

6.2 Traffic and transport

This section provides a summary of the assessment of potential traffic and transport impacts during construction and operation of the proposal and identifies mitigation measures to address these impacts. A detailed assessment of traffic and transport impacts is presented in the technical working paper – traffic and transport (Appendix E).

6.2.1 Methodology

The traffic and transport assessment involved the following:

- A review of existing conditions within the proposal area including the road network, road performance, intersection layouts, road safety concerns, public transport amenity, pedestrian and cyclist facilities and residential access
- A review of the traffic model of future conditions within the proposal area without the Great Western Highway being upgraded between Little Hartley and Lithgow
- A review of the traffic model of future conditions within the proposal area with the Great Western Highway being upgraded between Little Hartley and Lithgow
- Assessment of the likely impacts of construction traffic and works during the construction of the proposal and the impacts on the local community and residential access
- A review of the road safety objectives and the necessary mitigation measures and strategies to improve road safety and to reduce or minimise impacts.

Traffic modelling

The following three stage approach was used to complete traffic modelling of future year scenarios with and without the proposal:

- AIMSUN (version 8.2.3) was used for operational traffic modelling. The AIMSUN modelling predicted travel times with and without upgrades to the Great Western Highway. Modelling was carried out for future years 2026 and 2036
- SIDRA Network (version 9) was used to analyse the intersection performance (delay and level of service) of key intersections on the Great Western Highway between Little Hartley and Lithgow. SIDRA modelling was undertaken for future years 2026 and 2036 for the AM peak hour (8.15am to 9.15am) and PM peak hour (3.45pm to 4.45pm). A sensitivity growth scenario of two per cent per annum was used in the assessment of intersection performance. The 2021 intersection turning volumes collected in March 2021 were grown by 0.4 per cent per annum for light vehicles and 1.3 per cent per annum for heavy vehicles to estimate the 2026 and 2036 peak hour traffic volumes
- Austroads Guide and Highway Capacity Manual were used to analyse the Great Western Highway's midblock road performance (level of service) between Little Hartley and Lithgow. Midblock level of service analysis was undertaken for future years 2026 and 2036 for the AM peak hour (8.15am to 9.15am) and PM peak hour (3.45pm to 4.45pm). The 2021 traffic volumes collected in March 2021 were grown by 0.4 per cent per annum for light vehicles and 1.3 per cent per annum for heavy vehicles to estimate the 2026 and 2036 peak hour traffic volumes.

The main performance indicators for intersection are delays (measured in seconds) and level of service. Level of service provides a grading for the performance of the intersection from A to F with A meaning that intersection performance is considered to be operating well and F meaning intersection performance is unsatisfactory with excessive queuing. Similarly, for midblock performance an A grading would indicate that motorists are experiencing high operating speeds and free flowing conditions. An F grade would indicate that motorists are experiencing heavy congestion and unstable flows.

Further details on the approach to traffic modelling, intersection and midblock level of service criteria and key modelling assumptions are provided in Section 3 of the technical working paper – Traffic and transport provided in Appendix E.

6.2.2 Existing environment

Existing road network

The Great Western Highway is the major arterial road through the proposal area, carrying local, intra-regional and inter-regional travel. The general alignment of the Great Western Highway between Little Hartley and Lithgow is mostly a two-way undivided carriageway with one lane in each direction. There are limited overtaking lanes. Speed limit along this section of Great Western Highway is generally 80 kilometres per hour with speeds reduced to 40 kilometres per hour for trucks and buses in some locations.

Local roads connection with the Great Western Highway between Little Hartley and Lithgow include:

- Coxs River Road
- Ambermere Drive
- Baaners Lane
- Browns Gap Road
- Mid Hartley Road
- Carroll Drive
- Old Great Western Highway
- Kelly Street
- Jenolan Caves Road
- Blackmans Creek Road
- Forty Bends Road
- Daintree Close
- McKanes Fall Road
- Old Bathurst Road
- Mudgee Street.

These roads are generally two-way undivided roads with one lane in each direction that provides access to local residential properties. The post speed limits range between 40 and 80 kilometers per hour.

