation will minimise the risk of run of road crashes, particularly in low light or periods with poor prevailing weather conditions. This recommendation complies with the warrants for use in the RTA Delineation Manual Section 16.3.1.1.
The preparation of a road safety audit during the development of the Hebden Road realignment.	To ensure that there is no net worsening of road safety conditions associated with the proposed realignment.
Blast activities conducted in off peak times and at times where school related traffic is not expected.	This will assist in minimising the disruption on the network.
Blast related disruption mitigation measures.	Mitigation measures including signage to indicate planned blast times, planned blast times posted on website, notification for blasts to those who request updates.

TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix A Traffic Study Data

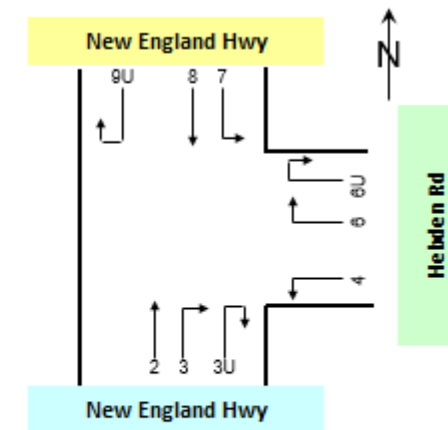
UMWELT (AUSTRALIA) PTY LTD

24hrs 0:00 0:00 All vehicles



Job No. : N4372
 Client : Calibre
 Suburb : Ravensworth
 Location : 1. New England Hwy / Hebden Rd
 Day/Date : Tues, 21st August 2018
 Weather : Fine
 Description : Classified Intersection Count
 : 15 mins Data

	Class 1	Class 2
Classifications	Lights	Heavies



Approach	New England Hwy									Hebden Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
0:00 to 0:15	9	3	12	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
0:15 to 0:30	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0:30 to 0:45	8	4	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0:45 to 1:00	5	0	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1:00 to 1:15	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 to 1:30	2	2	4	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
1:30 to 1:45	2	4	6	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
1:45 to 2:00	4	8	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 to 2:15	1	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 to 2:30	3	10	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 to 2:45	2	2	4	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0
2:45 to 3:00	1	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 to 3:15	3	2	5	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0

Approach	New England Hwy									Hebden Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
3:15 to 3:30	7	4	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 to 3:45	11	6	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 to 4:00	9	6	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 to 4:15	6	8	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 to 4:30	13	7	20	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4:30 to 4:45	50	10	60	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0
4:45 to 5:00	62	14	76	14	0	14	0	0	0	0	0	0	0	0	0	0	0	0
5:00 to 5:15	101	9	110	15	0	15	0	0	0	0	0	0	0	0	0	0	0	0
5:15 to 5:30	214	16	230	46	1	47	0	0	0	0	0	0	0	0	0	0	0	0
5:30 to 5:45	228	8	236	50	1	51	0	0	0	0	0	0	0	0	0	0	0	0
5:45 to 6:00	234	8	242	54	0	54	0	0	0	1	0	1	1	0	1	0	0	0
6:00 to 6:15	220	14	234	47	2	49	0	0	0	4	0	4	0	0	0	0	0	0
6:15 to 6:30	223	22	245	34	1	35	0	0	0	16	0	16	1	1	2	0	0	0
6:30 to 6:45	199	18	217	19	0	19	0	0	0	29	1	30	2	0	2	0	0	0
6:45 to 7:00	159	27	186	22	6	28	0	0	0	8	0	8	0	0	0	0	0	0
7:00 to 7:15	143	14	157	14	6	20	0	0	0	15	1	16	0	0	0	0	0	0
7:15 to 7:30	175	34	209	16	4	20	0	0	0	32	0	32	0	0	0	0	0	0
7:30 to 7:45	138	23	161	11	3	14	0	0	0	5	0	5	1	2	3	0	0	0
7:45 to 8:00	108	14	122	7	0	7	0	0	0	4	6	10	0	3	3	0	0	0
8:00 to 8:15	113	12	125	3	1	4	0	0	0	3	2	5	2	5	7	0	0	0
8:15 to 8:30	91	20	111	8	0	8	0	0	0	3	1	4	1	2	3	0	0	0
8:30 to 8:45	85	13	98	4	2	6	0	0	0	2	2	4	1	3	4	0	0	0
8:45 to 9:00	75	19	94	4	1	5	0	0	0	1	3	4	0	5	5	0	0	0
9:00 to 9:15	65	17	82	4	1	5	0	0	0	3	2	5	1	6	7	0	0	0

Approach	New England Hwy									Hebden Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
9:15 to 9:30	74	14	88	5	1	6	0	0	0	1	3	4	0	1	1	0	0	0
9:30 to 9:45	77	18	95	4	3	7	0	0	0	4	1	5	0	1	1	0	0	0
9:45 to 10:00	61	13	74	1	5	6	0	0	0	3	1	4	0	4	4	0	0	0
10:00 to 10:15	61	21	82	5	1	6	0	0	0	3	4	7	0	2	2	0	0	0
10:15 to 10:30	68	13	81	6	2	8	0	0	0	2	2	4	1	3	4	0	0	0
10:30 to 10:45	78	18	96	9	1	10	0	0	0	5	2	7	4	5	9	0	0	0
10:45 to 11:00	56	17	73	3	3	6	0	0	0	4	3	7	0	3	3	0	0	0
11:00 to 11:15	60	13	73	7	2	9	0	0	0	3	3	6	3	4	7	0	0	0
11:15 to 11:30	87	16	103	5	2	7	0	0	0	5	1	6	2	6	8	0	0	0
11:30 to 11:45	72	15	87	1	2	3	0	0	0	3	2	5	2	2	4	0	0	0
11:45 to 12:00	58	13	71	2	0	2	0	0	0	5	1	6	0	3	3	0	0	0
12:00 to 12:15	52	16	68	4	3	7	0	0	0	4	1	5	0	3	3	0	0	0
12:15 to 12:30	67	14	81	1	2	3	0	0	0	6	1	7	1	1	2	0	0	0
12:30 to 12:45	72	15	87	4	2	6	0	0	0	3	2	5	0	0	0	0	0	0
12:45 to 13:00	76	15	91	5	1	6	0	0	0	2	0	2	2	3	5	0	0	0
13:00 to 13:15	61	18	79	3	1	4	0	0	0	2	1	3	0	2	2	0	0	0
13:15 to 13:30	57	9	66	4	1	5	0	0	0	2	4	6	0	2	2	0	0	0
13:30 to 13:45	57	16	73	1	1	2	0	0	0	3	2	5	1	7	8	0	0	0
13:45 to 14:00	57	11	68	3	0	3	0	0	0	3	3	6	1	4	5	0	0	0
14:00 to 14:15	71	20	91	0	1	1	0	0	0	8	2	10	1	3	4	0	0	0
14:15 to 14:30	63	17	80	3	1	4	0	0	0	7	0	7	1	3	4	0	0	0
14:30 to 14:45	71	16	87	2	0	2	0	0	0	18	1	19	0	4	4	0	0	0
14:45 to 15:00	67	20	87	1	2	3	0	0	0	11	2	13	0	2	2	0	0	0
15:00 to 15:15	84	13	97	2	1	3	0	0	0	23	0	23	2	4	6	0	0	0

Approach	New England Hwy									Hebden Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
15:15 to 15:30	72	14	86	5	0	5	0	0	0	16	2	18	0	5	5	0	0	0
15:30 to 15:45	84	5	89	1	0	1	0	0	0	16	3	19	1	1	2	0	0	0
15:45 to 16:00	75	21	96	3	1	4	0	0	0	21	0	21	0	0	0	0	0	0
16:00 to 16:15	79	16	95	1	1	2	0	0	0	33	0	33	3	1	4	0	0	0
16:15 to 16:30	69	8	77	2	1	3	0	0	0	26	2	28	0	1	1	0	0	0
16:30 to 16:45	75	7	82	4	1	5	0	0	0	14	0	14	1	4	5	0	0	0
16:45 to 17:00	78	10	88	4	0	4	0	0	0	16	3	19	1	0	1	0	0	0
17:00 to 17:15	93	16	109	1	0	1	0	0	0	7	0	7	0	1	1	0	0	0
17:15 to 17:30	113	14	127	9	0	9	0	0	0	15	1	16	3	3	6	0	0	0
17:30 to 17:45	106	6	112	23	1	24	0	0	0	10	0	10	1	2	3	0	0	0
17:45 to 18:00	101	10	111	27	0	27	0	0	0	12	1	13	1	1	2	0	0	0
18:00 to 18:15	91	12	103	19	1	20	0	0	0	12	1	13	0	0	0	0	0	0
18:15 to 18:30	52	8	60	17	0	17	0	0	0	20	1	21	1	0	1	0	0	0
18:30 to 18:45	58	8	66	5	0	5	0	0	0	26	0	26	2	0	2	0	0	0
18:45 to 19:00	45	9	54	1	0	1	0	0	0	8	0	8	1	0	1	0	0	0
19:00 to 19:15	23	5	28	1	0	1	0	0	0	28	0	28	0	0	0	0	0	0
19:15 to 19:30	42	4	46	1	0	1	0	0	0	21	0	21	1	0	1	0	0	0
19:30 to 19:45	18	7	25	2	0	2	0	0	0	5	0	5	0	0	0	0	0	0
19:45 to 20:00	21	4	25	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0
20:00 to 20:15	14	5	19	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
20:15 to 20:30	12	4	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:30 to 20:45	9	9	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:45 to 21:00	27	7	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00 to 21:15	24	6	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Approach	New England Hwy									Hebden Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
21:15 to 21:30	11	4	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:30 to 21:45	8	9	17	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
21:45 to 22:00	4	6	10	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0
22:00 to 22:15	11	7	18	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0
22:15 to 22:30	6	1	7	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0
22:30 to 22:45	8	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:45 to 23:00	5	3	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00 to 23:15	12	3	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:15 to 23:30	8	1	9	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0
23:30 to 23:45	1	4	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
23:45 to 0:00	2	1	3	2	0	2	0	0	0	1	1	2	0	0	0	0	0	0
24hr Totals	5,843	1,015	6,858	591	79	670	0	0	0	570	79	649	49	118	167	0	0	0

Approach	New England Hwy								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
0:00 to 0:15	0	0	0	4	3	7	0	0	0
0:15 to 0:30	0	0	0	2	5	7	0	0	0
0:30 to 0:45	0	0	0	7	5	12	0	0	0
0:45 to 1:00	0	0	0	2	3	5	0	0	0
1:00 to 1:15	0	0	0	1	4	5	0	0	0
1:15 to 1:30	0	0	0	8	4	12	0	0	0
1:30 to 1:45	0	0	0	3	6	9	0	0	0
1:45 to 2:00	0	0	0	3	2	5	0	0	0
2:00 to 2:15	0	0	0	1	3	4	0	0	0
2:15 to 2:30	0	0	0	0	3	3	0	0	0
2:30 to 2:45	0	0	0	2	1	3	0	0	0
2:45 to 3:00	0	0	0	3	1	4	0	0	0
3:00 to 3:15	0	0	0	24	4	28	0	0	0
3:15 to 3:30	0	0	0	3	2	5	0	0	0
3:30 to 3:45	0	0	0	4	3	7	0	0	0
3:45 to 4:00	0	0	0	0	3	3	0	0	0
4:00 to 4:15	0	0	0	5	4	9	0	0	0
4:15 to 4:30	0	0	0	5	3	8	0	0	0
4:30 to 4:45	1	0	1	8	2	10	0	0	0
4:45 to 5:00	1	0	1	19	5	24	0	0	0
5:00 to 5:15	1	0	1	13	3	16	0	0	0
5:15 to 5:30	1	2	3	36	8	44	0	0	0
5:30 to 5:45	3	2	5	37	5	42	0	0	0

Approach	New England Hwy								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
5:45 to 6:00	3	2	5	40	11	51	0	0	0
6:00 to 6:15	3	1	4	40	7	47	0	0	0
6:15 to 6:30	3	3	6	64	10	74	0	0	0
6:30 to 6:45	1	1	2	68	9	77	0	0	0
6:45 to 7:00	0	1	1	74	7	81	0	0	0
7:00 to 7:15	3	0	3	107	6	113	0	0	0
7:15 to 7:30	0	1	1	103	9	112	0	0	0
7:30 to 7:45	0	2	2	57	10	67	0	0	0
7:45 to 8:00	0	4	4	63	14	77	0	0	0
8:00 to 8:15	0	6	6	58	17	75	0	0	0
8:15 to 8:30	0	5	5	53	10	63	0	0	0
8:30 to 8:45	2	1	3	64	18	82	0	0	0
8:45 to 9:00	1	3	4	54	9	63	0	0	0
9:00 to 9:15	0	2	2	65	22	87	0	0	0
9:15 to 9:30	1	4	5	55	22	77	0	0	0
9:30 to 9:45	0	6	6	52	14	66	0	0	0
9:45 to 10:00	2	1	3	59	25	84	0	0	0
10:00 to 10:15	1	4	5	78	19	97	0	0	0
10:15 to 10:30	1	7	8	49	7	56	0	0	0
10:30 to 10:45	1	5	6	62	8	70	0	0	0
10:45 to 11:00	1	2	3	56	18	74	0	0	0
11:00 to 11:15	3	2	5	53	10	63	0	0	0
11:15 to 11:30	2	1	3	55	24	79	0	0	0
11:30 to 11:45	1	2	3	57	23	80	0	0	0

Approach	New England Hwy								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
11:45 to 12:00	0	1	1	55	24	79	0	0	0
12:00 to 12:15	0	4	4	54	24	78	0	0	0
12:15 to 12:30	0	4	4	74	19	93	0	0	0
12:30 to 12:45	1	5	6	69	19	88	0	0	0
12:45 to 13:00	1	1	2	66	17	83	0	0	0
13:00 to 13:15	0	1	1	61	17	78	0	0	0
13:15 to 13:30	0	6	6	76	16	92	0	0	0
13:30 to 13:45	0	4	4	62	21	83	0	0	0
13:45 to 14:00	0	1	1	80	14	94	0	0	0
14:00 to 14:15	0	2	2	75	24	99	0	0	0
14:15 to 14:30	0	3	3	107	27	134	0	0	0
14:30 to 14:45	0	3	3	99	21	120	0	0	0
14:45 to 15:00	2	2	4	81	24	105	0	0	0
15:00 to 15:15	0	0	0	123	16	139	0	0	0
15:15 to 15:30	0	1	1	137	27	164	0	0	0
15:30 to 15:45	0	2	2	140	14	154	0	0	0
15:45 to 16:00	0	2	2	168	16	184	0	0	0
16:00 to 16:15	0	3	3	166	15	181	0	0	0
16:15 to 16:30	0	1	1	154	12	166	0	0	0
16:30 to 16:45	1	1	2	161	21	182	0	0	0
16:45 to 17:00	0	2	2	158	18	176	0	0	0
17:00 to 17:15	0	0	0	189	17	206	0	0	0
17:15 to 17:30	0	0	0	180	15	195	0	0	0
17:30 to 17:45	3	0	3	167	11	178	0	0	0

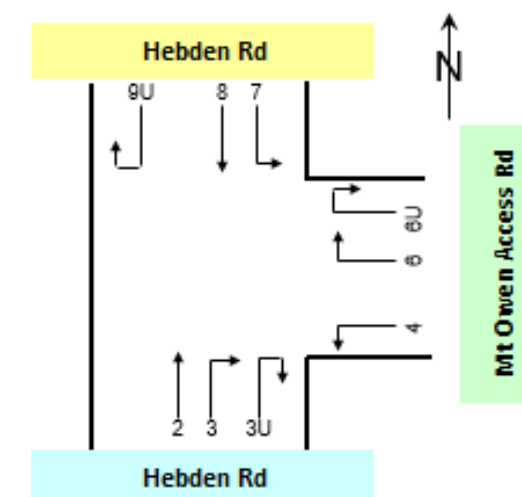
Approach	New England Hwy								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
17:45 to 18:00	0	0	0	147	15	162	0	0	0
18:00 to 18:15	0	0	0	109	24	133	0	0	0
18:15 to 18:30	1	0	1	128	7	135	0	0	0
18:30 to 18:45	0	0	0	104	17	121	0	0	0
18:45 to 19:00	0	0	0	121	9	130	0	0	0
19:00 to 19:15	0	0	0	110	16	126	0	0	0
19:15 to 19:30	0	0	0	124	10	134	0	0	0
19:30 to 19:45	0	0	0	54	6	60	0	0	0
19:45 to 20:00	0	0	0	39	11	50	0	0	0
20:00 to 20:15	0	0	0	28	11	39	0	0	0
20:15 to 20:30	0	0	0	28	7	35	0	0	0
20:30 to 20:45	0	0	0	25	9	34	0	0	0
20:45 to 21:00	0	0	0	12	6	18	0	0	0
21:00 to 21:15	1	0	1	20	5	25	0	0	0
21:15 to 21:30	0	0	0	9	7	16	0	0	0
21:30 to 21:45	0	0	0	11	11	22	0	0	0
21:45 to 22:00	0	0	0	13	5	18	0	0	0
22:00 to 22:15	0	0	0	10	8	18	0	0	0
22:15 to 22:30	0	0	0	9	9	18	0	0	0
22:30 to 22:45	0	0	0	5	8	13	0	0	0
22:45 to 23:00	0	0	0	14	7	21	0	0	0
23:00 to 23:15	0	0	0	2	5	7	0	0	0
23:15 to 23:30	0	0	0	6	3	9	0	0	0
23:30 to 23:45	0	0	0	7	4	11	0	0	0

Approach	New England Hwy								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
23:45 to 0:00	0	0	0	6	6	12	0	0	0
24hr Totals	46	119	165	5,519	1,086	6,605	0	0	0

Job No. : N4372
 Client : Calibre
 Suburb : Ravensworth
 Location : 2. Hebden Rd / Mt Owen Access Rd
 Day/Date : Tues, 21st August 2018
 Weather : Fine
 Description : Classified Intersection Count

: 15 mins Data

	Class 1	Class 2
Classifications	Lights	Heavies



Approach	Hebden Rd									Mount Owen Access Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
0:00 to 0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0:15 to 0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0:30 to 0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0:45 to 1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 to 1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 to 1:30	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0
1:30 to 1:45	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0
1:45 to 2:00	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2:00 to 2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 to 2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 to 2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 to 3:00	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
3:00 to 3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 to 3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Approach	Hebden Rd									Mount Owen Access Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
3:30 to 3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 to 4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 to 4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 to 4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 to 4:45	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0
4:45 to 5:00	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0
5:00 to 5:15	2	0	2	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0
5:15 to 5:30	2	1	3	15	0	15	0	0	0	0	0	0	0	0	0	0	0	0
5:30 to 5:45	2	0	2	26	1	27	0	0	0	0	0	0	0	0	0	0	0	0
5:45 to 6:00	0	0	0	25	2	27	0	0	0	0	0	0	0	0	0	0	0	0
6:00 to 6:15	1	1	2	34	2	36	0	0	0	0	0	0	0	0	0	0	0	0
6:15 to 6:30	2	2	4	30	0	30	0	0	0	1	0	1	0	0	0	0	0	0
6:30 to 6:45	0	2	2	20	0	20	0	0	0	1	0	1	1	0	1	0	0	0
6:45 to 7:00	2	1	3	10	1	11	0	0	0	5	1	6	2	2	4	0	0	0
7:00 to 7:15	0	6	6	7	0	7	0	0	0	26	1	27	5	0	5	0	0	0
7:15 to 7:30	1	5	6	3	1	4	0	0	0	22	0	22	0	0	0	0	0	0
7:30 to 7:45	1	4	5	5	0	5	0	0	0	1	1	2	0	0	0	0	0	0
7:45 to 8:00	1	3	4	2	2	4	0	0	0	5	1	6	1	0	1	0	0	0
8:00 to 8:15	1	4	5	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0
8:15 to 8:30	1	5	6	3	2	5	0	0	0	0	1	1	0	0	0	0	0	0
8:30 to 8:45	0	3	3	6	1	7	0	0	0	1	1	2	0	0	0	0	0	0
8:45 to 9:00	0	1	1	4	1	5	0	0	0	3	4	7	1	0	1	0	0	0
9:00 to 9:15	0	3	3	4	1	5	0	0	0	1	1	2	0	0	0	0	0	0
9:15 to 9:30	0	3	3	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0

