

6.5 Traffic and transport

6.5.1 Existing environment

Existing road network

The New England Highway is a key strategic road forming part of the Sydney to Brisbane corridor of the National Land Transport Network. It is a major freight and commuter route between Newcastle and the Upper Hunter with about 15 per cent of traffic movements being heavy vehicles.

The New England Highway passes through Singleton providing links to Muswellbrook to the north and Maitland to the south. Between 18,000 and 28,000 vehicles per day (two-way) travel on the highway through Singleton.

With planned future developments in Singleton and the continual growth in regional freight movements, the resulting traffic growth is likely to impact on the functionality of the New England Highway in this area.

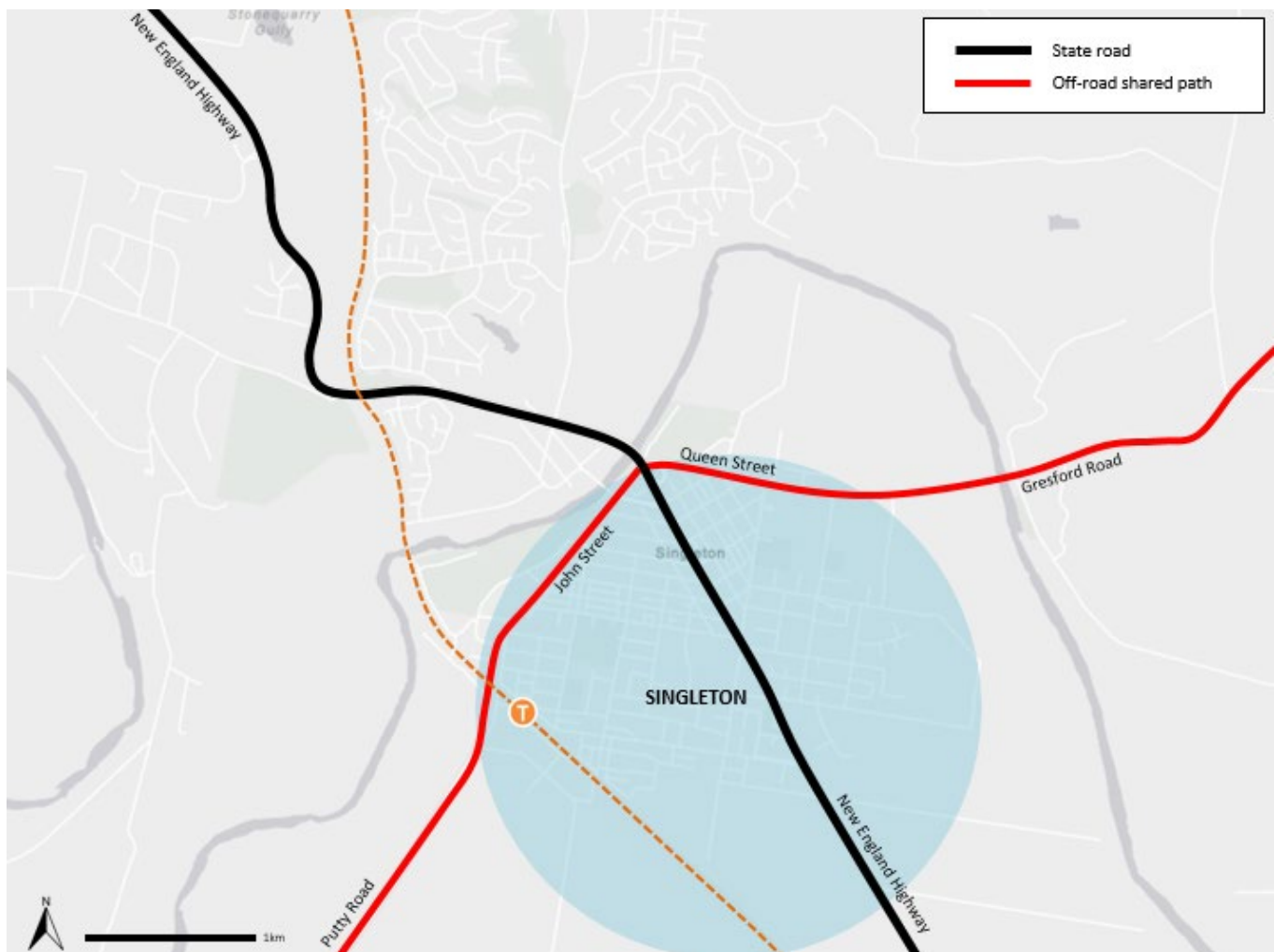


Figure 6-8: Existing road network for the Singleton area

Key roads within and around the proposal area are illustrated in Figure 6-8, and include:

- The New England Highway is a state road and classified as a highway. It is a major north-south route passing through Singleton. As the road passes through Singleton, it is generally one lane in each direction, with an on-street parking lane provided on both sides. It has a posted speed limit of 50 kilometres per hour to 60 kilometres per hour within the proposal area
- Gresford Road is a regional road and classified as a main road. It is an east-west route providing access to rural areas east of Singleton. The undivided road is one lane in each direction with a posted speed limit of 60 kilometres per hour
- Putty Road is a regional road and classified as a main road. It is a north-south route providing access to rural areas south-west of Singleton. The undivided road is one lane in each direction with a posted speed limit of 60 kilometres per hour