Currently, there are 14 sign-controlled intersections with the Great Western Highway between Little Hartley and Lithgow:

- Coxs River Road / Ambermere Drive
- Baaners Lane
- Browns Gap Road (I-3)
- Mid Hartley Road
- Carroll Drive
- Kelly Street
- Old Great Western Highway
- Jenolan Caves Road / Blackmans Creek Road
- Forty Bends Road
- Daintree Close
- McKanes Falls Road
- Old Bathurst Road
- Mudgee Street
- Quarry Place

The 2016 journey to work data shows the importance of cars for residents' mode of travel to their work in both Lithgow and the Lithgow Region with cars accounting for around 90 per cent of commuter trips.

Public transport

There are currently no regular public bus services (including the local Lithgow Buslines services) that connect Mount Victoria and Lithgow. Consequently, residents rely on private vehicles for business or leisure travel within the proposal area.

Lithgow Buslines operates school bus which utilise the Great Western Highway between Mount Victoria and Lithgow. Some of these operate as express services between Mount Victoria and Lithgow, while others pick up and set down along the highway and on side roads.

Greyhound coaches and tour buses travel along Great Western Highway however there are no regular stops within the proposal area.

Active transport

Active transport movements along and across the Great Western Highway in the proposal area are restricted by a lack of dedicated bicycle or pedestrian paths. There is currently an on-road cycleway on the Great Western Highway between McKanes Falls Road and Lithgow. However, narrow shoulder lanes restrict the use of the highway for cyclists.

Freight and heavy vehicles

The Great Western Highway is currently restricted to general access vehicles only which includes 19 metre long B-double heavy vehicles. Traffic volume data, recorded on the Great Western Highway between Little Hartley and Lithgow, shows that between 1,900 and 2,400 heavy vehicles travelled along the road corridor on an average weekday in 2021, which equates to a respective 18 to 22 per cent of total traffic during the 24-hour period.

Traffic crash history

A summary of traffic crash history is provided in Section 2.2.

Traffic volumes

A summary of daily traffic volumes at six locations on the Great Western Highway between Little Hartley and Lithgow is provided in Table 6-13.

Table 6-13 Average weekday traffic volumes on the Great Western Highway between Little Hartley and Lithgow (2021)

Location on Great Western Highway	Average weekday daily traffic		Average weekend daily traffic	
	Total vehicles	Heavy vehicle per cent to total vehicle	Total vehicles	Heavy vehicle per cent to total vehicle
East of Coxs River Road	11,840	19 per cent	12,060	7 per cent
West of Coxs River Road	12,140	19 per cent	12,430	8 per cent
East of Carroll Drive	11,060	22 per cent	11,400	11 per cent
East of Jenolan Caves Road	10,530	20 per cent	11,460	8 per cent
East of Daintree Close	10,390	19 per cent	11,560	8 per cent
South of Quarry Place	10,640	18 per cent	11,750	7 per cent

Weekday AM and PM peak hour directional and total traffic volumes on the Great Western Highway in the proposal area are shown in Table 6-14.

During the weekday AM peak hour, the Great Western Highway carried marginally higher traffic volumes in the westbound direction towards Lithgow. Specifically, traffic volumes peaked at 454 vehicles per hour in the westbound direction, and 444 vehicles per hour in the eastbound direction towards Little Hartley.

By comparison, traffic volumes were higher in the PM peak, with a maximum flow of 678 vehicles per hour in the westbound direction towards Lithgow, and 599 vehicles per hour in the eastbound direction towards Little Hartley. In general, PM peak hour traffic volumes were between 45 per cent and 49 per cent higher than the corresponding AM peak hour volumes.