Approach	Hebden Rd									Mount Owen Access Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
9:30 to 9:45	0	6	6	4	1	5	0	0	0	2	1	3	0	0	0	0	0	0
9:45 to 10:00	0	5	5	3	0	3	0	0	0	1	0	1	0	0	0	0	0	0
10:00 to 10:15	1	4	5	4	2	6	0	0	0	2	0	2	3	0	3	0	0	0
10:15 to 10:30	2	5	7	2	2	4	0	0	0	1	1	2	0	2	2	0	0	0
10:30 to 10:45	0	5	5	3	0	3	0	0	0	5	0	5	0	0	0	0	0	0
10:45 to 11:00	1	2	3	4	0	4	0	0	0	1	1	2	1	0	1	0	0	0
11:00 to 11:15	2	2	4	5	0	5	0	0	0	5	0	5	1	0	1	0	0	0
11:15 to 11:30	0	3	3	4	0	4	0	0	0	5	0	5	0	1	1	0	0	0
11:30 to 11:45	1	2	3	4	2	6	0	0	0	4	1	5	0	0	0	0	0	0
11:45 to 12:00	0	1	1	2	0	2	0	0	0	5	0	5	0	0	0	0	0	0
12:00 to 12:15	2	1	3	2	0	2	0	0	0	4	0	4	1	0	1	0	0	0
12:15 to 12:30	0	7	7	2	1	3	0	0	0	3	0	3	0	0	0	0	0	0
12:30 to 12:45	0	6	6	1	0	1	0	0	0	4	0	4	0	1	1	0	0	0
12:45 to 13:00	1	3	4	7	0	7	0	0	0	4	0	4	0	0	0	0	0	0
13:00 to 13:15	1	1	2	2	1	3	0	0	0	2	0	2	0	0	0	0	0	0
13:15 to 13:30	1	5	6	3	0	3	0	0	0	3	2	5	1	0	1	0	0	0
13:30 to 13:45	0	2	2	2	2	4	0	0	0	5	0	5	0	0	0	0	0	0
13:45 to 14:00	0	3	3	3	0	3	0	0	0	2	3	5	0	1	1	0	0	0
14:00 to 14:15	1	2	3	1	0	1	0	0	0	7	0	7	0	0	0	0	0	0
14:15 to 14:30	2	3	5	1	1	2	0	0	0	8	1	9	0	0	0	0	0	0
14:30 to 14:45	0	4	4	0	0	0	0	0	0	7	0	7	2	2	4	0	0	0
14:45 to 15:00	2	2	4	4	0	4	0	0	0	3	0	3	1	0	1	0	0	0
15:00 to 15:15	0	2	2	2	1	3	0	0	0	11	0	11	2	0	2	0	0	0
15:15 to 15:30	2	0	2	1	0	1	0	0	0	4	2	6	4	0	4	0	0	0

Approach	Hebden Rd									Mount Owen Access Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
15:30 to 15:45	0	1	1	1	0	1	0	0	0	13	1	14	1	0	1	0	0	0
15:45 to 16:00	1	3	4	1	1	2	0	0	0	15	0	15	1	1	2	0	0	0
16:00 to 16:15	1	1	2	1	1	2	0	0	0	19	1	20	4	0	4	0	0	0
16:15 to 16:30	3	2	5	1	0	1	0	0	0	15	3	18	6	0	6	0	0	0
16:30 to 16:45	1	0	1	1	0	1	0	0	0	11	0	11	1	0	1	0	0	0
16:45 to 17:00	1	3	4	2	0	2	0	0	0	6	0	6	1	0	1	0	0	0
17:00 to 17:15	1	1	2	1	0	1	0	0	0	6	0	6	0	0	0	0	0	0
17:15 to 17:30	0	0	0	1	0	1	0	0	0	5	0	5	0	0	0	0	0	0
17:30 to 17:45	1	0	1	3	0	3	0	0	0	4	0	4	0	0	0	0	0	0
17:45 to 18:00	2	0	2	5	1	6	0	0	0	3	1	4	0	0	0	0	0	0
18:00 to 18:15	1	0	1	13	0	13	0	0	0	0	1	1	0	0	0	0	0	0
18:15 to 18:30	1	0	1	18	0	18	0	0	0	3	0	3	0	0	0	0	0	0
18:30 to 18:45	0	0	0	11	0	11	0	0	0	8	0	8	3	1	4	0	0	0
18:45 to 19:00	1	0	1	1	0	1	0	0	0	14	0	14	2	0	2	0	0	0
19:00 to 19:15	1	0	1	0	0	0	0	0	0	29	0	29	10	0	10	0	0	0
19:15 to 19:30	0	0	0	1	0	1	0	0	0	15	0	15	3	0	3	0	0	0
19:30 to 19:45	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0
19:45 to 20:00	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
20:00 to 20:15	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
20:15 to 20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:30 to 20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:45 to 21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00 to 21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:15 to 21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Approach	Hebden Rd									Mount Owen Access Rd								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
21:30 to 21:45	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
21:45 to 22:00	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
22:00 to 22:15	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
22:15 to 22:30	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
22:30 to 22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:45 to 23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00 to 23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:15 to 23:30	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
23:30 to 23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:45 to 0:00	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
24hr Totals	51	131	182	342	34	376	0	0	0	339	32	371	59	11	70	0	0	0

Approach	Hebden Rd								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
0:00 to 0:15	0	0	0	0	0	0	0	0	0
0:15 to 0:30	0	0	0	0	0	0	0	0	0
0:30 to 0:45	0	0	0	0	0	0	0	0	0
0:45 to 1:00	0	0	0	0	0	0	0	0	0
1:00 to 1:15	0	0	0	0	0	0	0	0	0
1:15 to 1:30	0	0	0	0	0	0	0	0	0
1:30 to 1:45	0	0	0	0	0	0	0	0	0
1:45 to 2:00	0	0	0	0	0	0	0	0	0
2:00 to 2:15	0	0	0	0	0	0	0	0	0
2:15 to 2:30	0	0	0	0	0	0	0	0	0
2:30 to 2:45	0	0	0	0	0	0	0	0	0
2:45 to 3:00	0	0	0	0	0	0	0	0	0
3:00 to 3:15	0	0	0	0	0	0	0	0	0
3:15 to 3:30	0	0	0	0	0	0	0	0	0
3:30 to 3:45	0	0	0	0	0	0	0	0	0
3:45 to 4:00	0	0	0	0	0	0	0	0	0
4:00 to 4:15	0	0	0	0	0	0	0	0	0
4:15 to 4:30	0	0	0	0	0	0	0	0	0
4:30 to 4:45	0	0	0	0	0	0	0	0	0
4:45 to 5:00	1	0	1	0	0	0	0	0	0
5:00 to 5:15	0	0	0	0	0	0	0	0	0
5:15 to 5:30	2	0	2	1	0	1	0	0	0
5:30 to 5:45	5	0	5	2	0	2	0	0	0

Approach	Hebden Rd								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
5:45 to 6:00	9	1	10	0	0	0	0	0	0
6:00 to 6:15	9	0	9	0	0	0	0	0	0
6:15 to 6:30	7	1	8	1	0	1	0	0	0
6:30 to 6:45	4	0	4	3	1	4	0	0	0
6:45 to 7:00	0	0	0	2	1	3	0	0	0
7:00 to 7:15	0	0	0	0	0	0	0	0	0
7:15 to 7:30	0	0	0	0	1	1	0	0	0
7:30 to 7:45	1	1	2	1	2	3	0	0	0
7:45 to 8:00	1	0	1	1	10	11	0	0	0
8:00 to 8:15	0	0	0	1	5	6	0	0	0
8:15 to 8:30	2	0	2	1	3	4	0	0	0
8:30 to 8:45	0	0	0	1	5	6	0	0	0
8:45 to 9:00	0	0	0	1	6	7	0	0	0
9:00 to 9:15	0	1	1	0	2	2	0	0	0
9:15 to 9:30	0	1	1	1	1	2	0	0	0
9:30 to 9:45	1	0	1	1	4	5	0	0	0
9:45 to 10:00	0	0	0	0	2	2	0	0	0
10:00 to 10:15	0	0	0	1	7	8	0	0	0
10:15 to 10:30	0	0	0	1	1	2	0	0	0
10:30 to 10:45	0	0	0	2	6	8	0	0	0
10:45 to 11:00	0	1	1	0	3	3	0	0	0
11:00 to 11:15	0	0	0	0	6	6	0	0	0
11:15 to 11:30	0	0	0	1	4	5	0	0	0
11:30 to 11:45	0	0	0	0	2	2	0	0	0

Approach	Hebden Rd								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
11:45 to 12:00	0	0	0	0	2	2	0	0	0
12:00 to 12:15	1	1	2	4	3	7	0	0	0
12:15 to 12:30	3	0	3	1	0	1	0	0	0
12:30 to 12:45	0	0	0	0	2	2	0	0	0
12:45 to 13:00	0	0	0	1	3	4	0	0	0
13:00 to 13:15	0	0	0	1	6	7	0	0	0
13:15 to 13:30	0	1	1	0	3	3	0	0	0
13:30 to 13:45	0	0	0	0	4	4	0	0	0
13:45 to 14:00	2	0	2	0	5	5	0	0	0
14:00 to 14:15	0	0	0	0	4	4	0	0	0
14:15 to 14:30	0	0	0	2	2	4	0	0	0
14:30 to 14:45	0	0	0	1	1	2	0	0	0
14:45 to 15:00	0	0	0	0	3	3	0	0	0
15:00 to 15:15	0	2	2	1	5	6	0	0	0
15:15 to 15:30	1	0	1	0	5	5	0	0	0
15:30 to 15:45	0	0	0	1	0	1	0	0	0
15:45 to 16:00	0	0	0	1	0	1	0	0	0
16:00 to 16:15	0	0	0	2	1	3	0	0	0
16:15 to 16:30	0	0	0	1	0	1	0	0	0
16:30 to 16:45	0	0	0	1	4	5	0	0	0
16:45 to 17:00	1	0	1	1	1	2	0	0	0
17:00 to 17:15	0	0	0	1	1	2	0	0	0
17:15 to 17:30	0	0	0	2	3	5	0	0	0
17:30 to 17:45	0	0	0	1	1	2	0	0	0

Approach	Hebden Rd								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
17:45 to 18:00	0	0	0	4	1	5	0	0	0
18:00 to 18:15	1	0	1	1	0	1	0	0	0
18:15 to 18:30	5	0	5	0	0	0	0	0	0
18:30 to 18:45	2	0	2	0	0	0	0	0	0
18:45 to 19:00	0	0	0	0	0	0	0	0	0
19:00 to 19:15	0	0	0	0	0	0	0	0	0
19:15 to 19:30	1	0	1	0	0	0	0	0	0
19:30 to 19:45	0	0	0	0	0	0	0	0	0
19:45 to 20:00	0	0	0	1	0	1	0	0	0
20:00 to 20:15	0	0	0	0	0	0	0	0	0
20:15 to 20:30	0	0	0	0	0	0	0	0	0
20:30 to 20:45	0	0	0	0	0	0	0	0	0
20:45 to 21:00	0	0	0	0	0	0	0	0	0
21:00 to 21:15	0	0	0	0	0	0	0	0	0
21:15 to 21:30	0	0	0	0	0	0	0	0	0
21:30 to 21:45	0	0	0	0	0	0	0	0	0
21:45 to 22:00	0	0	0	0	0	0	0	0	0
22:00 to 22:15	0	0	0	0	0	0	0	0	0
22:15 to 22:30	0	0	0	0	0	0	0	0	0
22:30 to 22:45	0	0	0	0	0	0	0	0	0
22:45 to 23:00	0	0	0	0	0	0	0	0	0
23:00 to 23:15	0	0	0	0	0	0	0	0	0
23:15 to 23:30	0	0	0	0	0	0	0	0	0
23:30 to 23:45	0	0	0	0	0	0	0	0	0

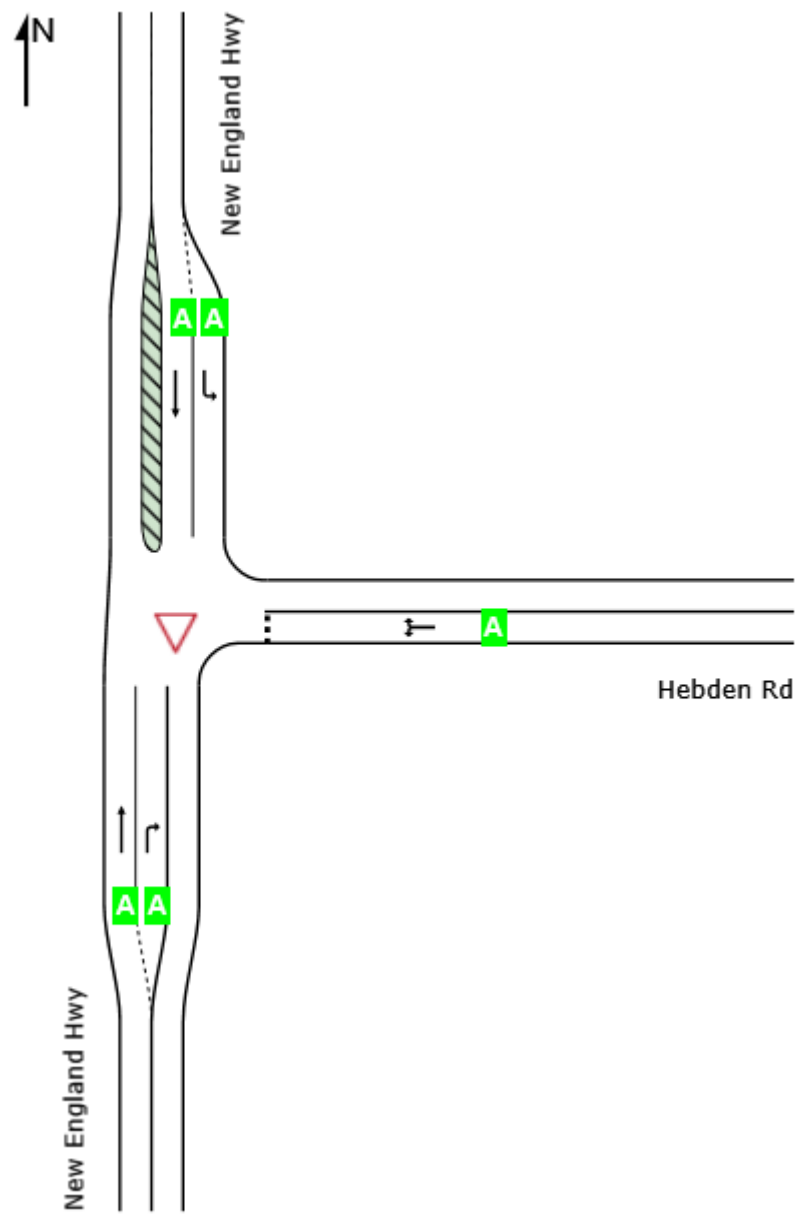
Approach	Hebden Rd								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
23:45 to 0:00	0	0	0	0	0	0	0	0	0
24hr Totals	59	10	69	50	132	182	0	0	0

TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix B Sidra Output New England Highway / Hebden Road 2018 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: New England Hwy													
Lane 1	957	5.4	1872	0.511	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	189	2.1	1411	0.134	100	7.6	LOS A	0.6	4.5	Short	120	0.0	NA
Approach	1146	4.9		0.511		1.3	NA	0.6	4.5				
East: Hebden Rd													
Lane 1	24	4.2	795	0.030	100	8.2	LOS A	0.1	0.8	Full	185	0.0	0.0
Approach	24	4.2		0.030		8.2	LOS A	0.1	0.8				
North: New England Hwy													
Lane 1	20	40.0	1445	0.014	100	7.7	LOS A	0.0	0.0	Short	90	0.0	NA
Lane 2	214	15.4	1772	0.121	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	234	17.5		0.121		0.7	NA	0.0	0.0				
Intersection	1404	7.0		0.511		1.3	NA	0.6	4.5				

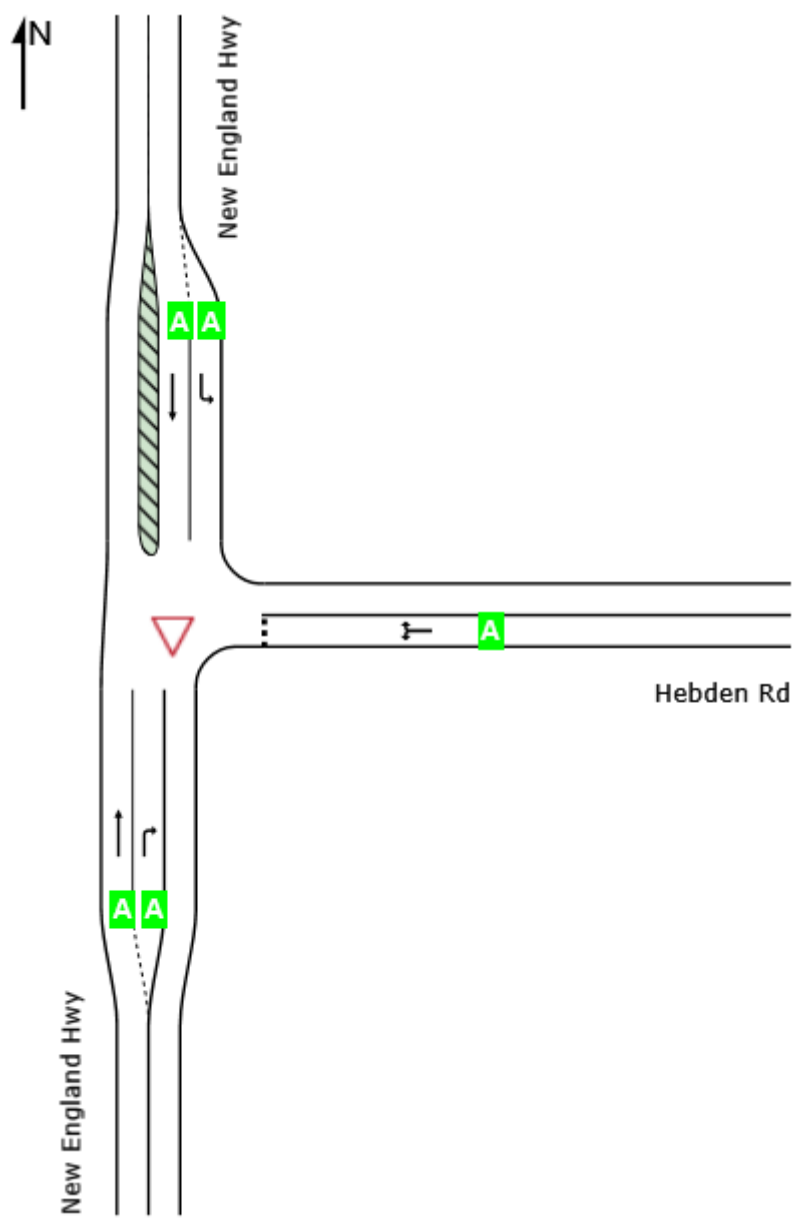


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix C Sidra Output New England Highway / Hebden Road 2018 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: New England Hwy													
Lane 1	208	14.4	1783	0.117	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	24	0.0	1035	0.023	100	8.7	LOS A	0.1	0.7	Short	120	0.0	NA
Approach	232	12.9		0.117		0.9	NA	0.1	0.7				
East: Hebden Rd													
Lane 1	87	1.1	934	0.093	100	7.9	LOS A	0.4	2.5	Full	185	0.0	0.0
Approach	87	1.1		0.093		7.9	LOS A	0.4	2.5				
North: New England Hwy													
Lane 1	1	0.0	1857	0.001	100	6.9	LOS A	0.0	0.0	Short	90	0.0	NA
Lane 2	512	9.6	1836	0.279	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	513	9.6		0.279		0.0	NA	0.0	0.0				
Intersection	832	9.6		0.279		1.1	NA	0.4	2.5				