- Queen Street and John Street are regional roads and both classified as main roads. These two roads provide an east-west link through Singleton linking with Putty Road and Gresford Road. These undivided roads have one lane in each direction with an on-street parking lane on both sides. There are posted speed limits of 50 kilometres per hour to 60 kilometres per hour, within the proposal area. A school zone operates on Queen Street between Combo Lane and Boundary Street.

The roads described above are considered to be key roads as they form the primary north-south and east-west traffic routes to and from Singleton.

Key intersections

Key intersections along the New England Highway through Singleton provide connectivity to residential streets and regional roads and include:

- New England Highway / Magpie Street (signals)
- New England Highway / Bridgman Road (signals)
- New England Highway / Boundary Street / York Street (signals)
- New England Highway / Orchard Avenue / Howe Street (signals)
- John Street / Hunter Street / Ryan Avenue (signals)
- Putty Road / Ryan Avenue (signals)
- John Street / Newton Street / Campbell Street (roundabout).

As the New England Highway passes through Singleton, there are a number of priority controlled intersections, the majority of which are T-intersections. At priority controlled intersections, the side road(s) has either a 'give way' or a 'stop' sign.

Parking facilities

On-street kerbside parking (parallel) is provided on both sides of New England Highway as it passes through Singleton. The majority of the on-street kerbside parking is unrestricted with some timed restrictions in place for retail uses, such as the pharmacy and bakery along New England Highway.

Heavy vehicles

The New England Highway is a major freight route between Newcastle, Maitland and the Upper Hunter. It is classified as a B-double route for trucks up to 25/26 metres in length, as shown in Figure 6-9.

Putty Road and Gresford Road are also classified as B-double routes, with some time-of-day restrictions on certain sections on the approach to and through Singleton.