Table 6-14 AM and PM peak hour traffic volumes on the Great Western Highway between Little Hartley to Lithgow in 2021

Location on Great Western Highway	AM peak one hour (vehicles/hr)			PM peak one hour (vehicles/hr)		
	West	East	Two-way	West	East	Two-way
East of Coxs River Road	429	444	873	678	588	1266
West of Coxs River Road	454	411	865	658	599	1257
East of Carroll Drive	387	357	744	571	534	1105
East of Jenolan Caves Road	355	353	708	544	514	1058
East of Daintree Close	350	348	698	537	507	1044
South of Quarry Place	378	365	743	559	536	1095

Sunday peak hour traffic volumes on Great Western Highway are shown in Table 6-15. During the Sunday peak hour, the Great Western Highway carried substantial higher traffic volumes than the weekday AM and PM peak, with a maximum flow of 850 vehicles per hour in the westbound direction towards Lithgow, and 793 vehicles per hour in the eastbound direction towards Little Hartley. In general, Sunday peak hour traffic volumes were around 36 per cent higher than the corresponding weekday PM peak hour volumes.

Table 6-15 Sunday peak hour traffic volumes on the Great Western Highway, Little Hartley to Lithgow in 2021

Location on Great Western Highway	Sunday peak one hour (vehicles/hr)		
	West	East	Two-way
East of Coxs River Road	837	766	1,603
West of Coxs River Road	850	771	1,621
East of Carroll Drive	739	780	1,519
East of Jenolan Caves Road	733	780	1,513
East of Daintree Close	739	787	1526
South of Quarry Place	754	793	1,547

The forecast weekday daily traffic volumes on the Great Western Highway between Little Hartley and Lithgow for the 2026 and 2036 future year periods are shown in Table 6-16.

Average weekday traffic volumes on the Great Western Highway are predicted to grow from 11,100 vehicles per day in 2021 to 11,400 vehicles per day in 2026, equivalent of about 103 per cent of current (2021) traffic volumes. In 2036, traffic volumes on the Great Western Highway are predicted to increase to 12,100 vehicles per day, equivalent to about 109 per cent of current (2021) traffic volumes. The proportion of heavy vehicles in the proposal area is forecast to increase from 20 per cent in 2021 to 22 per cent in 2036.

Table 6-16 Forecast daily traffic volumes on the Great Western Highway in 2026 and 2036

Location on Great Western Highway	Average weekday daily traffic volume			Heavy vehicle per cent to total vehicle		
	2021	2026	2036	2021	2026	2036
East of Coxs River Road	11,840	12,190	12,910	19 per cent	19 per cent	21 per cent
West of Coxs River Road	12,140	12,500	13,250	19 per cent	20 per cent	21 per cent
East of Carroll Drive	11,060	11,400	12,110	22 per cent	22 per cent	24 per cent
East of Jenolan Caves Road	10,530	10,850	11,520	22 per cent	22 per cent	24 per cent
East of Daintree Close	10,390	10,700	11,330	20 per cent	21 per cent	23 per cent
South of Quarry Place	10,640	10,950	11,590	18 per cent	19 per cent	20 per cent
Average	11,100	11,440	12,120	20 per cent	21 per cent	22 per cent

Mid-block level of service on Great Western Highway

The existing 2021 midblock level of service D for all locations in the proposal area during the weekday AM and PM and Sunday peak periods is shown in Table 6-17. This indicates that a high percentage of vehicles travelled in platoons, resulting in limited opportunities to overtake.

Table 6-17 Existing 2021 midblock level of service on the Great Western Highway

Location on Great Western Highway	Level of service		
	2021 base case	2026 base case (Do nothing)	2036 base case (Do nothing)
East of Coxs River Road	D	E	E
West of Coxs River Road	D	E	E
East of Carroll Drive	D	D	E
East of Jenolan Caves Road	D	D	E
East of Daintree Close	D	D	E
South of Quarry Place	D	D	E

Intersection performance

Details of existing (2021) operational performance levels for the AM peak and PM peak hour periods and the modelled future (2026 and 2036) intersection performance levels for the AM peak and PM peak without the proposal (base case/‘do nothing’) are provided in Table 6-18. Intersection delay and level of service is reported for each of the 14 sign-controlled intersections in the proposal area.