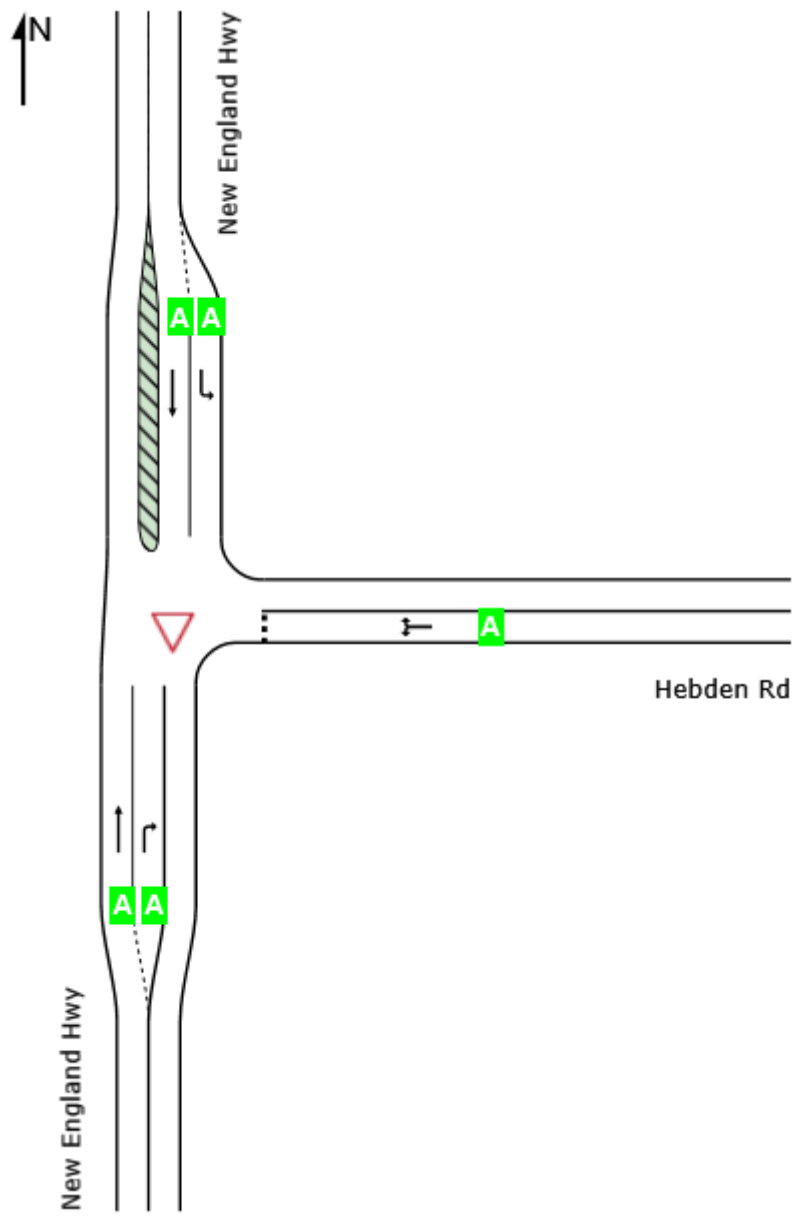


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix D Sidra Output New England Highway / Hebden Road 2022 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: New England Hwy													
Lane 1	1037	5.5	1871	0.554	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	435	13.1	1285	0.338	100	8.3	LOS A	1.9	14.5	Short	120	0.0	NA
Approach	1472	7.7		0.554		2.5	NA	1.9	14.5				
East: Hebden Rd													
Lane 1	29	17.2	397	0.073	100	12.8	LOS A	0.2	1.8	Full	185	0.0	0.0
Approach	29	17.2		0.073		12.8	LOS A	0.2	1.8				
North: New England Hwy													
Lane 1	29	13.8	1691	0.017	100	7.2	LOS A	0.0	0.0	Short	90	0.0	NA
Lane 2	232	15.5	1771	0.131	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	261	15.3		0.131		0.8	NA	0.0	0.0				
Intersection	1762	9.0		0.554		2.4	NA	1.9	14.5				

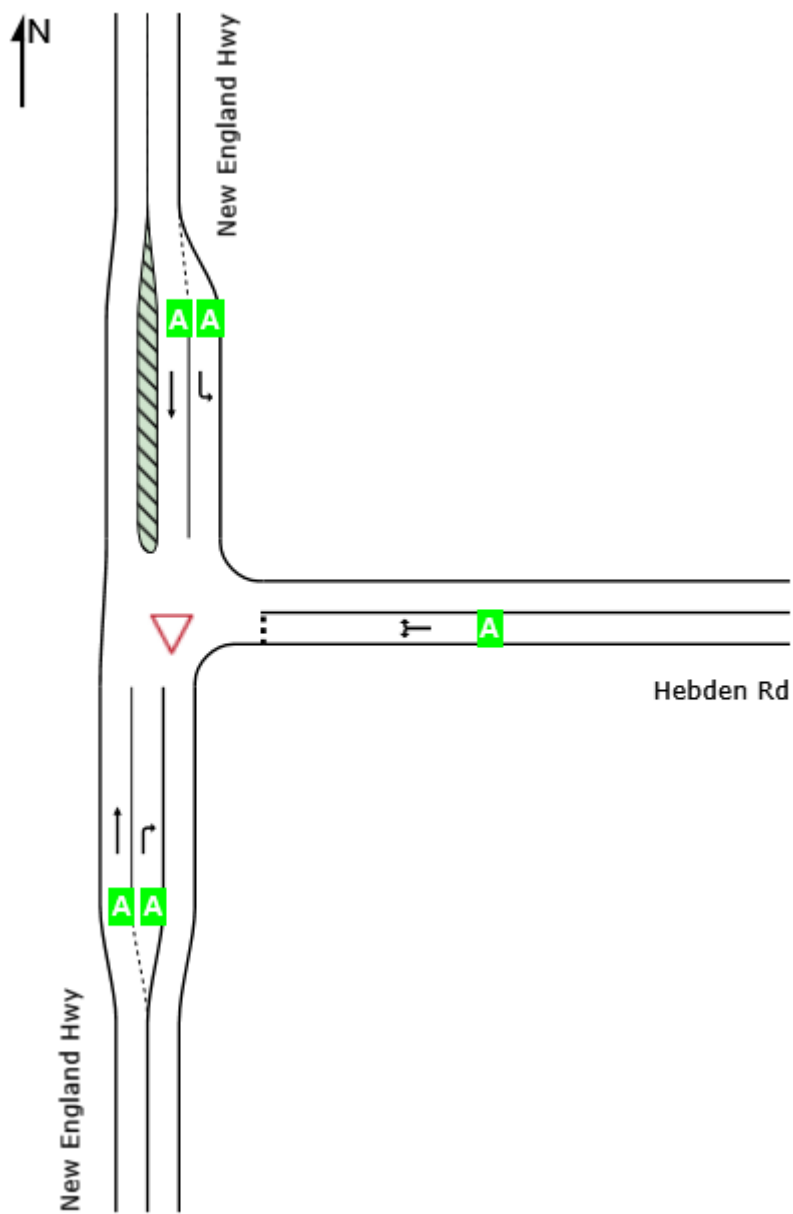


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix E Sidra Output New England Highway / Hebden Road 2022 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: New England Hwy													
Lane 1	226	14.6	1769	0.128	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	37	0.0	974	0.038	100	9.0	LOS A	0.2	1.1	Short	120	0.0	NA
Approach	263	12.5		0.128		1.3	NA	0.2	1.1				
East: Hebden Rd													
Lane 1	394	16.2	766	0.514	100	11.5	LOS A	3.3	26.1	Full	185	0.0	0.0
Approach	394	16.2		0.514		11.5	LOS A	3.3	26.1				
North: New England Hwy													
Lane 1	2	0.0	1857	0.001	100	6.9	LOS A	0.0	0.0	Short	90	0.0	NA
Lane 2	556	9.7	1834	0.303	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	558	9.7		0.303		0.1	NA	0.0	0.0				
Intersection	1215	12.4		0.514		4.0	NA	3.3	26.1				



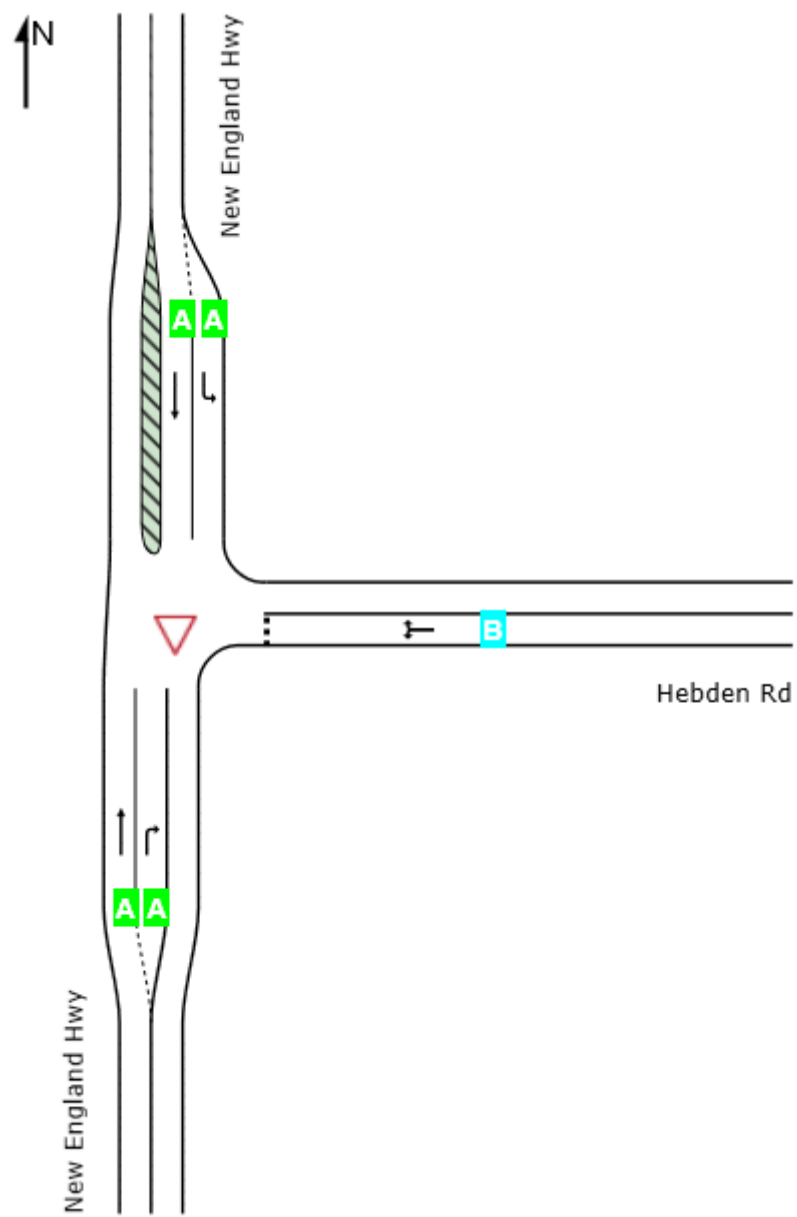
TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix F Sidra Output New England
Highway / Hebden Road 2033 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: New England Hwy													
Lane 1	1290	5.5	1872	0.689	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	411	14.8	1256	0.327	100	8.4	LOS A	1.8	14.0	Short	120	0.0	NA
Approach	1701	7.8		0.689		2.2	NA	1.8	14.0				
East: Hebden Rd													
Lane 1	25	16.0	315	0.079	100	14.8	LOS B	0.2	1.8	Full	185	0.0	0.0
Approach	25	16.0		0.079		14.8	LOS B	0.2	1.8				
North: New England Hwy													
Lane 1	27	14.8	1680	0.016	100	7.2	LOS A	0.0	0.0	Short	90	0.0	NA
Lane 2	241	18.7	1739	0.139	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	268	18.3		0.139		0.7	NA	0.0	0.0				
Intersection	1994	9.3		0.689		2.1	NA	1.8	14.0				



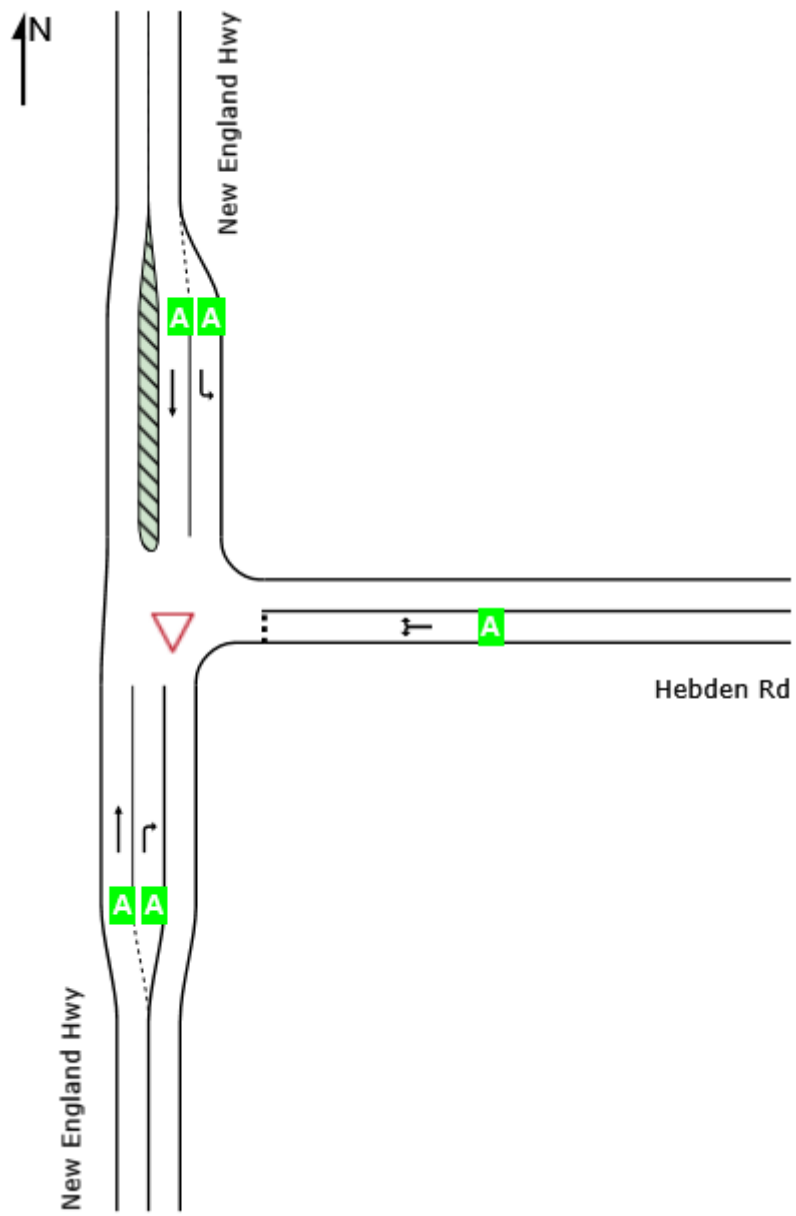
TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix G Sidra Output New England Highway / Hebden Road 2033 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: New England Hwy													
Lane 1	245	14.7	1766	0.139	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	102	12.7	814	0.125	100	10.3	LOS A	0.5	4.0	Short	120	0.0	NA
Approach	347	14.1		0.139		3.0	NA	0.5	4.0				
East: Hebden Rd													
Lane 1	169	13.0	724	0.233	100	9.7	LOS A	0.9	7.2	Full	185	0.0	0.0
Approach	169	13.0		0.233		9.7	LOS A	0.9	7.2				
North: New England Hwy													
Lane 1	7	14.3	1685	0.004	100	7.2	LOS A	0.0	0.0	Short	90	0.0	NA
Lane 2	603	9.8	1833	0.329	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	610	9.8		0.329		0.1	NA	0.0	0.0				
Intersection	1126	11.6		0.329		2.5	NA	0.9	7.2				

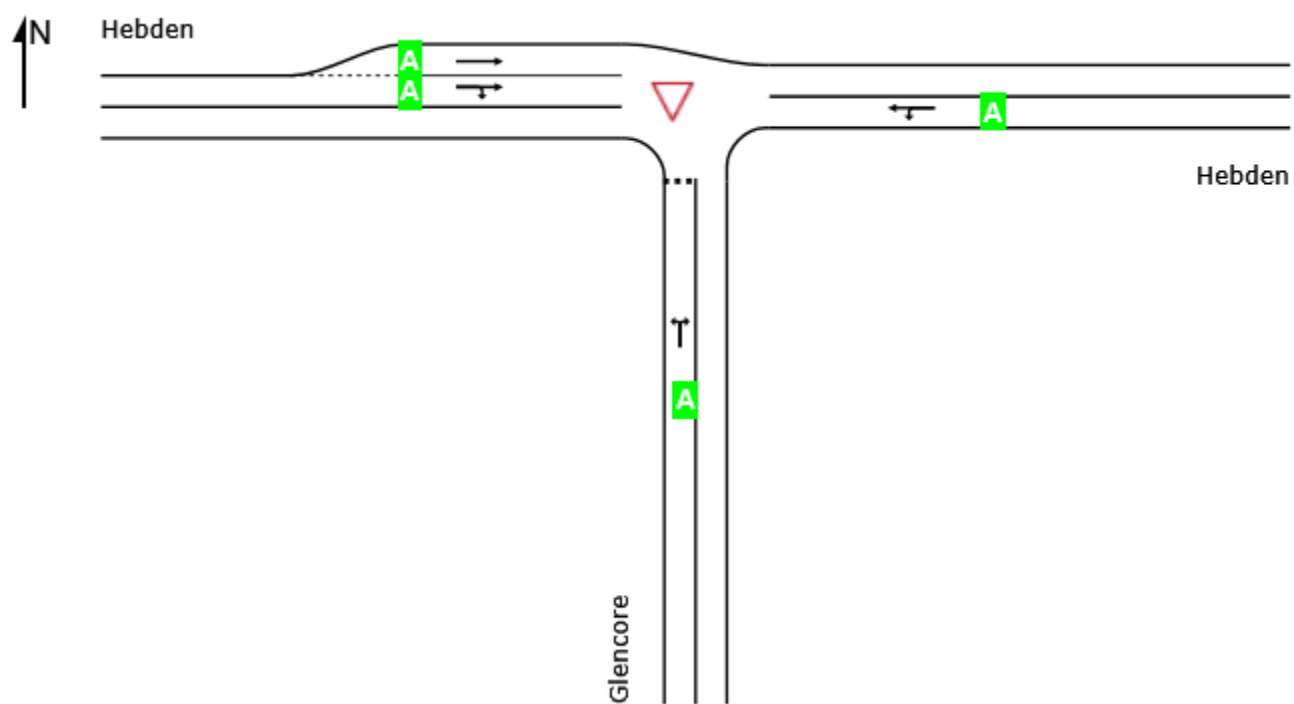


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix H Sidra Output Hebden Road / Glendell Access Road 2018 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Glencore													
Lane 1	15	6.7	1985	0.008	100	5.7	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	15	6.7		0.008		5.7	LOS A	0.0	0.3				
East: Hebden													
Lane 1	12	8.3	1843	0.007	100	0.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	12	8.3		0.007		0.6	NA	0.0	0.0				
West: Hebden													
Lane 1	33	5.9	1878	0.018	206	0.0	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	176	5.7	1978	0.089	100	2.2	LOS A	0.3	2.1	Full	500	0.0	0.0
Approach	209	5.7		0.089		1.8	NA	0.3	2.1				
Intersection	236	5.9		0.089		2.0	NA	0.3	2.1				