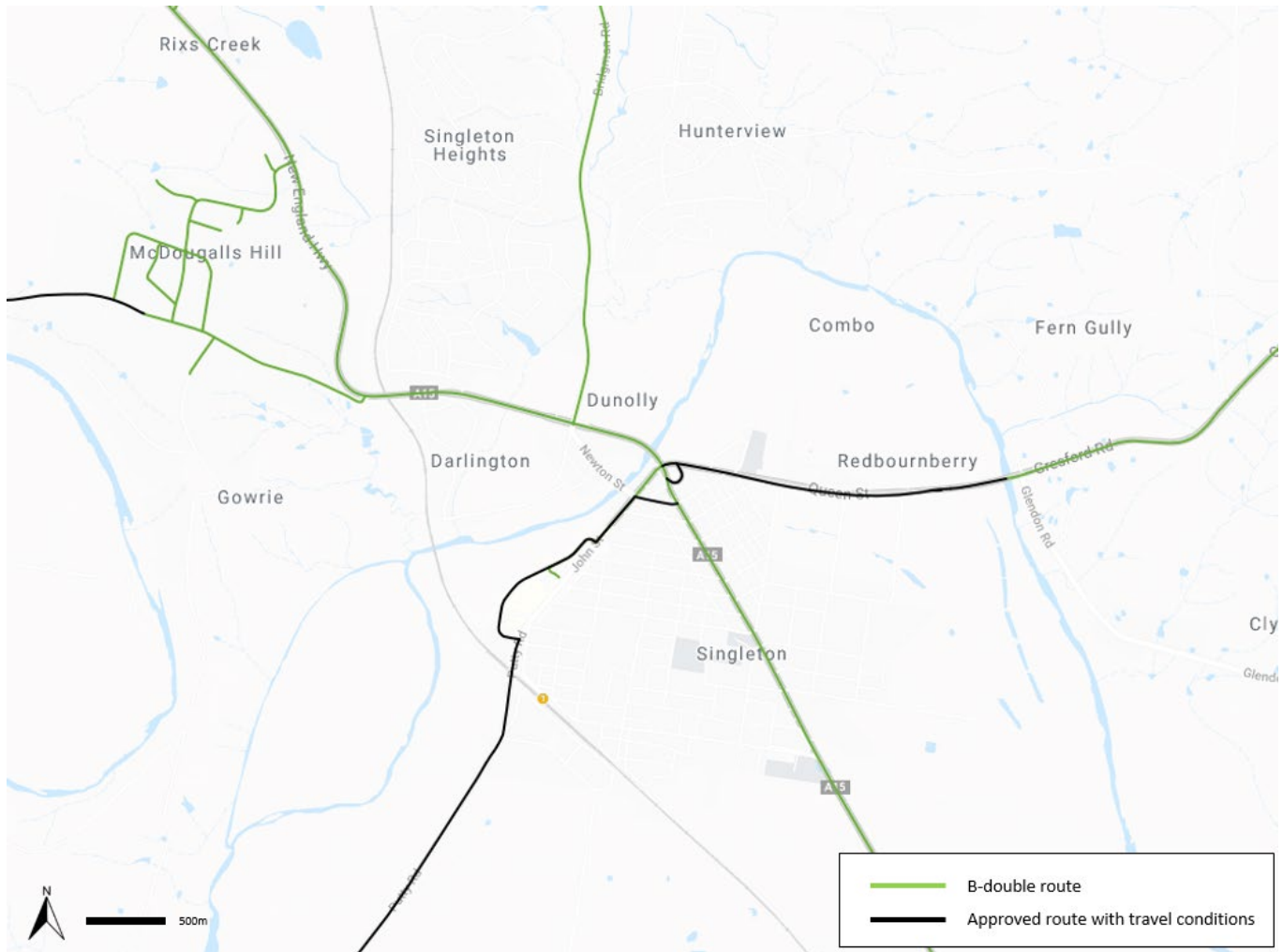


Figure 6-9: B-double routes

Existing traffic volumes

Roads and Maritime has a permanent classifier station located on the New England Highway about 200 metres north of Rixs Creek Lane at Rixs Creek. This station provides historical annual average daily traffic (AADT) data, which is presented in Table 6-15.

The AADT data for the New England Highway shows traffic volumes have steadily increased at an annual rate of about 2.6 per cent between 2015 and 2018.