Currently (2021), 13 of 14 intersections in the proposal area except for the intersection with Coxs River Road/Ambermere Drive operate with a level of service from A to C during weekday AM or PM peak periods. The modelled intersection delay ranges between 7 seconds and 41 seconds per vehicle, which is primarily contributed by traffic on side roads. The intersection with Coxs River Road/Ambermere Drive currently operates with a level of service E during weekday PM peak periods.

Overall, the existing (2021) level of service analysis does not indicate any significant operational capacity issues at 14 intersections in the proposal area except for Coxs River Road/Ambermere Drive in the PM peak period.

As shown in Table 6-18, by 2026 an unsatisfactory level of service F is predicted at the Great Western Highway intersection with Coxs River Road/Ambermere Drive during the PM peak, with average delay of 77 seconds per vehicles. By 2036, an unsatisfactory level of service E or F is predicted at seven of the 14 intersections in the proposal area during the PM peak. This includes the Great Western Highway intersections with Coxs River Road/Ambermere Drive, Banners Lane, Mid Hartley Road, Carroll Drive, Old Great Western Highway, Jenolan Caves Road/Blackmans Creek Road and Daintree Close.

Table 6-18 Existing and future intersection level of service during the weekday AM and PM peak in 2021, 2026 and 2036 without the proposal (base case/‘do nothing’)

Intersections with Great Western Highway	2021 AM (existing)		2021 PM (existing)		2026 AM (base case)		2026 PM (base case)		2036 AM (base case)		2036 PM (base case)	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Coxs River Road/ Ambermere Drive	26	B	62	E	29	C	77	F	51	D	>250	F
Baaners Lane	14	A	28	B	15	B	31	C	21	B	59	E
Browns Gap Road	12	A	17	B	12	A	18	B	15	B	27	B
Mid Hartley Road	21	B	39	C	21	B	44	D	28	B	70	E
Carroll Drive	21	B	41	C	23	B	46	D	32	C	86	F
Kelly Street	10	A	16	B	10	A	17	B	12	A	25	B
Old Great Western Highway	16	B	30	C	17	B	34	C	24	B	61	E
Jenolan Caves Road/ Blackmans Creek Road	24	B	39	C	26	B	47	D	42	C	194	F

Intersections with Great Western Highway	2021 AM (existing)		2021 PM (existing)		2026 AM (base case)		2026 PM (base case)		2036 AM (base case)		2036 PM (base case)	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Forty Bends Road	9	A	10	A	9	A	10	A	9	A	11	A
Daintree Close	11	A	18	B	11	A	64	E	15	B	131	F
McKanes Falls Road	13	A	20	B	14	A	21	B	17	B	32	C
Old Bathurst Road	7	A	7	A	9	A	7	A	9	A	7	A
Mudgee Street	9	A	10	A	9	A	11	A	10	A	15	B
Quarry Place	9	A	10	A	9	A	11	A	9	A	14	A

During the Sunday peak period, five intersections operate with a level of service E to F (Table 6-19). These include Coxs River Road/Ambermere Drive, Mid Hartley Road, Carroll Drive, Kelly Street, and Jenolan Caves Road/ Blackmans Creek Road. Motorists on the side roads experience a delay up to 145 seconds during the Sunday peak period.

Intersection performance during the Sunday peak would continue to deteriorate with delays per vehicle at the worst performing intersection (Coxs River Road/ Ambermere Drive) increasing from 145 seconds currently to 163 seconds in 2026 and to 225 seconds in 2036. In 2036, six intersections will be performing at an unsatisfactory E or F level of service. These would include Coxs River Road/ Ambermere Drive, Baaners Lane, Mid Hartley Road, Carroll Drive, Old Great Western Highway, and Jenolan Cave Road/ Blackmans Creek Road.