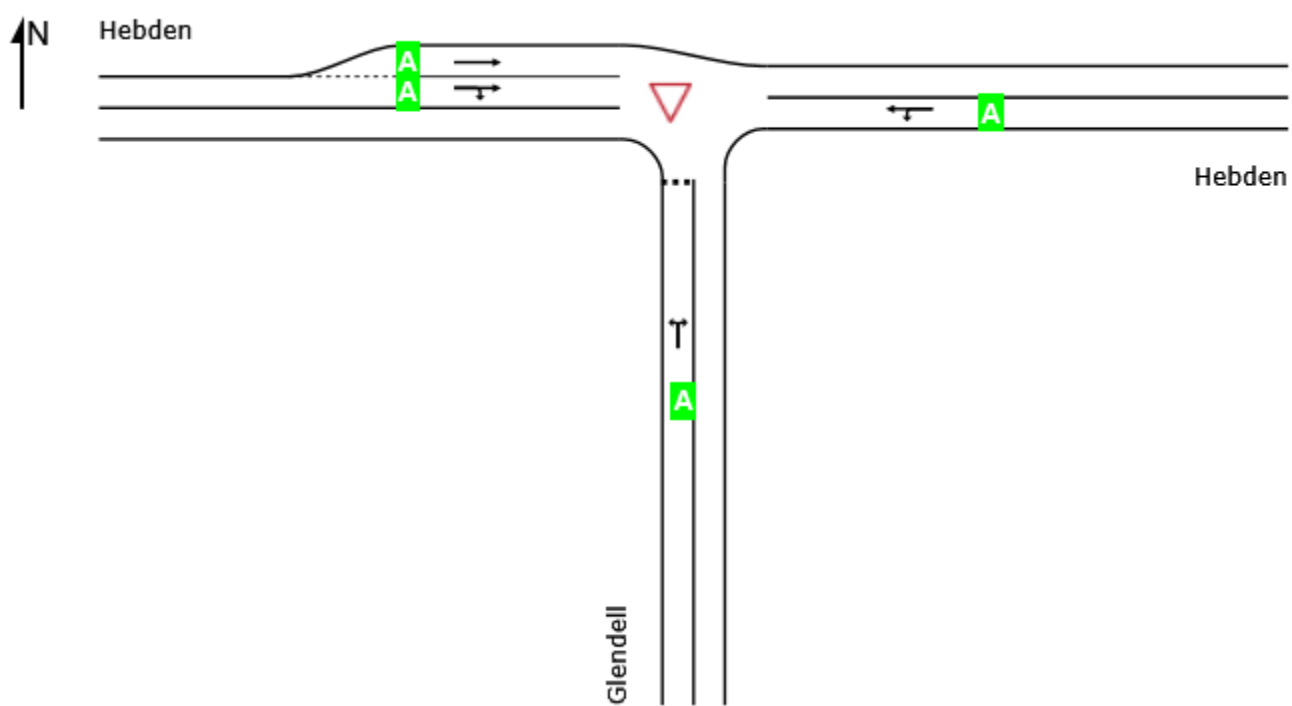


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix I Sidra Output Hebden Road / Glendell Access Road 2018 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Glendell													
Lane 1	30	3.3	1899	0.016	100	5.7	LOS A	0.1	0.5	Full	500	0.0	0.0
Approach	30	3.3		0.016		5.7	LOS A	0.1	0.5				
East: Hebden													
Lane 1	66	1.5	1930	0.034	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	66	1.5		0.034		0.1	NA	0.0	0.0				
West: Hebden													
Lane 1	4	0.0	1950	0.002	20 ⁶	0.0	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	21	0.0	1959	0.011	100	0.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	25	0.0		0.011		0.3	NA	0.0	0.0				
Intersection	121	1.7		0.034		1.5	NA	0.1	0.5				

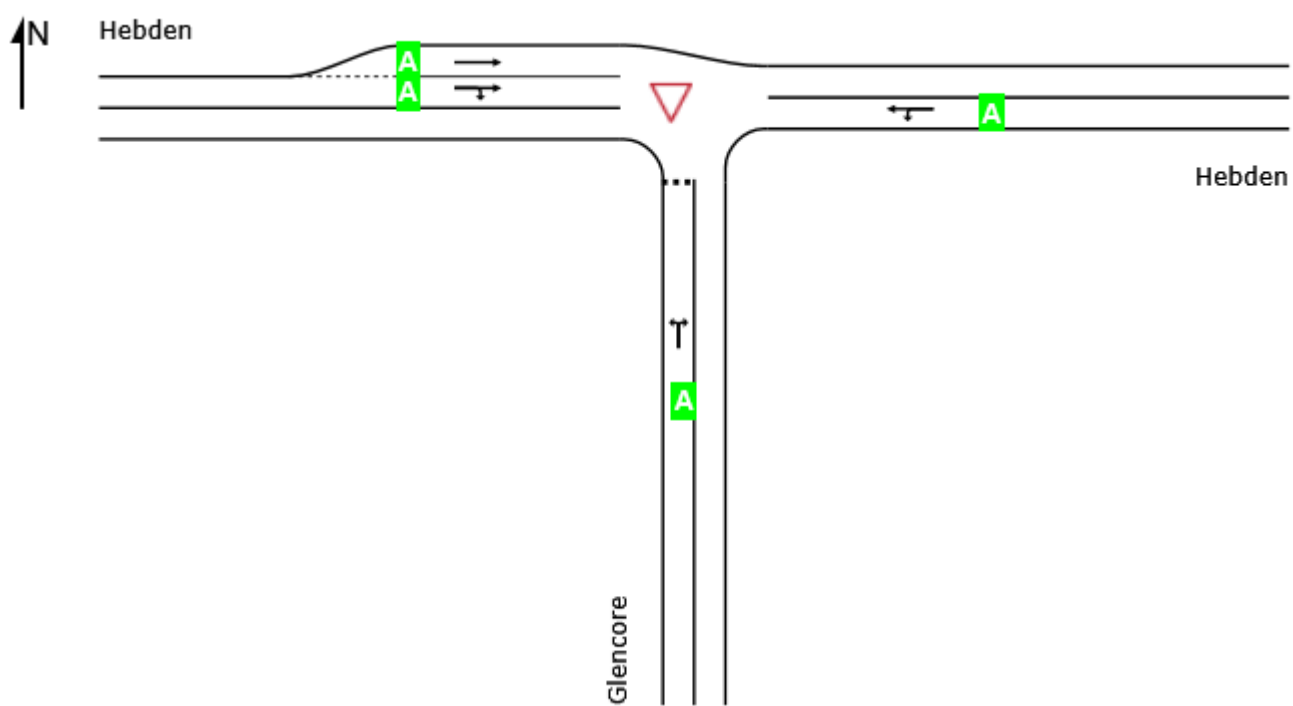


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix J Sidra Output Hebden Road / Glendell Access Road 2022 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Glendell													
Lane 1	16	6.3	1952	0.008	100	5.7	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	16	6.3		0.008		5.7	LOS A	0.0	0.3				
East: Hebden													
Lane 1	13	7.7	1850	0.007	100	0.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	13	7.7		0.007		0.5	NA	0.0	0.0				
West: Hebden													
Lane 1	75	14.5	1782	0.042	20.6	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	389	12.9	1850	0.210	100	1.0	LOS A	0.3	2.6	Short	60	0.0	NA
Approach	464	13.1		0.210		0.9	NA	0.3	2.6				
Intersection	493	12.8		0.210		1.0	NA	0.3	2.6				

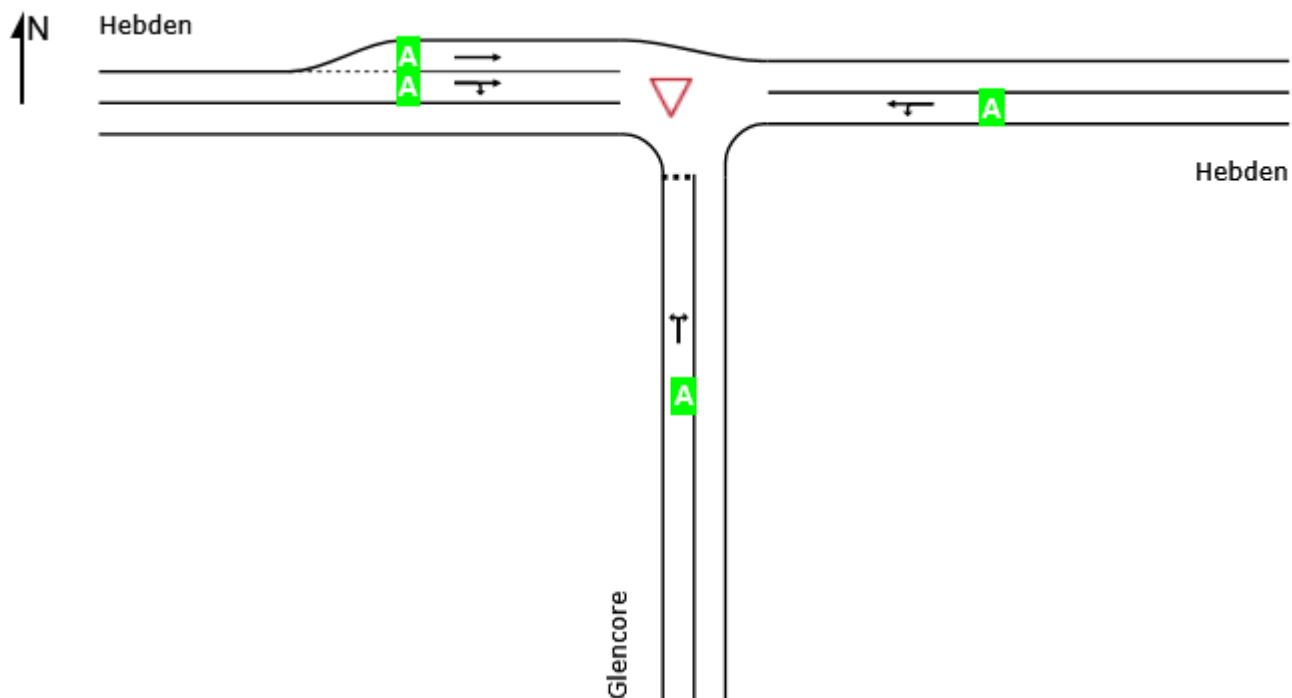


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix K Sidra Output Hebden Road / Glendell Access Road 2022 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Glendell													
Lane 1	31	3.2	1426	0.022	100	6.6	LOS A	0.1	0.6	Full	500	0.0	0.0
Approach	31	3.2		0.022		6.6	LOS A	0.1	0.6				
East: Hebden													
Lane 1	369	16.8	1758	0.210	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	369	16.8		0.210		0.0	NA	0.0	0.0				
West: Hebden													
Lane 1	36	0.0	1950	0.018	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	2	0.0	1685	0.001	100	7.6	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	38	0.0		0.018		0.4	NA	0.0	0.0				
Intersection	438	14.4		0.210		0.5	NA	0.1	0.6				

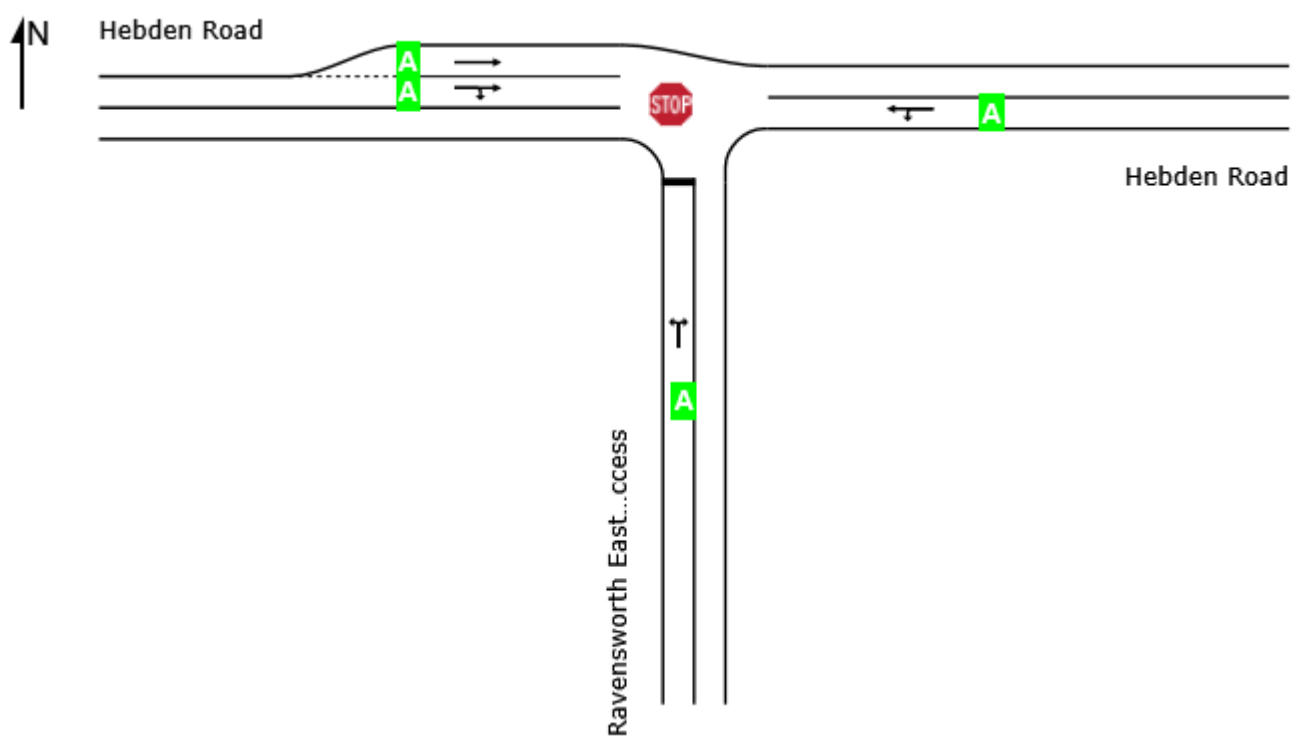


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix L Sidra Output Hebden Road / Ravensworth East Access Road 2018 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Ravensworth East Access													
Lane 1	8	12.5	1631	0.005	100	8.4	LOS A	0.0	0.2	Full	100	0.0	0.0
Approach	8	12.5		0.005		8.4	LOS A	0.0	0.2				
East: Hebden Road													
Lane 1	5	0.0	1931	0.003	100	1.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	5	0.0		0.003		1.1	NA	0.0	0.0				
West: Hebden Road													
Lane 1	25	5.5	1883	0.013	20.6	0.0	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	127	6.0	1930	0.066	100	1.1	LOS A	0.1	1.0	Full	500	0.0	0.0
Approach	152	5.9		0.066		0.9	NA	0.1	1.0				
Intersection	165	6.1		0.066		1.3	NA	0.1	1.0				

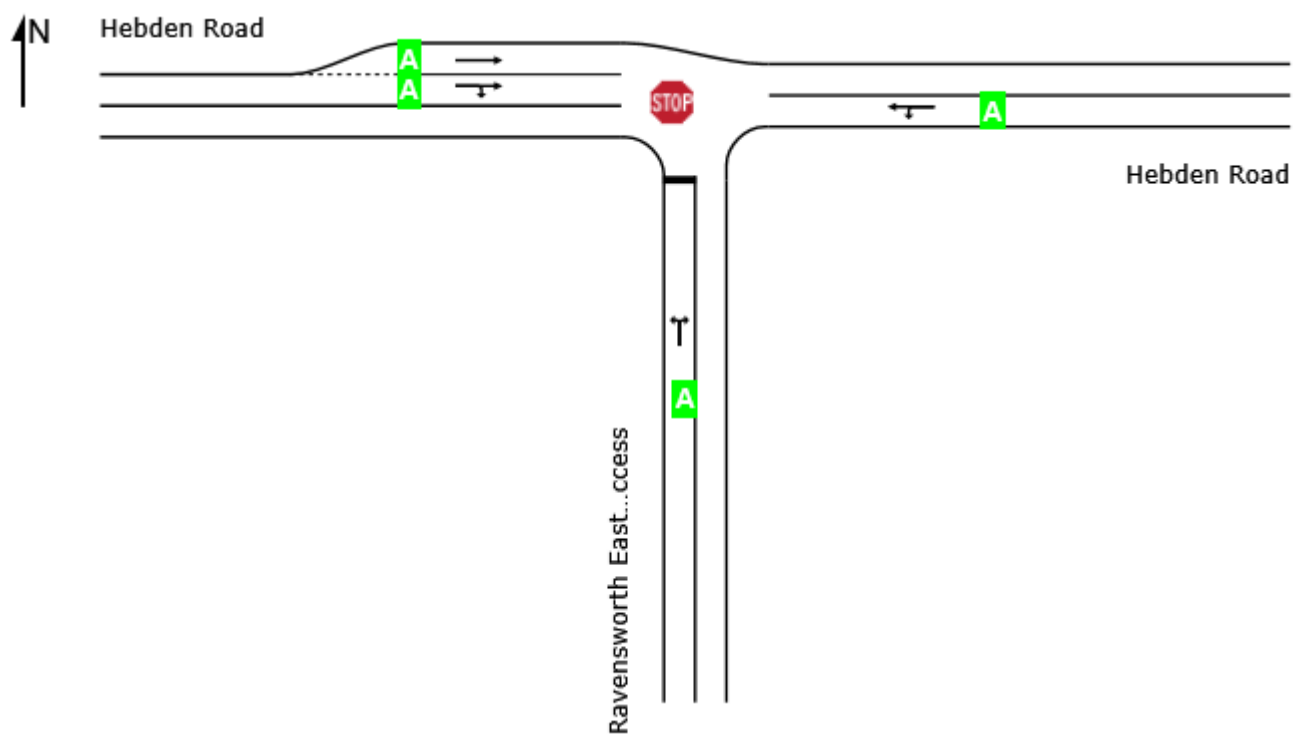


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix M Sidra Output Hebden Road /
Ravensworth East Access Road 2018 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Ravensworth East Access													
Lane 1	14	7.1	1601	0.009	100	8.3	LOS A	0.0	0.3	Full	100	0.0	0.0
Approach	14	7.1		0.009		8.3	LOS A	0.0	0.3				
East: Hebden Road													
Lane 1	55	0.0	1948	0.028	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	55	0.0		0.028		0.1	NA	0.0	0.0				
West: Hebden Road													
Lane 1	5	0.0	1950	0.003	20 ⁶	0.0	LOS A	0.0	0.0	Short	60	0.0	NA
Lane 2	26	0.0	1958	0.013	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	31	0.0		0.013		0.2	NA	0.0	0.0				
Intersection	100	1.0		0.028		1.3	NA	0.0	0.3				

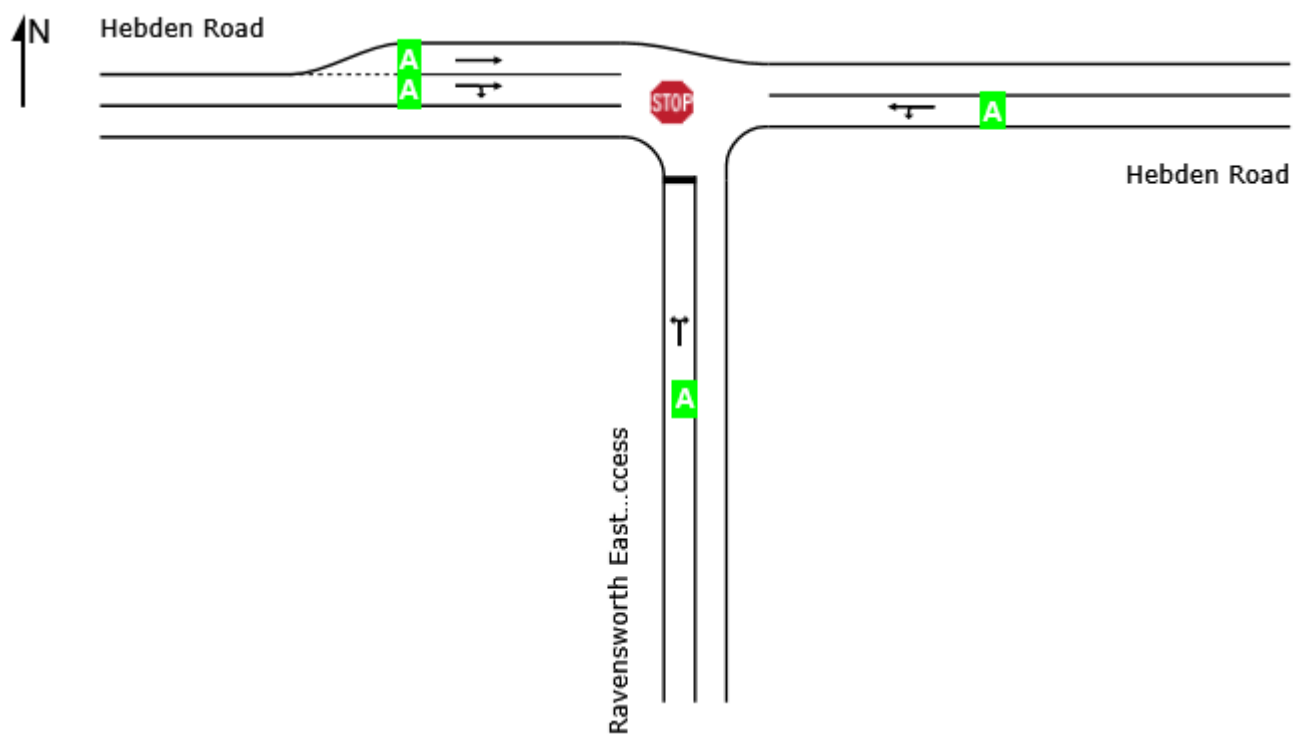


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix N Sidra Output Hebden Road / Ravensthorpe East Access Road 2022 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Ravensworth East Access													
Lane 1	8	12.5	1629	0.005	100	8.4	LOS A	0.0	0.2	Full	100	0.0	0.0
Approach	8	12.5		0.005		8.4	LOS A	0.0	0.2				
East: Hebden Road													
Lane 1	6	0.0	1934	0.003	100	0.9	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	6	0.0		0.003		0.9	NA	0.0	0.0				
West: Hebden Road													
Lane 1	129	6.2	1874	0.069	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	26	7.7	2300	0.011	100	5.6	LOS A	0.1	0.5	Short	60	0.0	NA
Approach	155	6.5		0.069		0.9	NA	0.1	0.5				
Intersection	169	6.5		0.069		1.3	NA	0.1	0.5				