Table 6-15: Roads and Maritime Services AADT data for New England Highway

ID	Station	Two-way traffic volumes (vehicles)				
		2015	2016*	2017	2018	Growth per annum
6153	200m north of Rixs Creek Lane, Rixs Creek	13,245	-	13,796	14,284	2.6%

* 2016 data has been excluded from the table as southbound traffic was only recorded

Mid-block traffic counts were also collected between 1 March and 19 March 2018, as summarised in Table 6-16. These surveys show the New England Highway (at Hunter River Bridge) carries up to 28,000 vehicles per weekday (two-way).

Table 6-16: 2018 traffic volumes

Road	Location	Direction	Weekday average (vehicles)
New England Highway	North of Rixs Creek Lane	NB	7879
		SB	8028
	West of Hunter River / Hunter River Bridge	EB	14,017
		WB	13,922
	South of Cambridge Street	NB	11,389
		SB	10,721
	South of Waddells Road	NB	10,504
		SB	10,689
	South of Haggartys Lane	NB	10,478
		SB	10,809
John Street	South of Campbell Street	NB	7166
		SB	7875
Putty Road	South of Carrington Street	NB	2649
		SB	2576
Queen Street	East of Raworth Street	EB	2385
		WB	2318
	West of Civic Avenue	EB	3835
		WB	3763

Note: NB = northbound, SB = southbound, EB = eastbound, WB = westbound

Figure 6-10 shows the daily traffic volume profile on the New England Highway at Hunter River Bridge. There are two distinct morning peaks, one between 5.30am and 6.30am and the other between 8.30am and 9.30am. The evening peak hour was identified to occur between 4pm and 5pm, which has the highest cumulative two-way traffic volume.