Table 6-19 Existing and future intersection level of service during the Sunday peak in 2021, 2026 and 2036 without the proposal (base case/'do nothing')

Intersections with Great Western Highway	2021 Sunday peak (existing)		2026 Sunday peak (base case)		2036 Sunday peak (base case)	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Coxs River Road/ Ambermere Drive	145	F	163	F	225	F
Baaners Lane	50	D	54	D	65	E
Browns Gap Road	29	C	31	C	35	C
Mid Hartley Road	58	E	62	E	73	F
Carroll Drive	99	F	109	F	132	F
Kelly Street	34	C	36	C	42	C
Old Great Western Highway	79	F	86	F	104	F
Jenolan Caves Road/ Blackmans Creek Road	72	F	79	F	95	F

Intersections with Great Western Highway	2021 Sunday peak (existing)		2026 Sunday peak (base case)		2036 Sunday peak (base case)	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Forty Bends Road	11	A	11	A	12	A
Daintree Close	40	C	43	D	50	D
McKanes Falls Road	41	C	43	D	50	D
Old Bathurst Road	7	A	7	A	8	A
Mudgee Street	18	B	18	B	20	B
Quarry Place	16	B	17	B	19	B

Travel times

The average weekday peak period journey time for vehicles travelling on the 38.5 kilometre section of the Great Western Highway between Katoomba and Lithgow was around 43 minutes.

6.2.3 Potential impacts

Construction

Traffic

The proposal would generate between 200 and 850 vehicles movements per day. The distribution of these movements on the road network would depend on the particular construction activities being undertaken at the time, the destination of the workforce, the source of imported material and the destination of exported material. It is assumed that most of the construction traffic would travel to and from the east via the Great Western Highway.

Daily construction vehicle movements and existing average weekday daily traffic on the Great Western Highway in the vicinity of the package of works are shown in Table 6-20.

Construction traffic would increase volumes on the Great Western Highway of between two per cent to eight per cent depending on package of works and locations. These increases would be minor and not impact the operational performance of the Great Western Highway. The proposal would aim to maintain one travel lane in each direction. However, there will be some instances during off peak times that lane closures or contraflow arrangements are required to complete works such as pavement resurfacing on the Great Western Highway.

Table 6-20 Impacts of construction traffic on Great Western Highway

Package	Existing average weekday traffic on Great Western Highway	Daily construction vehicle movements on Great Western Highway	Per cent increase on Great Western Highway
Little Hartley to River Lett Hill	11,845	520 - 620	4 - 5 per cent
Coxs River Road	11,845	367 - 687	3 - 6 per cent
River Lett Hill to Forty Bends	11,060	618 - 850	6 - 8 per cent

Package	Existing average weekday traffic on Great Western Highway	Daily construction vehicle movements on Great Western Highway	Per cent increase on Great Western Highway
Forty Bends to Lithgow	10,393	288 - 650	3 - 6 per cent

Intersection performance

The intersections listed below would require temporary road treatments to facilitate construction works and maintain local access:

- Coxs River Road. Grade separation of the new Great Western Highway and Coxs River Road would require a temporary connection to maintain connectivity for local properties
- Browns Gap Road. A road closure would be required at Browns Gap Road to construct the new pavement at the intersection of Service Road 2 and Browns Gap Road. To facilitate the closure, a detour to Browns Gap Road would be provided at Mid Hartley Road
- Banners Lane. Temporary connection to Baaners Lane would be constructed to maintain connectivity with the existing Great Western Highway and local properties
- Kelly Street. A temporary connection to Kelly Street would be constructed to maintain connectivity with the existing Great Western Highway and local properties
- Jenolan Caves Road. A temporary connection and turnaround would be constructed to maintain connectivity with the existing Great Western Highway
- Blackmans Creek Road. A temporary connection and turnaround would be constructed to maintain connectivity with the existing Great Western Highway
- Intersections with Forty Bends Road, McKanes Falls Road, Old Bathurst Road, Mudgee Street require temporarily reduced lane widths during construction.

During construction, these intersections would experience a deterioration in performance. Vehicles using these intersections may at times experience increased delays and congestion. These impacts would be temporary.

Active transport

Cyclists travelling on Great Western Highway would be required to share lanes with traffic in locations during construction where the shoulder width is insufficient. Shared paths in the vicinity of the proposal would be further investigated during future design development. The alignment and structure of the future shared paths would be developed in consultation with Lithgow City Council and other relevant stakeholders. An indicative route is provided in Appendix R.