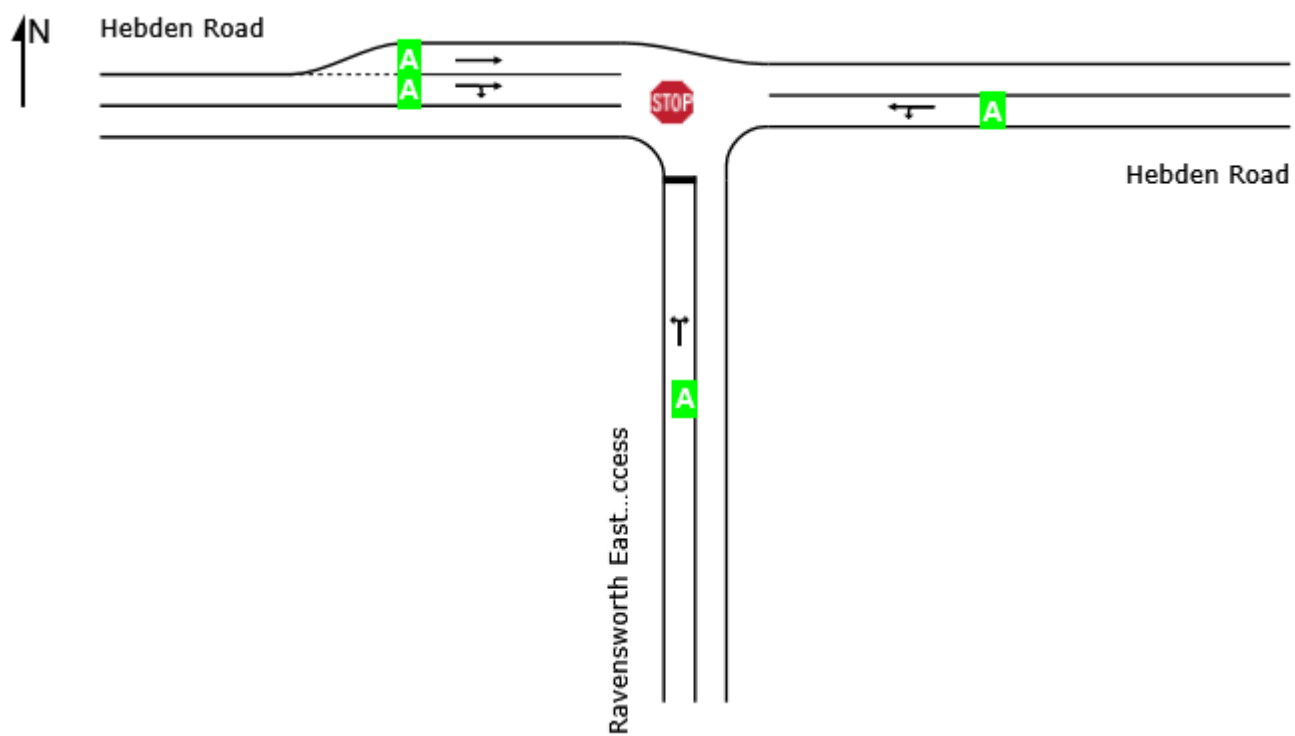


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix O Sidra Output Hebden Road /
Ravensthorpe East Access Road 2022 PM
Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Ravensworth East Access													
Lane 1	15	6.7	1587	0.009	100	8.3	LOS A	0.0	0.3	Full	100	0.0	0.0
Approach	15	6.7		0.009		8.3	LOS A	0.0	0.3				
East: Hebden Road													
Lane 1	55	0.0	1948	0.028	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	55	0.0		0.028		0.1	NA	0.0	0.0				
West: Hebden Road													
Lane 1	41	0.0	1950	0.021	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	2	0.0	2299	0.001	100	5.5	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	43	0.0		0.021		0.3	NA	0.0	0.0				
Intersection	113	0.9		0.028		1.2	NA	0.0	0.3				

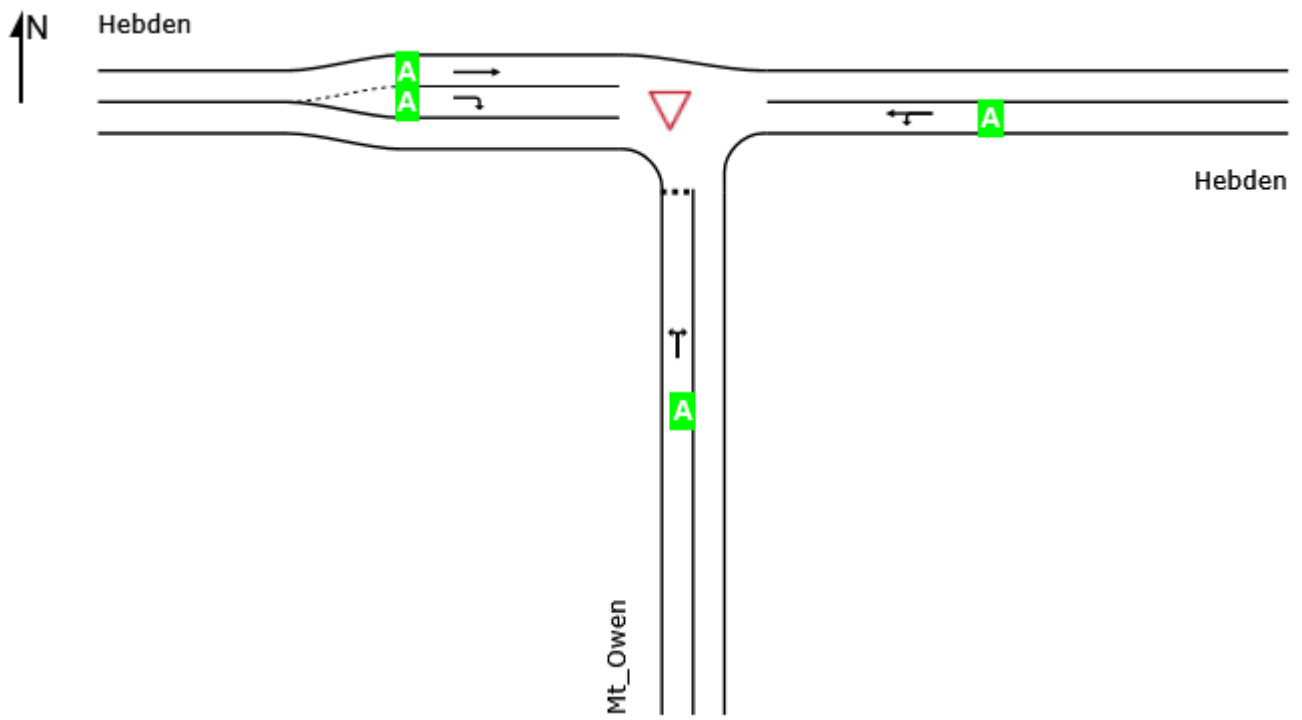


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix P Sidra Output Hebden Road /
Mount Owen Access Road 2018 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Mt_Owen													
Lane 1	2	0.0	1839	0.001	100	5.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2	0.0		0.001		5.6	LOS A	0.0	0.0				
East: Hebden													
Lane 1	35	5.7	1791	0.020	100	6.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	35	5.7		0.020		6.5	NA	0.0	0.0				
West: Hebden													
Lane 1	8	37.5	1557	0.005	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	120	4.2	2285	0.053	100	6.8	LOS A	0.3	2.2	Short	100	0.0	NA
Approach	128	6.3		0.053		6.3	NA	0.3	2.2				
Intersection	165	6.1		0.053		6.4	NA	0.3	2.2				

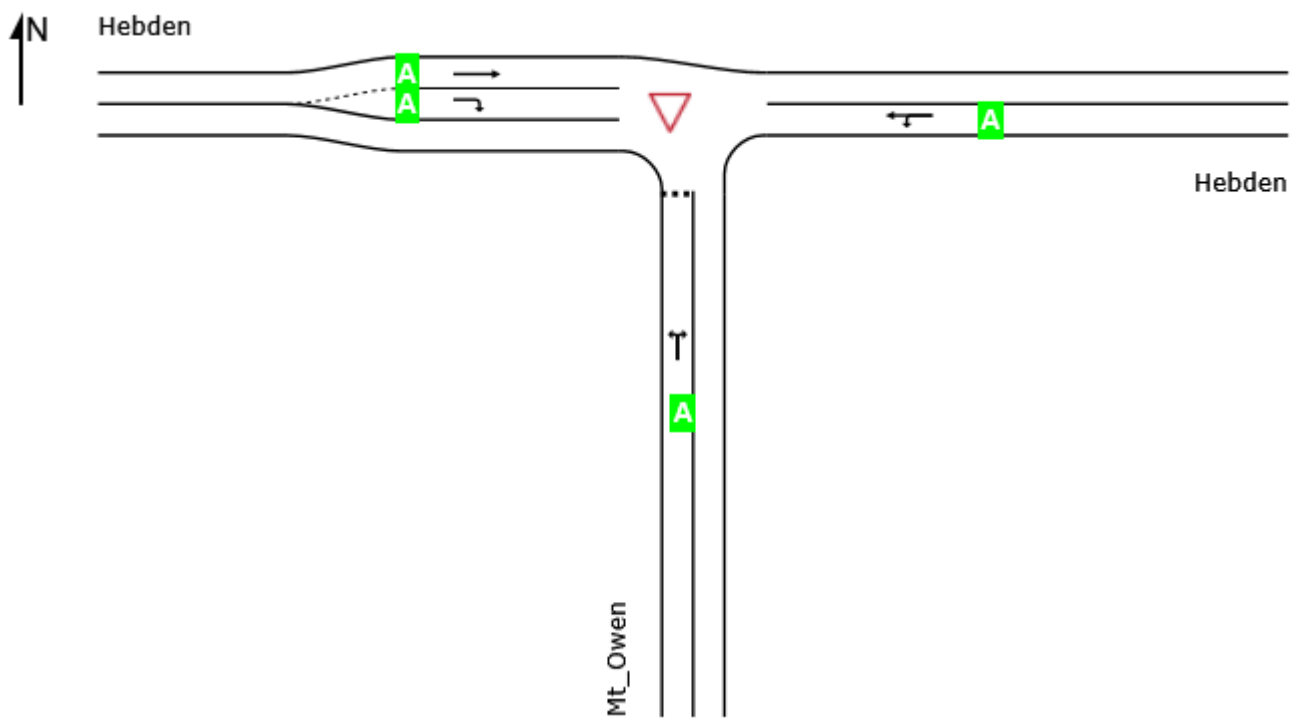


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix Q Sidra Output Hebden Road / Mount Owen Access Road 2018 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Mt_Owen													
Lane 1	70	1.4	2005	0.035	100	5.6	LOS A	0.2	1.1	Full	500	0.0	0.0
Approach	70	1.4		0.035		5.6	LOS A	0.2	1.1				
East: Hebden													
Lane 1	8	0.0	1868	0.004	100	6.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	8	0.0		0.004		6.1	NA	0.0	0.0				
West: Hebden													
Lane 1	3	0.0	1944	0.002	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	30	0.0	2385	0.013	100	6.6	LOS A	0.1	0.5	Short	100	0.0	NA
Approach	33	0.0		0.013		6.0	NA	0.1	0.5				
Intersection	111	0.9		0.035		5.7	NA	0.2	1.1				

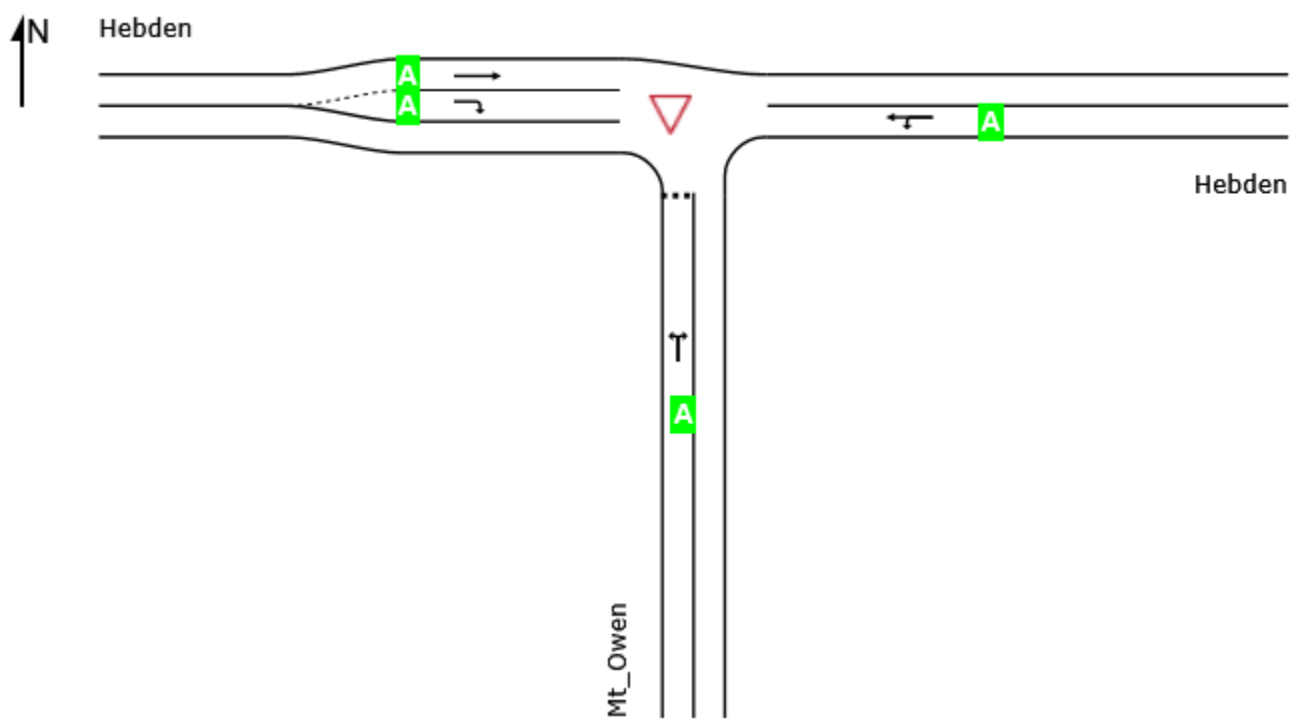


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix R Sidra Output Hebden Road /
Mount Owen Access Road 2022 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Mt_Owen													
Lane 1	70	1.4	2000	0.035	100	5.6	LOS A	0.2	1.1	Full	500	0.0	0.0
Approach	70	1.4		0.035		5.6	LOS A	0.2	1.1				
East: Hebden													
Lane 1	8	0.0	1868	0.004	100	6.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	8	0.0		0.004		6.1	NA	0.0	0.0				
West: Hebden													
Lane 1	15	0.0	1946	0.008	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	30	0.0	2385	0.013	100	6.6	LOS A	0.1	0.5	Short	100	0.0	NA
Approach	45	0.0		0.013		4.4	NA	0.1	0.5				
Intersection	123	0.8		0.035		5.2	NA	0.2	1.1				

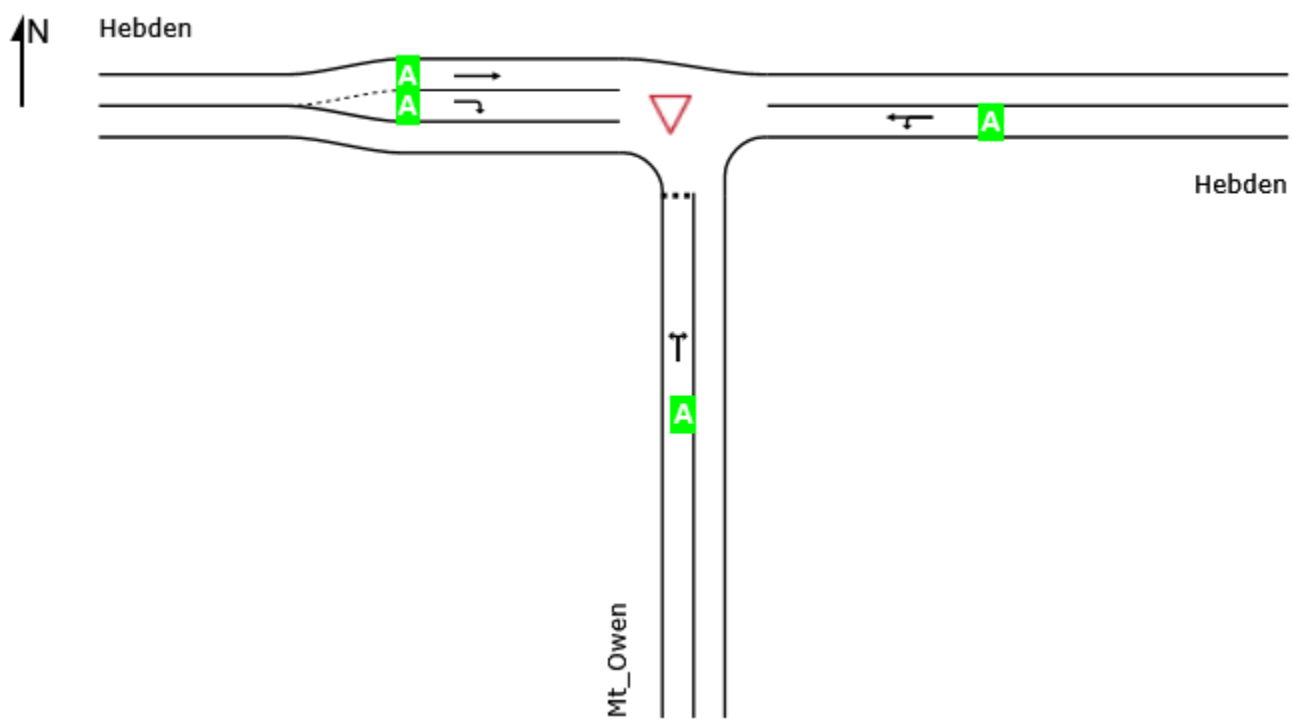


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix S Sidra Output Hebden Road / Mount Owen Access Road 2022 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%											
South: Mt_Owen													
Lane 1	69	1.4	2005	0.034	100	5.6	LOS A	0.2	1.1	Full	500	0.0	0.0
Approach	69	1.4		0.034		5.6	LOS A	0.2	1.1				
East: Hebden													
Lane 1	8	0.0	1868	0.004	100	6.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	8	0.0		0.004		6.1	NA	0.0	0.0				
West: Hebden													
Lane 1	15	0.0	1946	0.008	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	30	0.0	2385	0.013	100	6.6	LOS A	0.1	0.5	Short	100	0.0	NA
Approach	45	0.0		0.013		4.4	NA	0.1	0.5				
Intersection	122	0.8		0.034		5.2	NA	0.2	1.1				