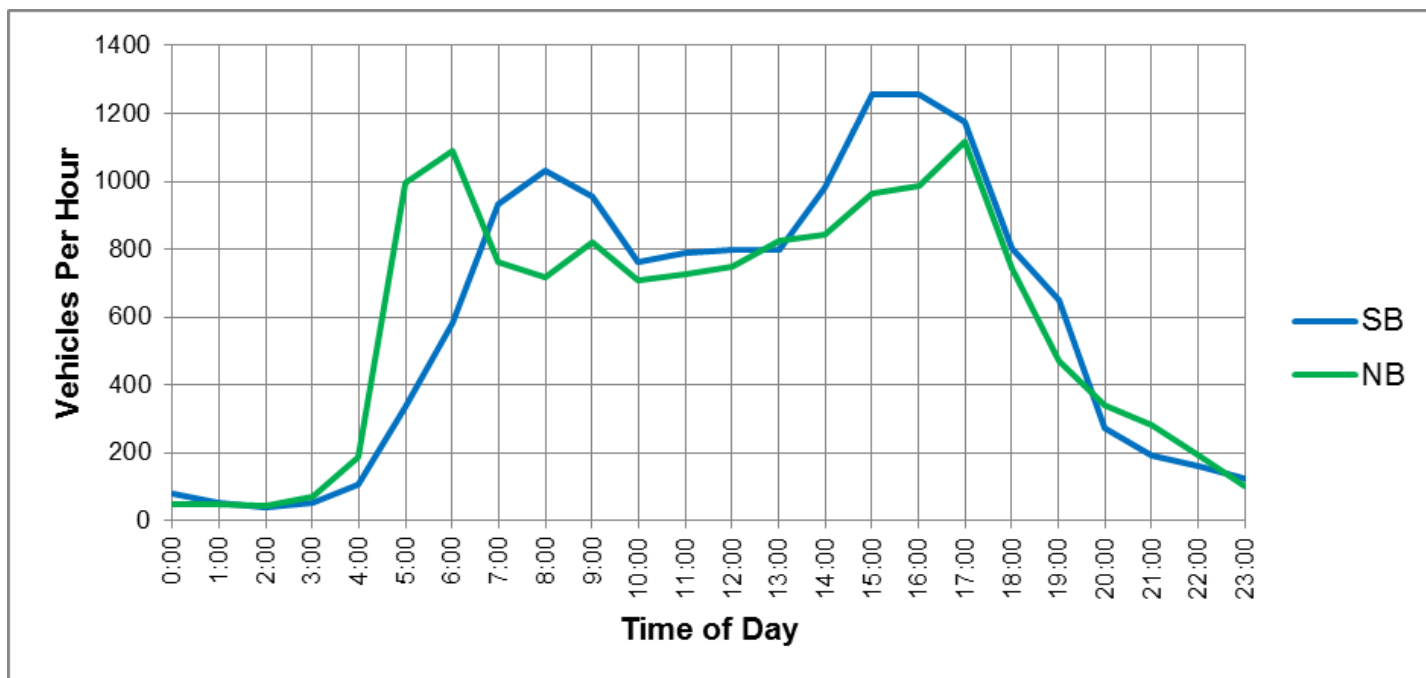


Figure 6-10: Daily traffic profile on New England Highway at Hunter River Bridge

A vehicle origin and destination (OD) survey was carried out in Singleton by Austraffic on Wednesday 28 February 2018. The data was collected in 15 minute intervals between 5am and 9:30am and between 3pm and 7pm.

Analysis of the OD survey data indicated:

- During the morning period, up to 44 per cent of trips originating south of Singleton (south of White Falls Lane) were through (northbound) trips along the New England Highway
- During the morning period, up to 54 per cent of trips originating north of Singleton (north of Magpie Street) were through (southbound) trips along the New England Highway
- During the evening period, up to 36 per cent of trips originating south of Singleton (south of White Falls Lane) were through (northbound) trips along the New England Highway
- During the evening period, up to 51 per cent of trips originating north of Singleton (north of Magpie Street) were through (southbound) trips along the New England Highway.

Intersection performance

Level of service (LoS) is the standard measure used to assess the operational performance of intersections. There are six levels of service, ranging from LoS A (the best) to LoS F (the worst). LoS D or better is considered to be an acceptable level of service.

An Aimsun traffic model was developed to assist with the operational traffic impact assessment of the proposal (see Appendix L for further details). The traffic model was calibrated and validated using 2018 traffic survey data. Table 6-17 summarises the intersection performance of key intersections, which shows most of the intersections operate satisfactorily except for the New England Highway and Bridgman Road intersection.

Table 6-17: 2018 intersection performance

Intersection	AM peak (5.30-6.30am)		AM peak (8.30-9.30am)		PM peak (4-5pm)	
	Avg. delay (s)	LoS	Avg. delay (s)	LoS	Avg. delay (s)	LoS
New England Highway / Bridgman Road	88	F	44	D	58	E
New England Highway / Orchard Avenue / Howe Street	9	A	20	B	16	B
New England Highway / Boundary Street / York Street	7	A	20	B	28	C
Putty Road / Ryan Avenue	13	A	14	B	13	A
John Street / Hunter Street / Ryan Avenue	10	A	26	B	24	B
John Street / Newton Street	2	A	12	A	19	B
Queen Street / New England Highway Ramp	3	A	7	A	6	A

Crash data

Figure 6-11 and Table 6-18 summarise crash data between January 2013 and December 2017 along the New England Highway within the proposal area. A total of 86 crashes were recorded, which involved 64 casualties. No fatalities were recorded during this period.