Public transport

The construction of the proposal would not have a direct impact on any public transport networks or facilities. Construction of the proposal may have an indirect impact on buses travelling along Great Western Highway as a result of the deterioration in performance experienced at the intersections listed above. This could result in an increase in travel time for some services.

Property access

Several access points to properties on the Great Western Highway may be temporarily impacted during construction. The proposal would be managed to limit potential impacts on property access. Any unavoidable temporary access closures would involve an appropriate level of engagement with the property owners prior to construction.

Operation

Midblock performance

A comparison of the mid-block performance with the proposal and without the proposal for the years 2026 and 2036 with the proposal is provided in Table 6-21.

Table 6-21 Midblock level of service

Package	Level of service (without the proposal)			Level of service (with the proposal)	
	2021	2026	2036	2026	2036
Little Hartley to River Lett Hill (L2R)	D	E	E	A	C
Coxs River Road (CRR)	D	E	E	A	C
River Lett Hill to Forty Bends (R2F)	D	D	E	A	B ¹
Forty Bends to Lithgow (F2L)	D	D	E	A	B

Note 1: R2F is a steep uphill carriageway in the westbound direction. The westbound climbing lane is predicted operate at a level of service C in both future year periods.

Intersection performance

Little Hartley to River Lett

A summary of the predicted level of service and delays at five intersections with the new Great Western Highway in the Little Hartley to River Lett section in the 2026 and 2036 future year AM peak and PM peak hour periods is provided in Table 6-22.

For both future year periods, the proposed intersection layouts and control measures are predicted to operate at a level of service A during weekday AM and PM peak and Sunday hours. Additionally, with only minor delays at all intersections, traffic modelling indicates good operational performance levels and hence the proposal would provide a reliable and efficient road network in this section.

Table 6-22 Modelled intersection level of service in 2026 and 2036 with the proposal – Little Hartley to River Lett

Intersections with Great Western Highway	2026 AM peak		2026 PM peak		2026 Sunday peak		2036 AM peak		2036 PM peak		2036 Sunday peak	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Service Road 3 / Connecting Road 4	7	A	8	A	7	A	7	A	8	A	7	A
New Great Western Highway / Connecting Road 4	9	A	9	A	9	A	9	A	9	A	9	A
Mid Hartley Road/ Service Road 3	7	A	8	A	7	A	7	A	8	A	7	A
Service Road 3 / Connecting Road 5	7	A	8	A	7	A	7	A	8	A	7	A

Intersections with Great Western Highway	2026 AM peak		2026 PM peak		2026 Sunday peak		2036 AM peak		2036 PM peak		2036 Sunday peak	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
New Great Western Highway / Connecting Road 5	9	A	9	A	9	A	9	A	9	A	9	A

Coxs River Road

The predicted level of service and delays at seven intersections with the new Great Western Highway within the Coxs River Road section in the 2026 and 2036 future year AM peak and PM peak hour periods are summarised in

Table 6-23.

For both future year periods, the proposed intersection layouts and control measures are predicted to operate between a level of service A and a level of service C during typical weekday AM and PM peak and Sunday hours. The associated intersection delays are predicted to range from seven to 32 seconds per vehicles due to geometry delay; particularly for left-turn vehicles. In summary, traffic modelling indicates that the proposal would provide a reliable and efficient road network in this section.

Table 6-23 Modelled intersection level of service in 2026 and 2036 with the proposal – Coxs River Road

Intersections with Great Western Highway	2026 AM peak		2026 PM peak		2026 Sunday peak		2036 AM peak		2036 PM peak		2036 Sunday peak	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
Coxs River Road / Ambergemere Drive / Service Road 1	9	A	13	A	11	A	10	A	16	B	13	A
Coxs River Road / Connecting Road 2	7	A	7	A	7	A	7	A	7	A	7	A
Service Road 2 / Connecting Road 3	7	A	7	A	7	A	7	A	7	A	7	A
New Great Western Highway / Connecting Road 3	9	A	9	A	9	A	9	A	9	A	9	A
New Great Western Highway / Connecting Road 2	8	A	8	A	8	A	8	A	8	A	8	A