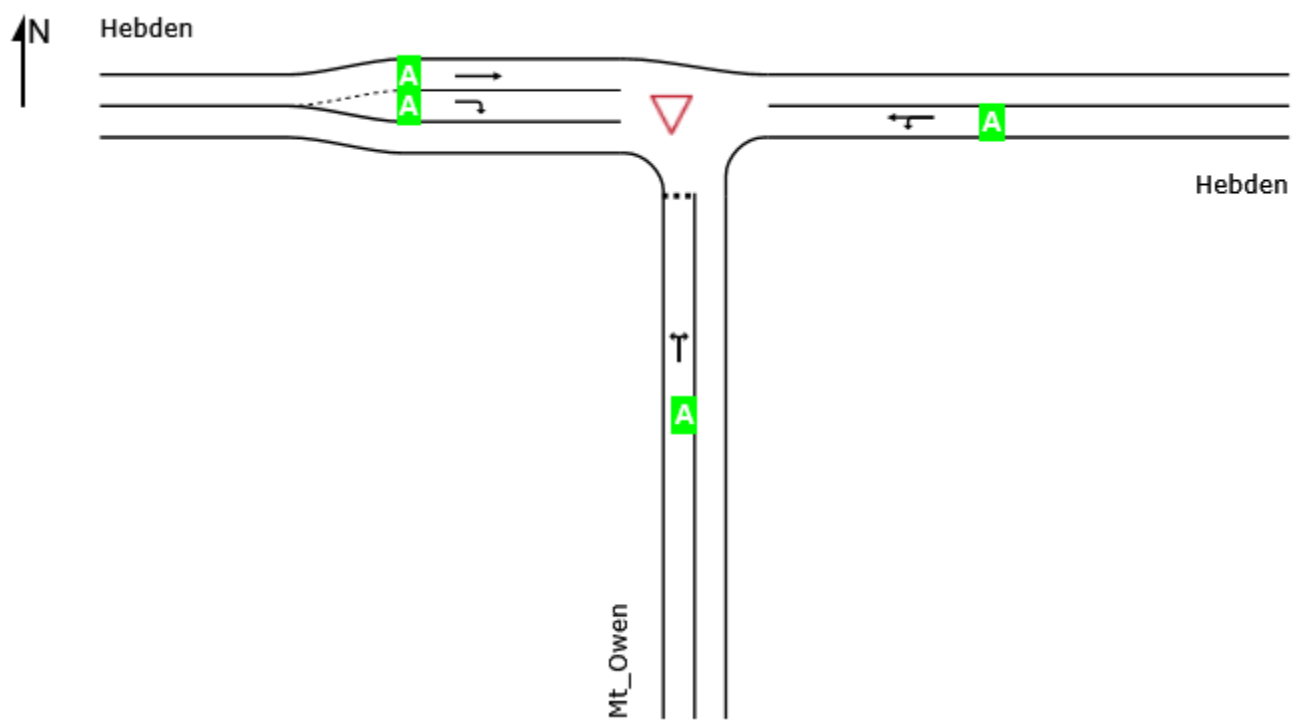


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix T Sidra Output Hebden Road /
Mount Owen Access Road 2033 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Mt_Owen													
Lane 1	3	33.3	1664	0.002	100	6.0	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	3	33.3		0.002		6.0	LOS A	0.0	0.1				
East: Hebden													
Lane 1	37	5.4	1799	0.021	100	6.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	37	5.4		0.021		6.1	NA	0.0	0.0				
West: Hebden													
Lane 1	12	33.3	1592	0.008	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	120	4.2	2282	0.053	100	6.8	LOS A	0.3	2.2	Short	100	0.0	NA
Approach	132	6.8		0.053		6.2	NA	0.3	2.2				
Intersection	172	7.0		0.053		6.1	NA	0.3	2.2				

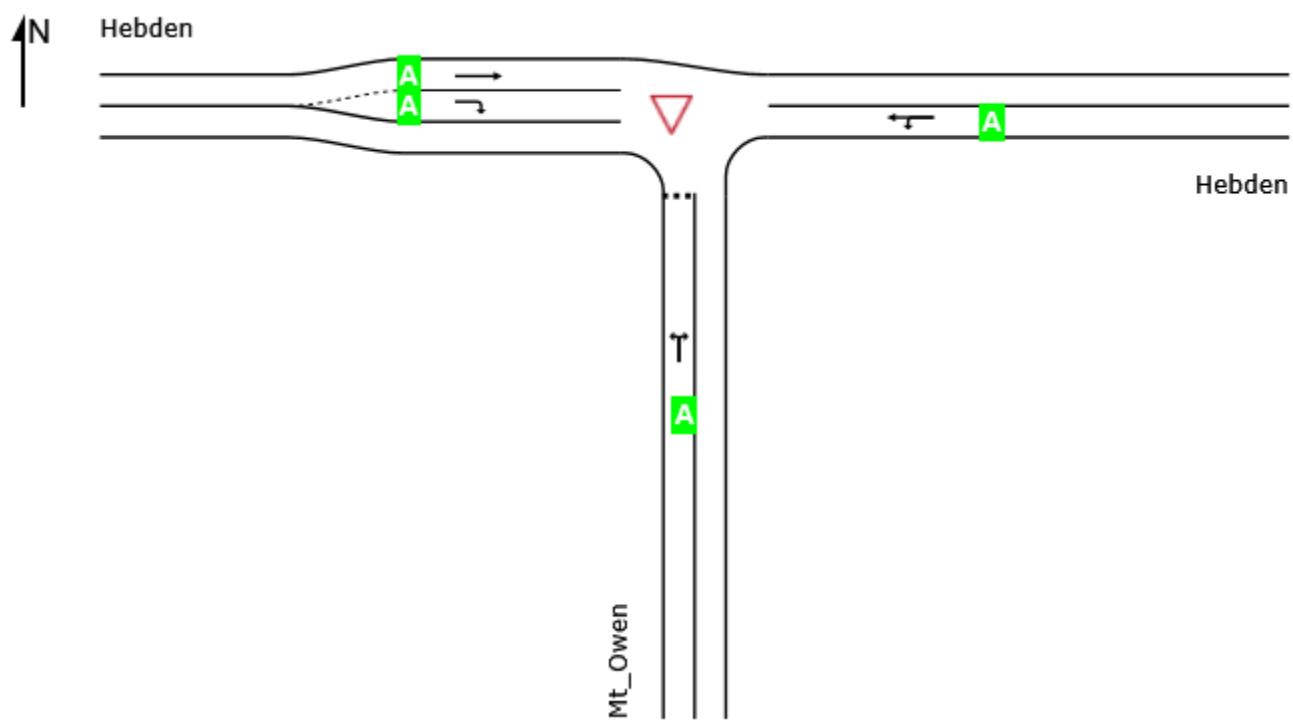


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix U Sidra Output Hebden Road /
Mount Owen Access Road 2033 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Mt_Owen													
Lane 1	70	1.4	1988	0.035	100	5.6	LOS A	0.2	1.1	Full	500	0.0	0.0
Approach	70	1.4		0.035		5.6	LOS A	0.2	1.1				
East: Hebden													
Lane 1	8	0.0	1868	0.004	100	6.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	8	0.0		0.004		6.1	NA	0.0	0.0				
West: Hebden													
Lane 1	46	13.0	1795	0.026	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	30	0.0	2385	0.013	100	6.6	LOS A	0.1	0.5	Short	100	0.0	NA
Approach	76	7.9		0.026		2.6	NA	0.1	0.5				
Intersection	154	4.5		0.035		4.1	NA	0.2	1.1				

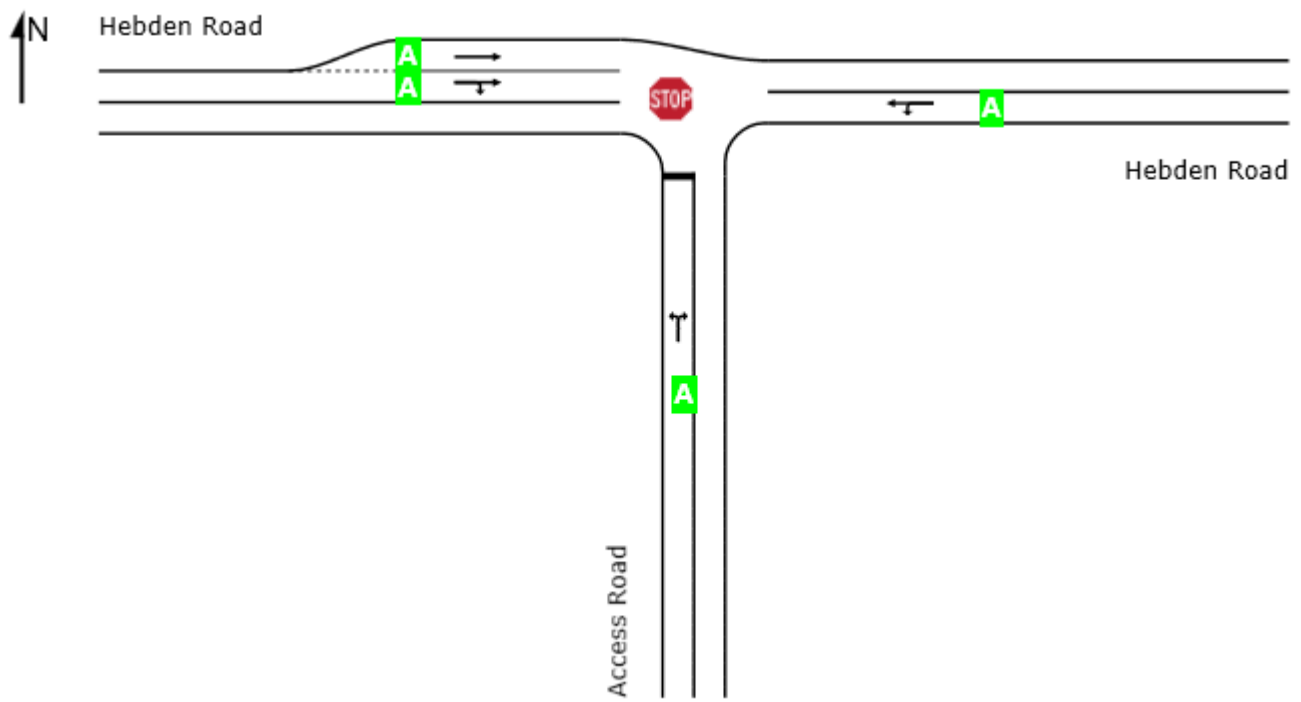


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix V Sidra Output Hebden Road /
Proposed Ancillary Pad North Access Road
2022 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Access Road													
Lane 1	2	0.0	1472	0.001	100	8.1	LOS A	0.0	0.0	Full	100	0.0	0.0
Approach	2	0.0		0.001		8.1	LOS A	0.0	0.0				
East: Hebden Road													
Lane 1	30	16.7	1757	0.017	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	30	16.7		0.017		0.2	NA	0.0	0.0				
West: Hebden Road													
Lane 1	212	8.5	1848	0.115	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	10	20.0	2122	0.005	100	5.8	LOS A	0.0	0.2	Short	60	0.0	NA
Approach	222	9.0		0.115		0.3	NA	0.0	0.2				
Intersection	254	9.8		0.115		0.3	NA	0.0	0.2				

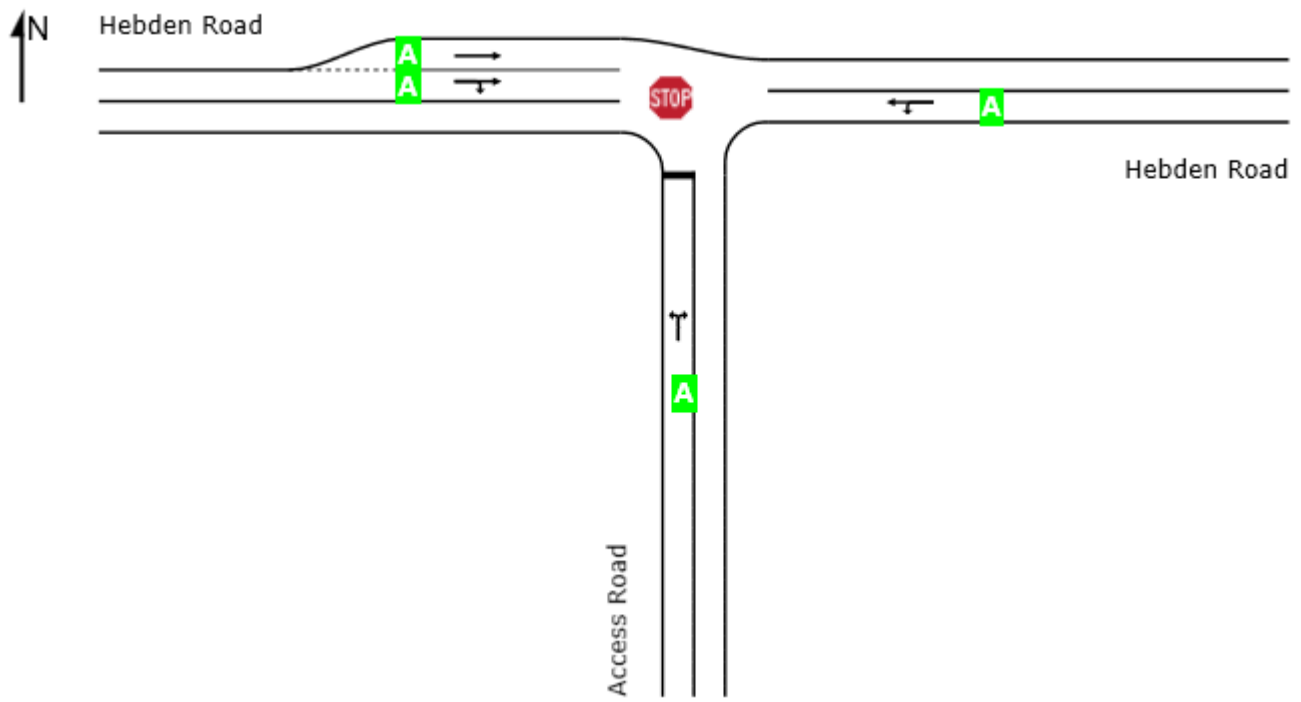


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix W Sidra Output Hebden Road / Proposed Ancillary Pad North Access Road 2022 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Ravensworth East Access													
Lane 1	11	18.2	1486	0.007	100	8.9	LOS A	0.0	0.3	Full	100	0.0	0.0
Approach	11	18.2		0.007		8.9	LOS A	0.0	0.3				
East: Hebden Road													
Lane 1	93	8.6	1846	0.050	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	93	8.6		0.050		0.1	NA	0.0	0.0				
West: Hebden Road													
Lane 1	37	0.0	1950	0.019	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1	0.0	2223	0.000	100	5.6	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	38	0.0		0.019		0.1	NA	0.0	0.0				
Intersection	142	7.0		0.050		0.8	NA	0.0	0.3				

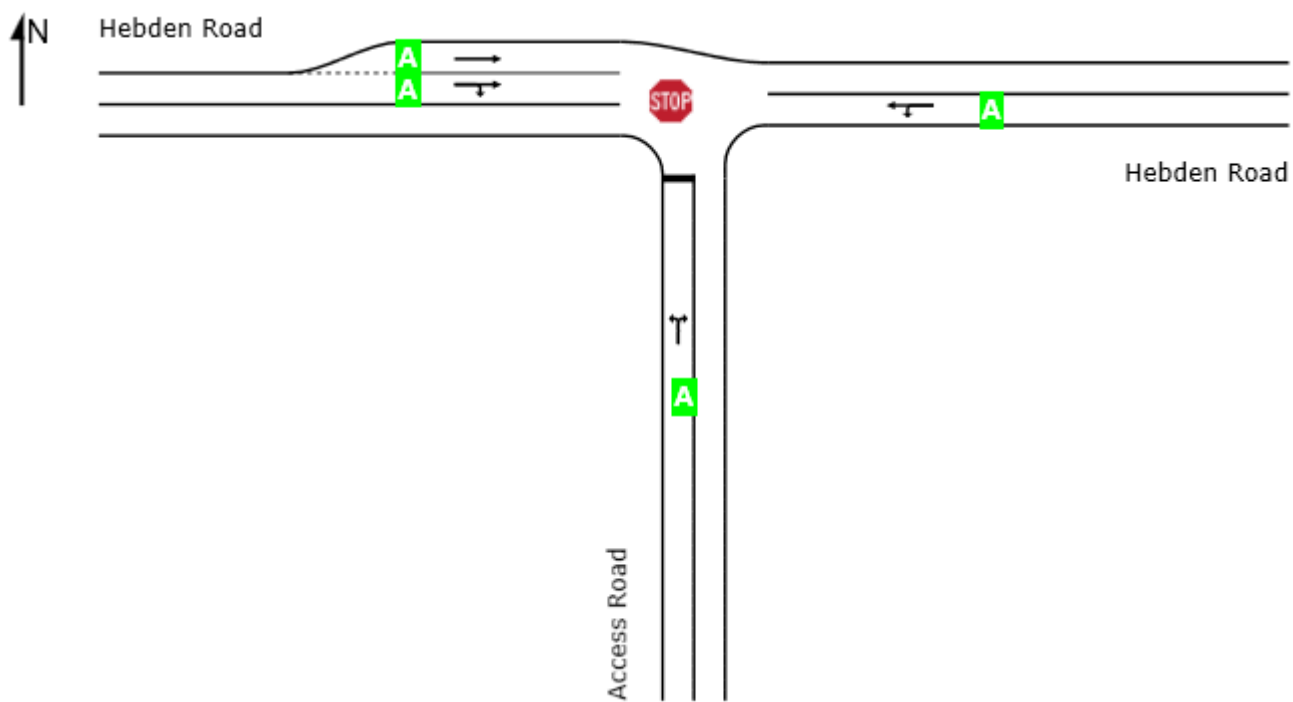


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix X Sidra Output Hebden Road /
Proposed Ancillary Pad North Access Road
2033 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Ravensworth East Access													
Lane 1	2	0.0	1439	0.001	100	8.2	LOS A	0.0	0.0	Full	100	0.0	0.0
Approach	2	0.0		0.001		8.2	LOS A	0.0	0.0				
East: Hebden Road													
Lane 1	29	13.8	1787	0.016	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	29	13.8		0.016		0.2	NA	0.0	0.0				
West: Hebden Road													
Lane 1	258	7.4	1861	0.139	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	10	20.0	2125	0.005	100	5.8	LOS A	0.0	0.2	Short	60	0.0	NA
Approach	268	7.8		0.139		0.2	NA	0.0	0.2				
Intersection	299	8.4		0.139		0.3	NA	0.0	0.2				

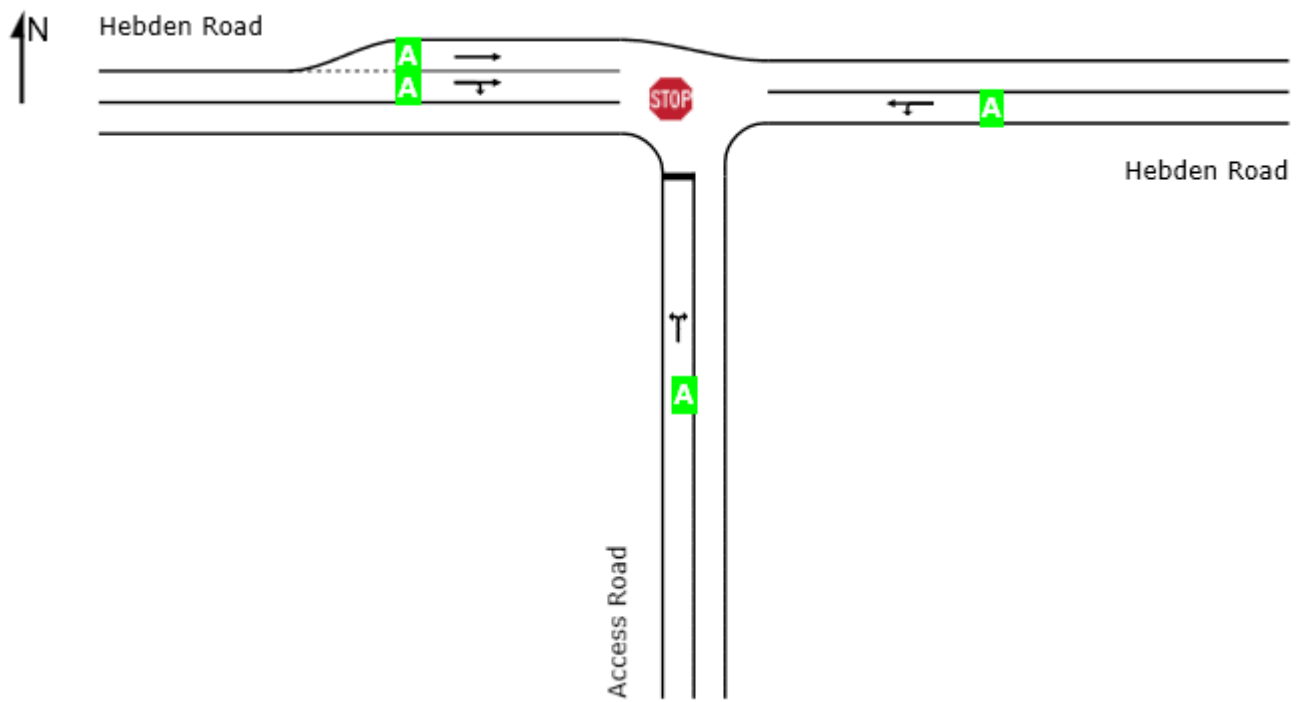


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix Y Sidra Output Hebden Road / Proposed Ancillary Pad North Access Road 2033 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Ravensworth East Access													
Lane 1	11	18.2	1610	0.007	100	8.6	LOS A	0.0	0.2	Full	100	0.0	0.0
Approach	11	18.2		0.007		8.6	LOS A	0.0	0.2				
East: Hebden Road													
Lane 1	149	2.7	1823	0.082	100	5.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	149	2.7		0.082		5.5	NA	0.0	0.0				
West: Hebden Road													
Lane 1	70	1.4	1932	0.036	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1	0.0	2126	0.000	100	5.7	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	71	1.4		0.036		0.1	NA	0.0	0.0				
Intersection	231	3.0		0.082		4.0	NA	0.0	0.2				