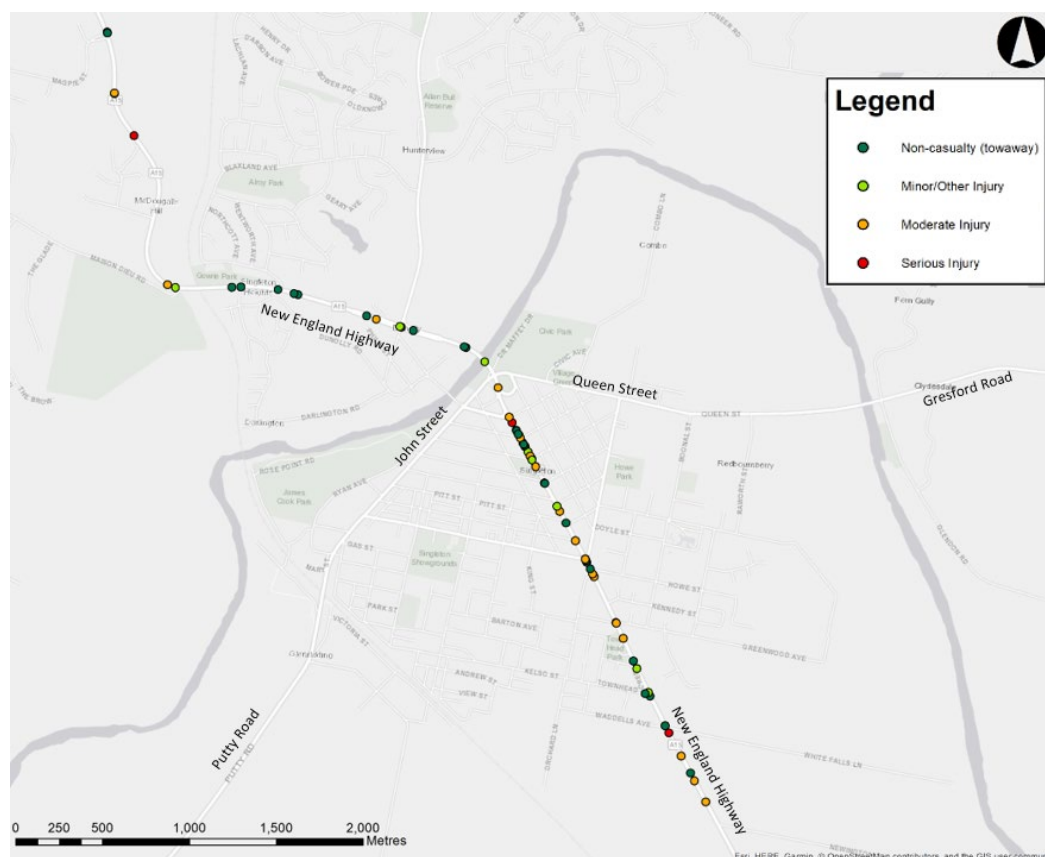


Figure 6-11: Crash location and types between 2013 and 2017

Source: Roads and Maritime, 2019

Table 6-18: Crash data summary between January 2013 and December 2017

Type	Crashes	Casualties
Fatal	0	0
Serious injury	9	9
Moderate injury	24	38
Minor/other injury	14	17
Non-casualty	39	-
Total	86	64