Intersections with Great Western Highway	2026 AM peak		2026 PM peak		2026 Sunday peak		2036 AM peak		2036 PM peak		2036 Sunday peak	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
New Great Western Highway / Banners Lane	13	A	18	B	23	B	15	B	23	B	32	C
Browns Gap Road / Service Road 2	7	A	7	A	7	A	7	A	7	A	7	A

River Lett to Forty Bends

The predicted level of service and delays at two intersections with the new Great Western Highway within the River Lett to Forty Bends section in the 2026 and 2036 future year AM peak and PM peak hour periods are summarised in Table 6-24.

For both future year periods, the proposed intersection layouts and control measures are predicted to operate between level of service A and level of service C during the respective weekday AM and PM peak and Sunday hours. The associated intersection delays range from 13 to 40 seconds per vehicle. In summary, traffic modelling indicates that the proposal would provide a reliable and efficient road network in this section.

Table 6-24 Modelled intersection level of service in 2026 and 2036 with the proposal –River Lett to Forty Bends

Intersections with Great Western Highway	2026 AM peak		2026 PM peak		2026 Sunday		2036 AM peak		2036 PM peak		2036 Sunday	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
New Great Western Highway / Service Road 8	13	A	17	B	24	B	15	B	21	B	34	C
New Great Western Highway / Service Road 10	13	A	16	B	27	B	15	B	20	B	40	C

Forty Bends to Lithgow

A summary of the predicted level of service and delays at six intersections with the new Great Western Highway within the Forty Bends to Lithgow section in the 2026 and 2036 future year AM peak and PM peak hour periods is provided in

Table 6-25.

For both future year periods, the proposed intersection layouts and control measures are predicted to operate between a level of service A and level of service C during typical weekday AM and PM peak and Sunday peak hours. The associated intersection delays range from seven to 29 seconds per vehicle. In summary, traffic modelling indicates that the proposal would provide a reliable and efficient road network in this section.

Table 6-25 Modelled intersection level of service in 2026 and 2036 with the proposal – Forty Bends to Lithgow

Intersections with Great Western Highway	2026 AM peak		2026 PM peak		2026 Sunday peak		2036 AM peak		2036 PM peak		2036 Sunday peak	
	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS	Delay (sec)	LoS
New Great Western Highway / Forty Bends Road	7	A	7	A	7	A	7	A	7	A	8	A
New Great Western Highway / Daintree Close	12	A	17	B	21	B	13	A	21	B	28	B
New Great Western Highway / McKanes Falls Road	12	A	15	B	21	B	14	A	19	B	29	C
New Great Western Highway / Old Bathurst Road	7	A	7	A	7	A	7	A	7	A	7	A
New Great Western Highway / Mudgee Street	10	A	14	A	19	B	12	A	18	B	27	B
New Great Western Highway / Quarry	12	A	16	B	21	B	13	A	20	B	29	C

Travel time savings on Great Western Highway

In 2036, the proposal would reduce travel time by up to 10 minutes between Katoomba and Lithgow from about 40 minutes in the base case/'do nothing' scenario to around 29 minutes with the proposal.

Crash reductions on Great Western Highway

Crash reduction analysis was undertaken on the Great Western Highway by comparing with and without proposal conditions to estimate potential crash reductions based on crash data recorded from 2014 to 2020.

The number of crashes predicted for base case/'do nothing' and without the proposal conditions are shown in Table 6-26. The analysis suggests that the proposal would reduce the total potential number of crashes on the Great Western Highway from 89 crashes to 38.7 crashes, which equates to a 57 per cent reduction.