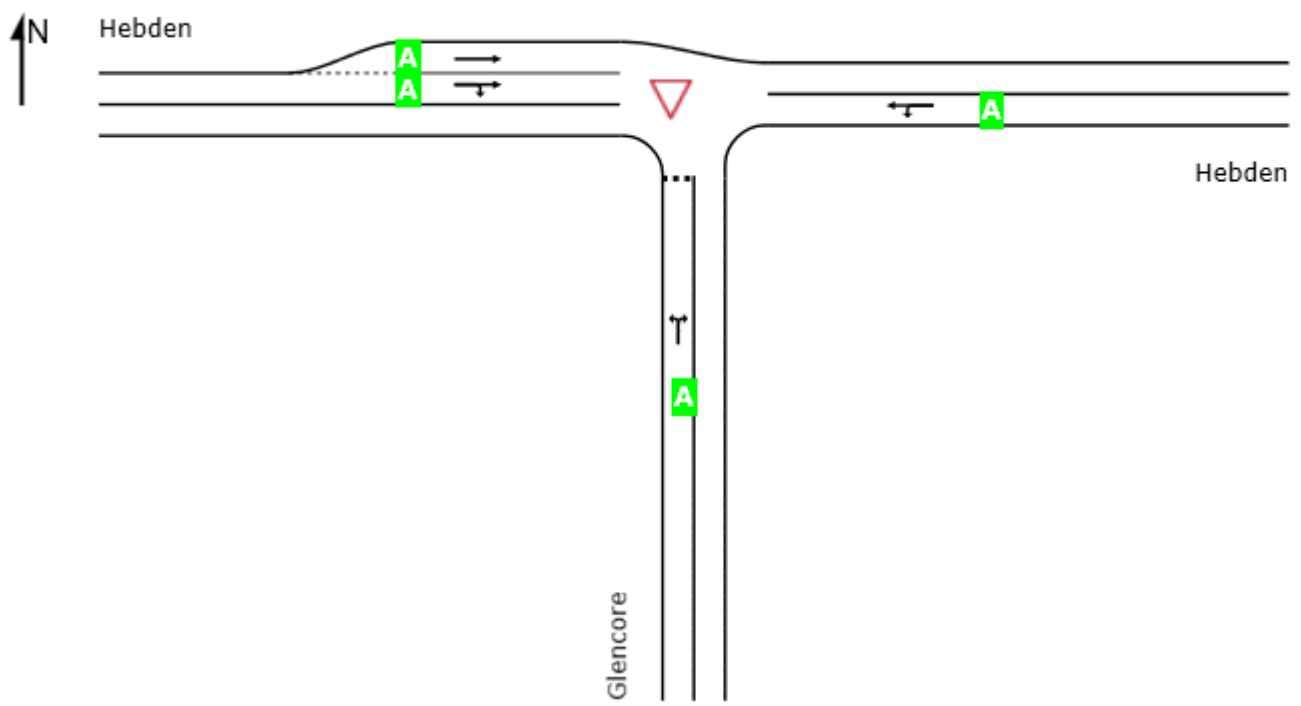


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix Z Sidra Output Hebden Road /
Proposed Ancillary Pad South Access Road
2022 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Glencore													
Lane 1	2	0.0	1731	0.001	100	5.8	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2	0.0		0.001		5.8	LOS A	0.0	0.0				
East: Hebden													
Lane 1	30	16.7	1757	0.017	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	30	16.7		0.017		0.2	NA	0.0	0.0				
West: Hebden													
Lane 1	222	9.0	1842	0.121	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	10	20.0	2122	0.005	100	7.1	LOS A	0.0	0.2	Short	60	0.0	NA
Approach	232	9.5		0.121		0.3	NA	0.0	0.2				
Intersection	264	10.2		0.121		0.3	NA	0.0	0.2				

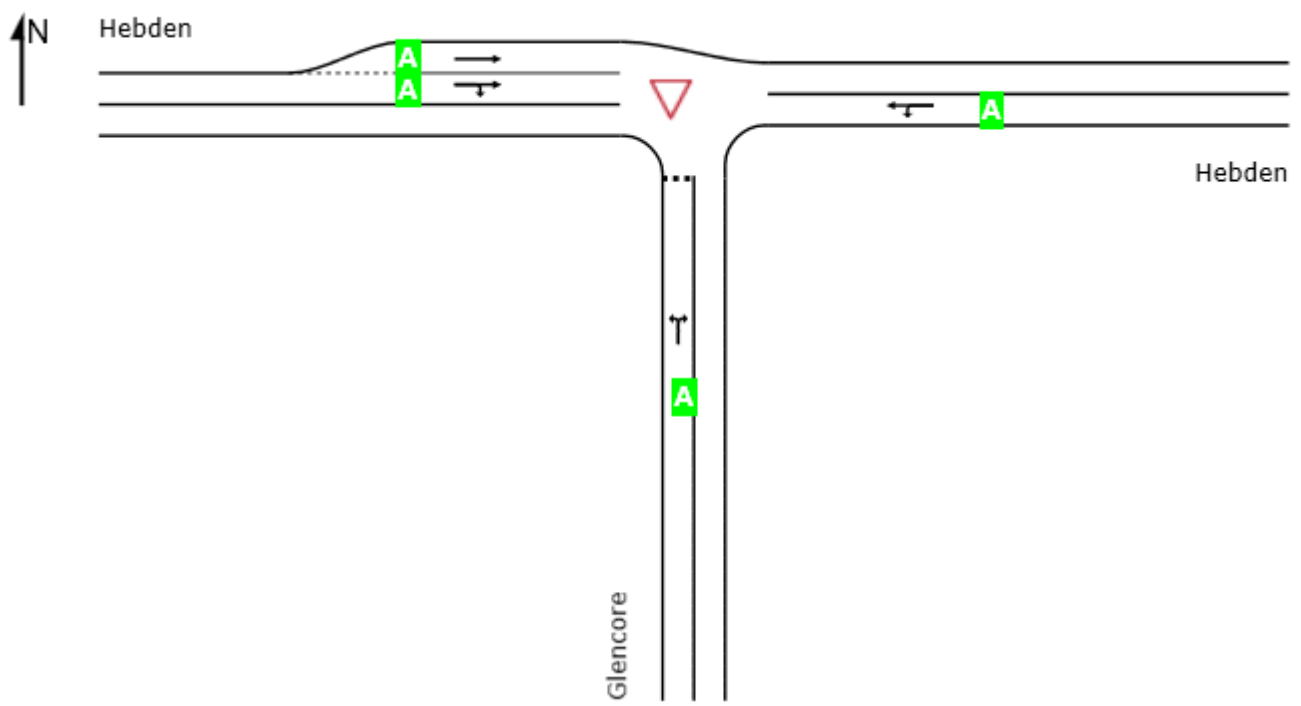


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix AASidra Output Hebden Road /
Proposed Ancillary Pad South Access Road
2022 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Glendell													
Lane 1	11	18.2	1747	0.006	100	6.0	LOS A	0.0	0.2	Full	500	0.0	0.0
Approach	11	18.2		0.006		6.0	LOS A	0.0	0.2				
East: Hebden													
Lane 1	103	9.7	1833	0.056	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	103	9.7		0.056		0.1	NA	0.0	0.0				
West: Hebden													
Lane 1	37	0.0	1950	0.019	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1	0.0	2203	0.000	100	6.8	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	38	0.0		0.019		0.2	NA	0.0	0.0				
Intersection	152	7.9		0.056		0.5	NA	0.0	0.2				

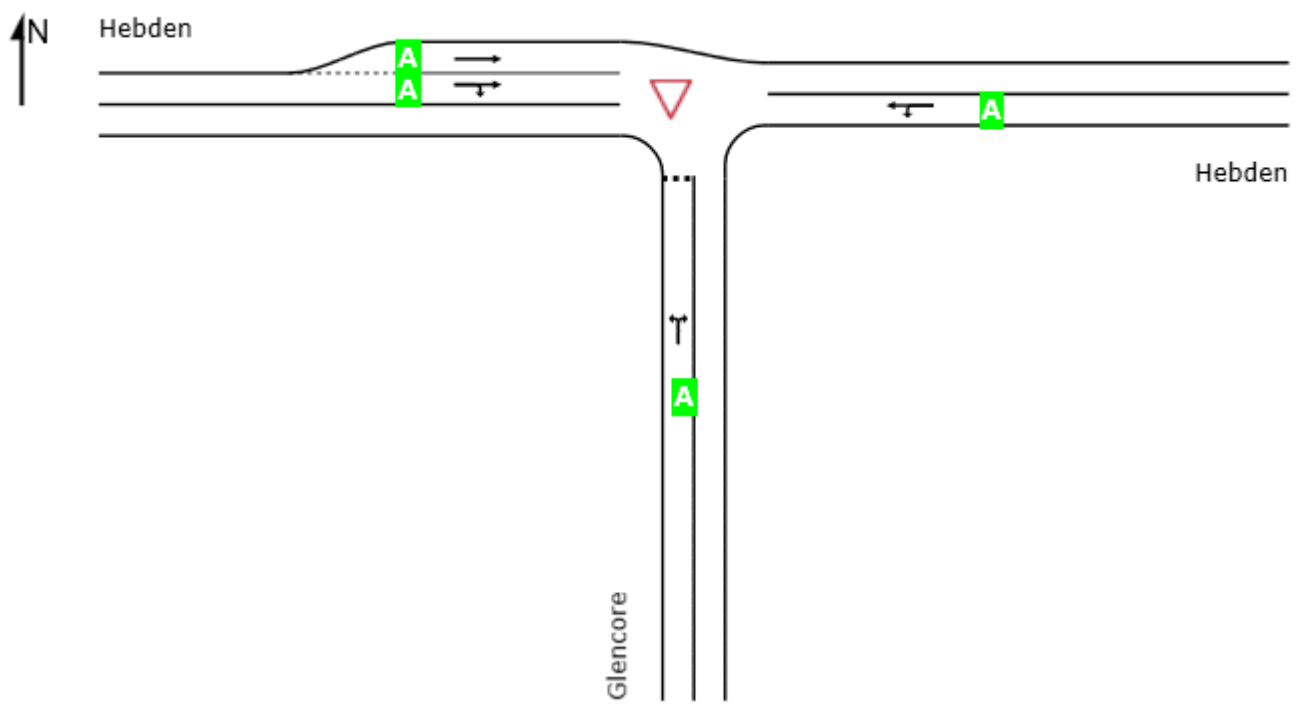


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix BB Sidra Output Hebden Road /
Proposed Ancillary Pad South Access Road
2033 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Glencore													
Lane 1	2	0.0	1698	0.001	100	5.8	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2	0.0		0.001		5.8	LOS A	0.0	0.0				
East: Hebden													
Lane 1	29	13.8	1787	0.016	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	29	13.8		0.016		0.2	NA	0.0	0.0				
West: Hebden													
Lane 1	268	7.8	1855	0.144	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	10	20.0	2125	0.005	100	7.1	LOS A	0.0	0.2	Short	60	0.0	NA
Approach	278	8.3		0.144		0.3	NA	0.0	0.2				
Intersection	309	8.7		0.144		0.3	NA	0.0	0.2				

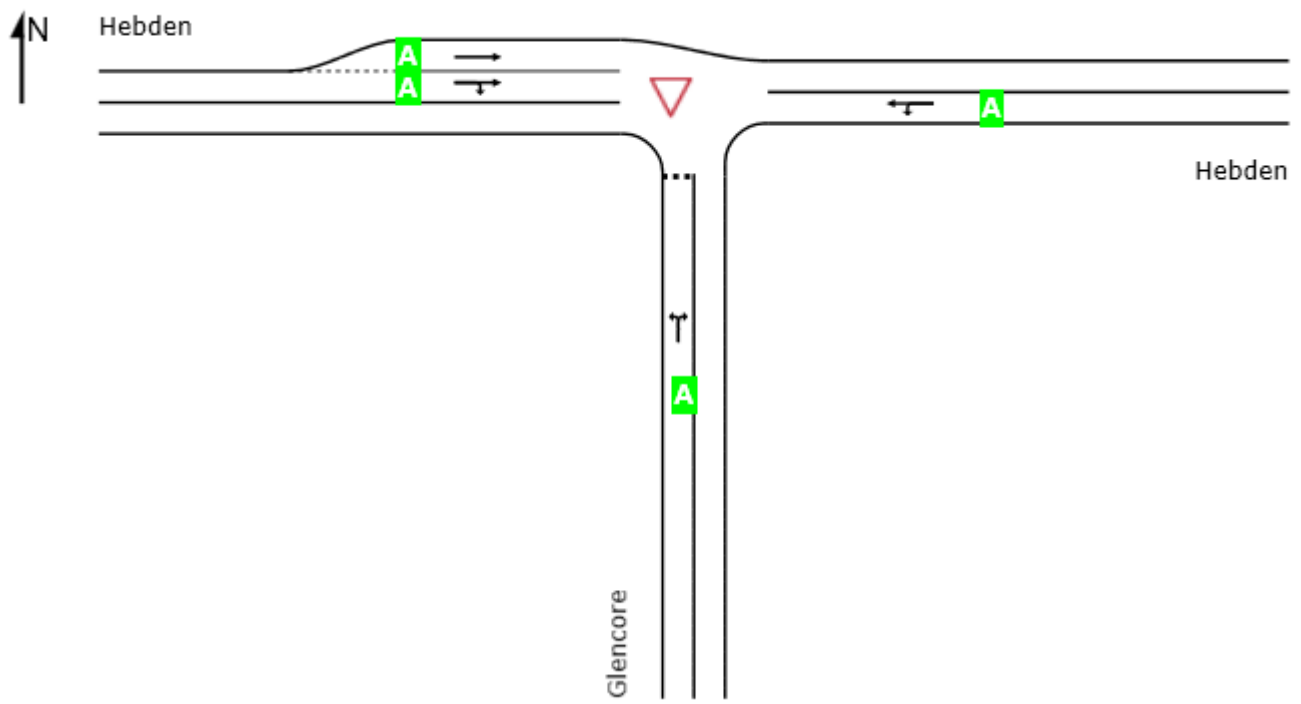


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix CC Sidra Output Hebden Road /
Proposed Ancillary Pad South Access Road
2033 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Glencore													
Lane 1	11	18.2	1663	0.007	100	6.2	LOS A	0.0	0.2	Full	500	0.0	0.0
Approach	11	18.2		0.007		6.2	LOS A	0.0	0.2				
East: Hebden													
Lane 1	159	3.8	1903	0.084	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	159	3.8		0.084		0.1	NA	0.0	0.0				
West: Hebden													
Lane 1	70	1.4	1932	0.036	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1	0.0	2106	0.000	100	6.9	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	71	1.4		0.036		0.1	NA	0.0	0.0				
Intersection	241	3.7		0.084		0.3	NA	0.0	0.2				

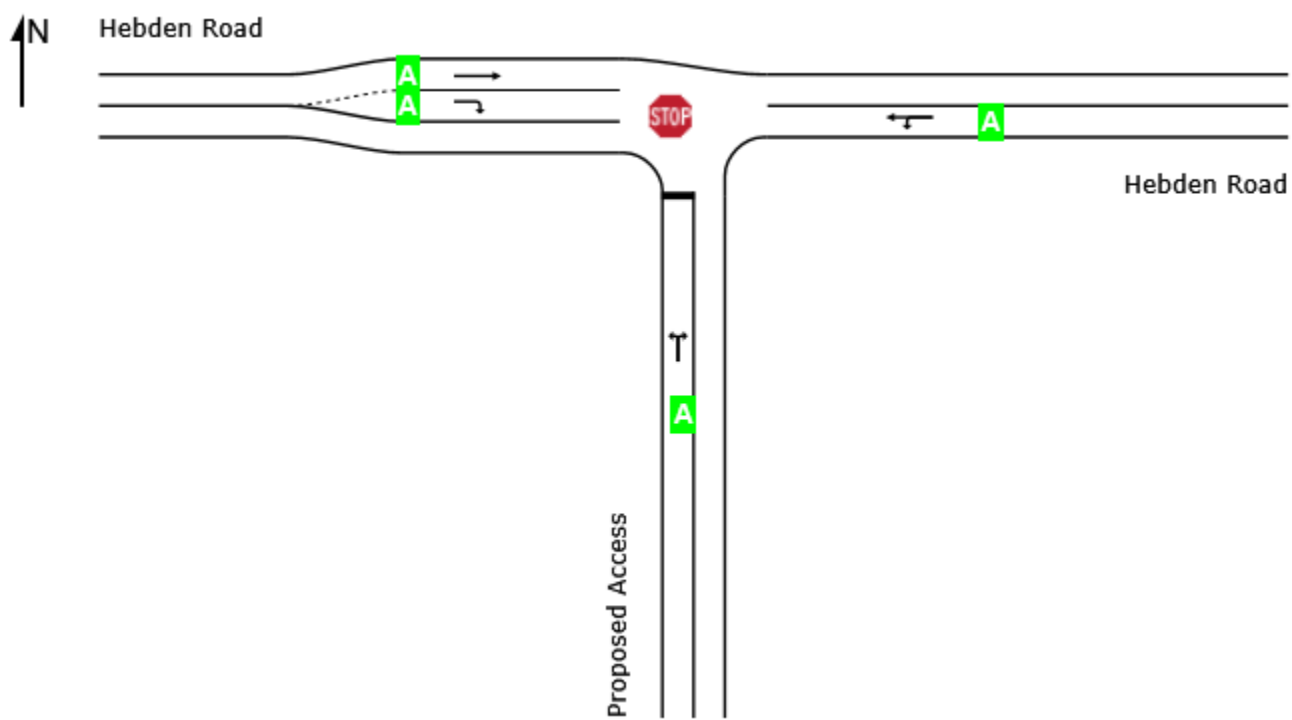


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix DD Sidra Output Hebden Road /
Proposed Glendell Access Road 2022 AM
Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Proposed Access													
Lane 1	25	20.0	1613	0.015	100	8.9	LOS A	0.1	0.6	Full	225	0.0	0.0
Approach	25	20.0		0.015		8.9	LOS A	0.1	0.6				
East: Hebden Road													
Lane 1	2	0.0	1902	0.001	100	2.8	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2	0.0		0.001		2.8	NA	0.0	0.0				
West: Hebden Road													
Lane 1	129	6.2	1873	0.069	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	83	12.0	1695	0.049	100	5.6	LOS A	0.2	1.8	Short	60	0.0	NA
Approach	212	8.5		0.069		2.2	NA	0.2	1.8				
Intersection	239	9.6		0.069		2.9	NA	0.2	1.8				

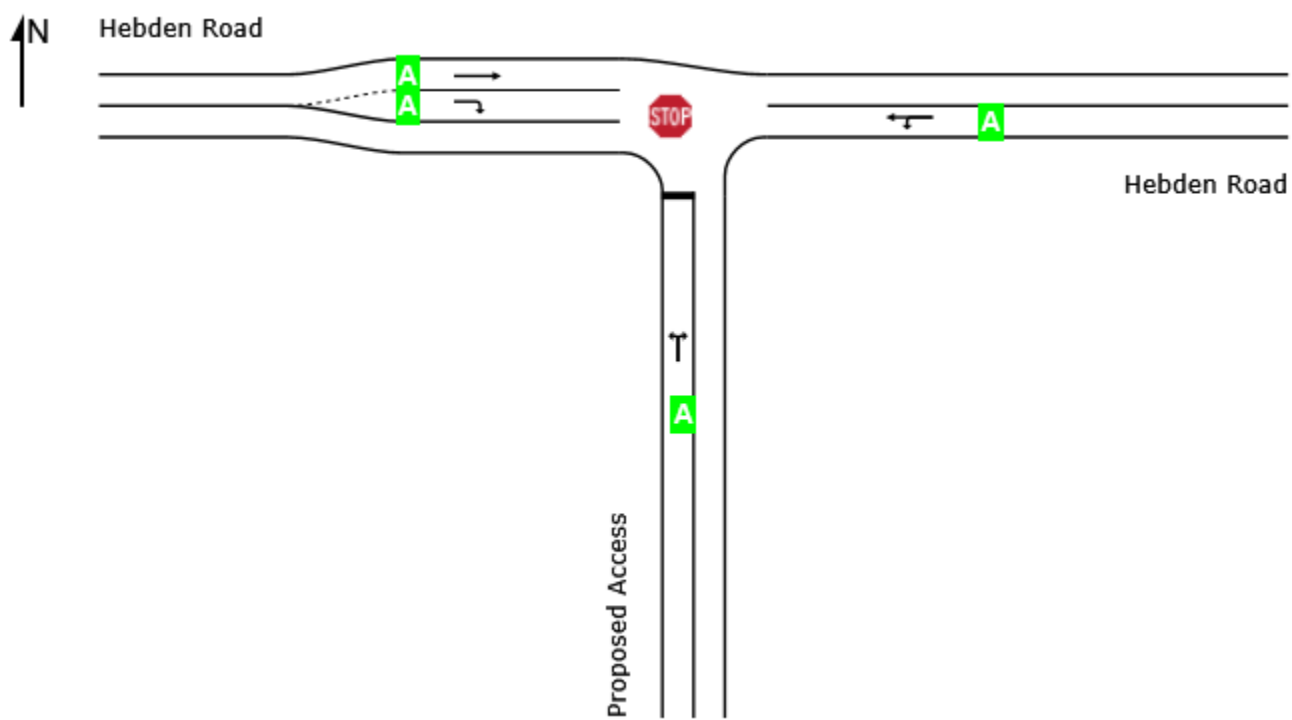


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix EE Sidra Output Hebden Road / Proposed Glendell Access Road 2022 PM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Proposed Access													
Lane 1	51	21.6	1476	0.035	100	9.0	LOS A	0.1	1.2	Full	225	0.0	0.0
Approach	51	21.6		0.035		9.0	LOS A	0.1	1.2				
East: Hebden Road													
Lane 1	55	0.0	1948	0.028	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	55	0.0		0.028		0.1	NA	0.0	0.0				
West: Hebden Road													
Lane 1	36	0.0	1950	0.018	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	2	0.0	1718	0.001	100	5.6	LOS A	0.0	0.0	Short	60	0.0	NA
Approach	38	0.0		0.018		0.3	NA	0.0	0.0				
Intersection	144	7.6		0.035		3.3	NA	0.1	1.2				

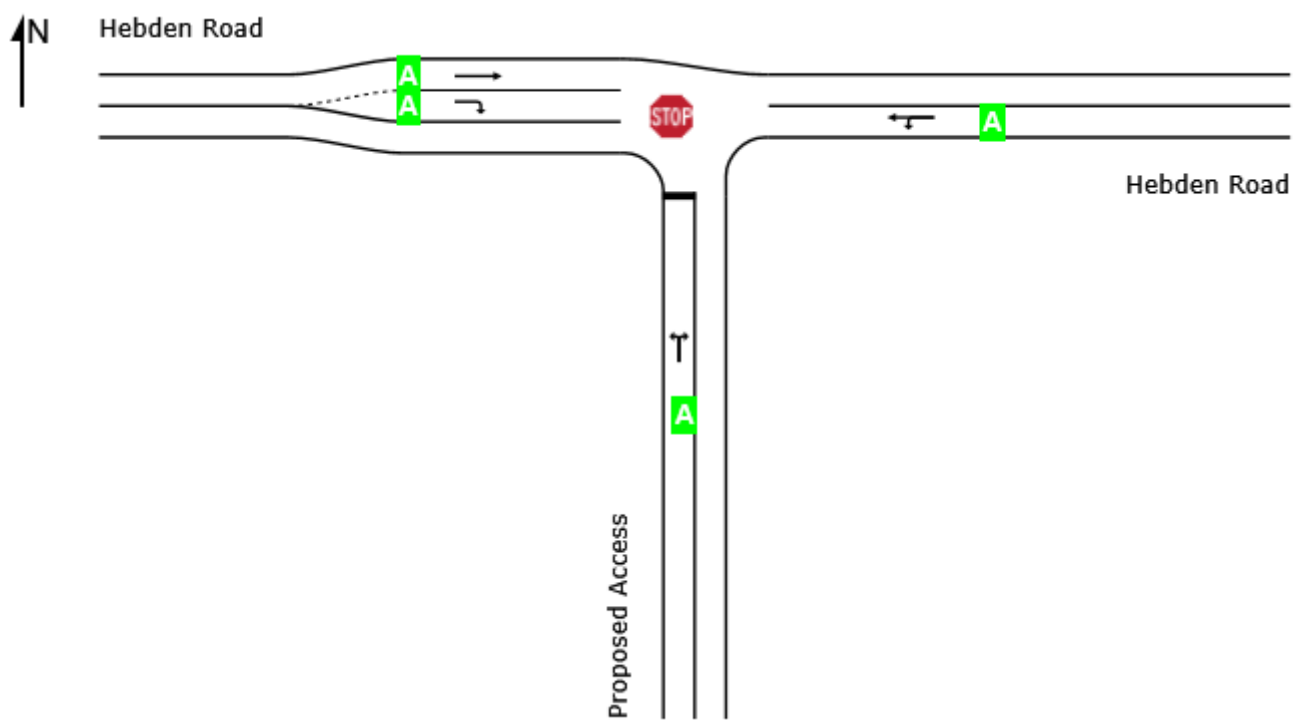


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix FF Sidra Output Hebden Road / Proposed Glendell Access Road 2033 AM Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Proposed Access													
Lane 1	23	17.4	1620	0.014	100	8.8	LOS A	0.1	0.5	Full	225	0.0	0.0
Approach	23	17.4		0.014		8.8	LOS A	0.1	0.5				
East: Hebden Road													
Lane 1	7	0.0	1936	0.004	100	0.8	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	7	0.0		0.004		0.8	NA	0.0	0.0				
West: Hebden Road													
Lane 1	132	6.8	1864	0.071	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	126	7.9	1721	0.073	100	5.6	LOS A	0.3	2.6	Short	60	0.0	NA
Approach	258	7.4		0.073		2.7	NA	0.3	2.6				
Intersection	288	8.0		0.073		3.2	NA	0.3	2.6				

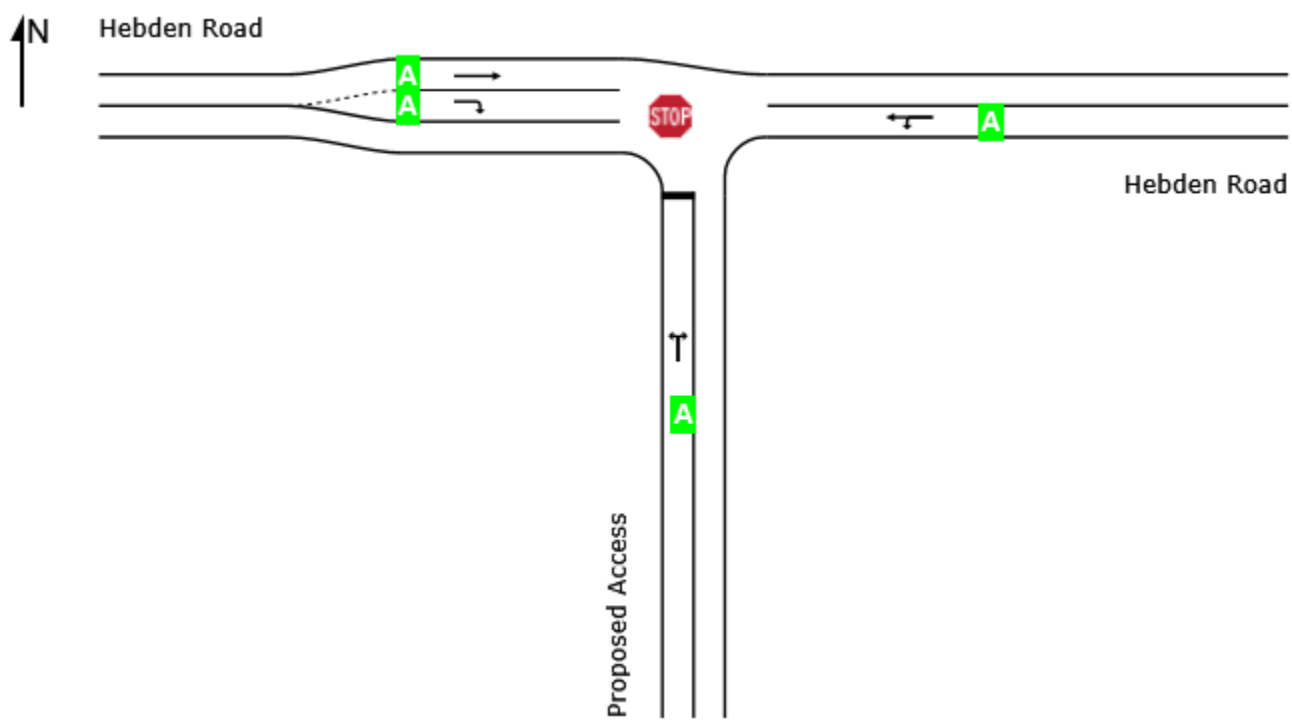


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix GG Sidra Output Hebden Road /
Proposed Glendell Access Road 2033 PM
Peak

UMWELT (AUSTRALIA) PTY LTD

Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%						veh/h	v/c				
South: Proposed Access													
Lane 1	104	3.8	1653	0.063	100	8.3	LOS A	0.3	2.1	Full	225	0.0	0.0
Approach	104	3.8		0.063		8.3	LOS A	0.3	2.1				
East: Hebden Road													
Lane 1	55	0.0	1948	0.028	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	55	0.0		0.028		0.1	NA	0.0	0.0				
West: Hebden Road													
Lane 1	47	0.0	1931	0.024	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	23	4.3	1680	0.014	100	5.6	LOS A	0.1	0.4	Short	60	0.0	NA
Approach	70	1.4		0.024		1.9	NA	0.1	0.4				
Intersection	229	2.2		0.063		4.4	NA	0.3	2.1				

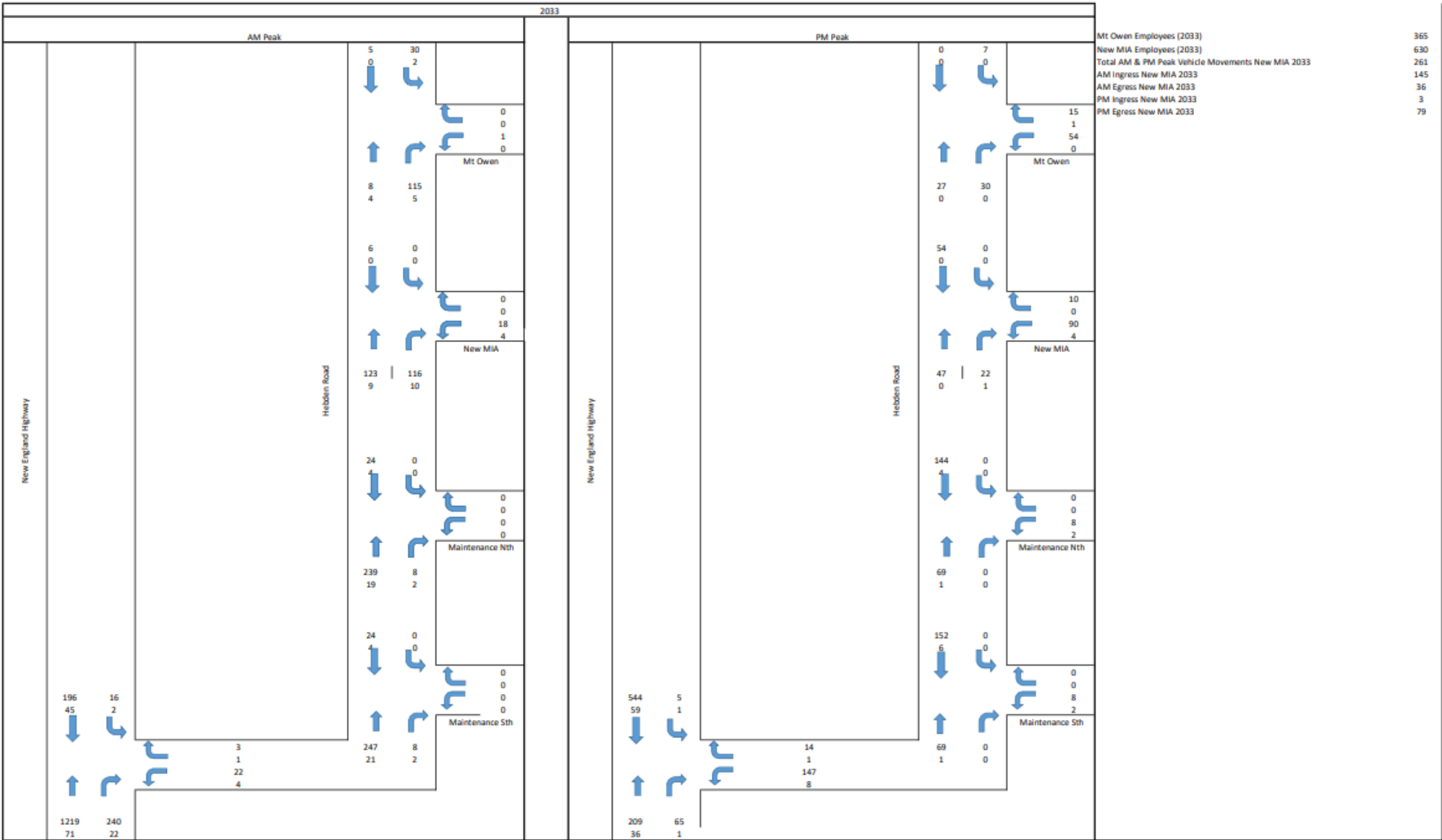
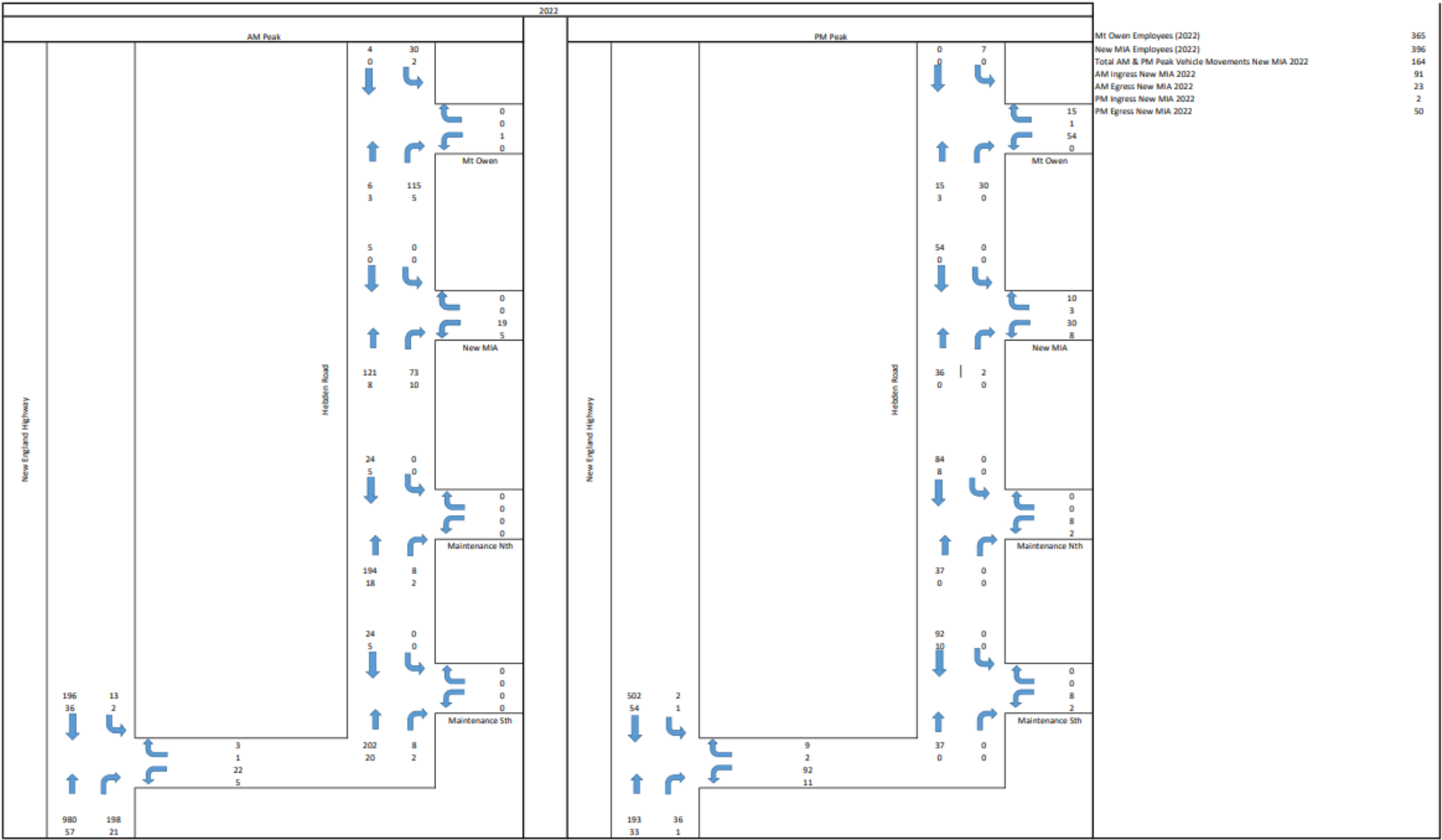


TRAFFIC AND TRANSPORT IMPACT ASSESSMENT FOR GLENDELL
CONTINUED OPERATIONS PROJECT

Appendix HH Calculations

UMWELT (AUSTRALIA) PTY LTD

2018										Calculations	
AM Peak					PM Peak						
New England Highway						Mt Owen Employees (2018)		365			
						Total AM & PM Peak Vehicle Movements Mt Owen		252			
						AM & PM Vehicle Movements / person Mt Owen		0.690411			
						AM Ingress 2018		58%			
						AM Egress 2018		0%			
						PM Ingress 2018		15%			
						PM Egress 2018		27%			
						Glendell Employees (2018)		236			
						Total AM & PM Peak Vehicle Movements Glendell		98			
						AM & PM Vehicle Movements / person Glendell		0.413559			
AM Ingress Glendell 2018		55%									
AM Egress Glendell 2018		14%									
PM Ingress Glendell 2018		1%									
PM Egress Glendell 2018		30%									
Ravensworth East Employees (2018)		101									
Total AM & PM Peak Vehicle Movements Ravensworth East		42									
AM & PM Vehicle Movements / person Ravensworth East		0.419802									
AM Ingress 2018		54%									
AM Egress 2018		13%									
PM Ingress 2018		2%									
PM Egress 2018		30%									
2022											
AM Peak					PM Peak						
New England Highway						Mt Owen Employees (2022)		365			
						Glendell Employees (2022)		236			
						Total AM & PM Peak Vehicle Movements Glendell 2022		98			
						AM Ingress Glendell 2022		55			
						AM Egress Glendell 2022		14			
						PM Ingress Glendell 2022		2			
						PM Egress Glendell 2022		30			
						Ravensworth East Employees (2022)		101			
						Total AM & PM Peak Vehicle Movements Glendell		43			
						AM Ingress 2022		24			
AM Egress 2022		6									
PM Ingress 2022		2									
PM Egress 2022		13									
% Vehicles Turning Left onto New England Hwy am		91%									
% Vehicles Turning Right onto New England Hwy am		9%									
% Vehicles Turning Left onto New England Hwy pm		95%									
% Vehicles Turning Right onto New England Hwy pm		5%									
% Vehicles Turning Left onto Hebdon Road am		6%									
% Vehicles Turning Right onto Hebdon Road am		94%									
% Vehicles Turning Left onto Hebdon Road pm		4%									
% Vehicles Turning Right onto Hebdon Road pm		96%									
MIA Construction										150	
HV Road North										20	
Hebdon Road										40	
Yorks Creek West										30	
HV Road Central										20	
Homestead Relocation Route										20	
HV Road South											
Glendell Demolition										7	
Rav. East Demolition										0	
Homestead Relocation										23	
Yorks Creek East										1	
Glencore Personnel										23	
Assumed that construction workers will each generate 1 am and 1 pm vehicles movement a day											
20% of these movements will be HV											



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