Table 6-26 Predicted crashes and crash reduction on the proposal

Crash description	Base case/'do nothing'	With the proposal	Change	per cent change
Intersection, from adjacent approaches	2.0	1.0	-1.0	-50 per cent
Head-on	7.0	0.0	-7.0	-100 per cent
Opposing vehicles; turning	1.0	0.5	-0.5	-50 per cent
Rear end	10.0	4.0	-6.0	-60 per cent
Lane change	5.0	4.4	-0.6	-12 per cent
Vehicle leaving driveway	1.0	0.0	-1.0	-100 per cent
Hit animal	1.0	-	-	-
Off carriageway, on straight	1.0	0.6	-0.5	-45 per cent
Off carriageway on straight, hit object	11.0	6.1	-5.0	-45 per cent
Off carriageway, on curve	5.0	2.0	-3.0	-60 per cent
Off carriageway on curve, hit object	39.0	15.6	-23.4	-60 per cent
Out of control on curve	4.0	1.6	-2.4	-60 per cent
Other	2.0	-	-	-
Total	89.0	38.7	-50.3	-57 per cent

Active transport

The proposal would improve conditions for pedestrians and cyclists by providing a range of improvements to the existing active transport network and facilities by providing:

- A 2.5 metre nearside sealed shoulder has been provided on Great Western Highway. It is anticipated that the sealed shoulders are sufficient to accommodate on road cyclists on both sides of each carriageway of Great Western Highway
- A two metre nearside sealed shoulder has been provided on Service Road 2 and Coxs River Road for on road cyclists
- A two metre nearside sealed shoulder has been provided on Service Roads 1 and 3 for on road cyclists.
- Design development has considered the future development of shared paths in the vicinity of the proposal. The alignment and structure of the future shared paths would be developed and finalised during future design development and in consultation with Lithgow City Council and other relevant stakeholders. An indicative route is provided in Appendix R.

Public transport

The operation of the proposal is not expected to impact on any public transport networks.

6.2.4 Safeguards and management measures

Table 6-27 Safeguards and management measures – traffic and transport

No	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
TT01	Construction traffic	<p>A Traffic Management Plan (TMP) will be prepared for the construction phase of the proposal. This will adhere to Traffic Control at Worksites, Technical Manual, Issue No. 6, Transport, September 2020 and QA Specification G10 Traffic Management (Transport, August 2020). This will include details on:</p> <ul style="list-style-type: none"> • Measures to maintain access to properties and local roads • Site specific traffic control measures to manage and regulate traffic movement • Requirement and methods to consult and inform the local community of impacts on the local road network • Measures to maintain pedestrian and cyclist access • Access to ancillary sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads 	Contractor	Prior to and during construction	Appendix E	All

No	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
		<ul style="list-style-type: none"> • A response plan for any construction road traffic incident • Consideration of other developments which may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms. 				
TT02	Construction traffic staging	Traffic management plans would be prepared for the construction area and progressively updated as the works progress. The plans would be prepared and implemented by suitably qualified personnel	Contractor	Prior to and during construction	Appendix E	All
TT03	Construction traffic staging	Schedule partial road closures to maintain 2 lanes at all times except for blasting periods. Full road closures would be required for short periods of time (approximately 15 minutes) however this would be conducted at non-peak times.	Contractor	Prior to and during construction	Appendix E	All
TT04	Consultation	Undertake consultation with local and regional bus companies prior to and during construction	Contractor	Prior to and during construction	Appendix E	All
TT05	Consultation	Undertake consultation with emergency services prior to and during construction to confirm any diversions during construction and any operational road network changes	Contractor	Prior to and during construction	Appendix E	All
TT06	Consultation	Undertake consultation with property owners and occupiers regarding	Contractor	Prior to and during construction	Appendix E	All

No	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
		changes to access arrangements				
TT07	Consultation	Undertake consultation with local councils regarding potential impacts to parking during the construction period.	Contractor	Prior to and during construction	Appendix E	All
TT08	Operational traffic management	Review incident management plan in the event the highway may be temporarily closed due to scheduled maintenance or accident	Transport	Operation	Appendix E	All
TT09	Operational traffic management	Consult with residents who may be affected by the temporary closure of the highway closed due to scheduled maintenance or accident.	Transport	Operation	Appendix E	All

Other safeguards and management measures that would address traffic impacts are identified in Section 6.10 Socio-economic.