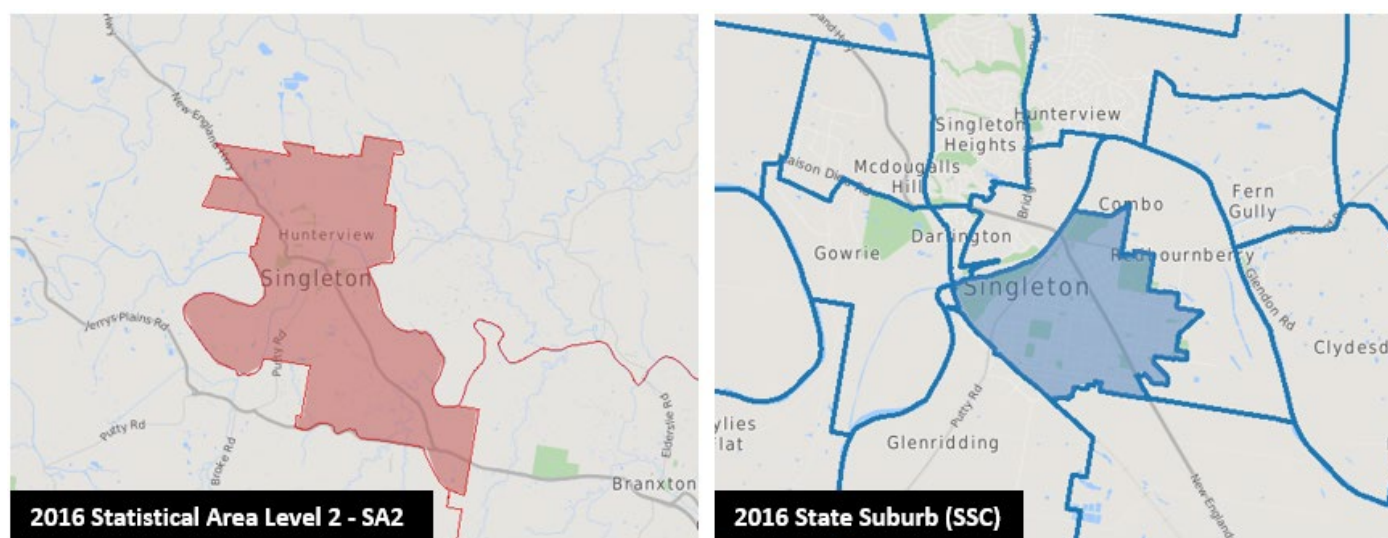
Source: Roads and Maritime, 2019

Analysis of the crash data indicated the following:

- About 90 per cent of crashes involved multiple vehicles
- About 44 per cent of crashes were rear-ends
- About 54 per cent of crashes occurred at an intersection
- Current trends indicate fewer crashes are occurring with 27 crashes recorded in 2013 and 14 crashes in 2017.

Mode of travel

Travel characteristics for Singleton were based on 2016 Census data. This data provides details on the mode of transport by which residents travelled to work on the day of the Census. The assessment of traffic and transport impacts related to the proposal considers the traffic environment within the boundary of Singleton (state suburb) that is located within the broader statistical area of Singleton (SA2). The mode of travel shared for these two key areas are summarised in Table 6-19.



Private vehicles are the predominant mode of transport for travel to work in Singleton, accounting for about 80 per cent of commute trips. This could be attributed to the limited public transport services to key employment areas, which is reflected by the low reliance on public transport, accounting for less than one per cent of commute trips.

Table 6-19: Method of travel to work (2016 Census)

Boundary	Car – driver or passenger	Public transport	Walked	Other
Singleton (SA2)	78%	<1%	4%	17%
Singleton (state suburb)	79%	<1%	4%	16%

Public transport services

Rail services

Singleton Station, which is served by the Hunter Line and North Western NSW Line, both operated by NSW TrainLink, is adjacent to the proposal area:

- The Hunter Line through Singleton provides an intercity service between Newcastle and Scone
- The North Western NSW Line is a regional service through the Hunter, New England and North West Slopes & Plains regions.

Table 6-20 summarises the number of train services at Singleton Station.

Table 6-20: Rail services at Singleton Station

Rail service	Description	No. of weekday services	No. of weekend services
Hunter Line	Scone to Newcastle	4	2
	Newcastle to Scone	4	2
North Western NSW Line	Central to Armidale	1	1
	Armidale to Central	1	1

Bus services

Hunter Valley Buses provides the following bus services to the Singleton area:

- 180: Singleton Heights to Stockland Green Hills
- 180X: Singleton Heights to Stockland Green Hills (express)
- 401: Singleton town Service
- 402: Singleton to Darlington and Hunterview
- 403: Singleton to Singleton Heights
- 404: Singleton to Singleton Heights.

The bus routes serving Singleton and surrounding areas, provide a mixture of regional and local connections, as shown in Figure 6-12 and summarised in Table 6-21.

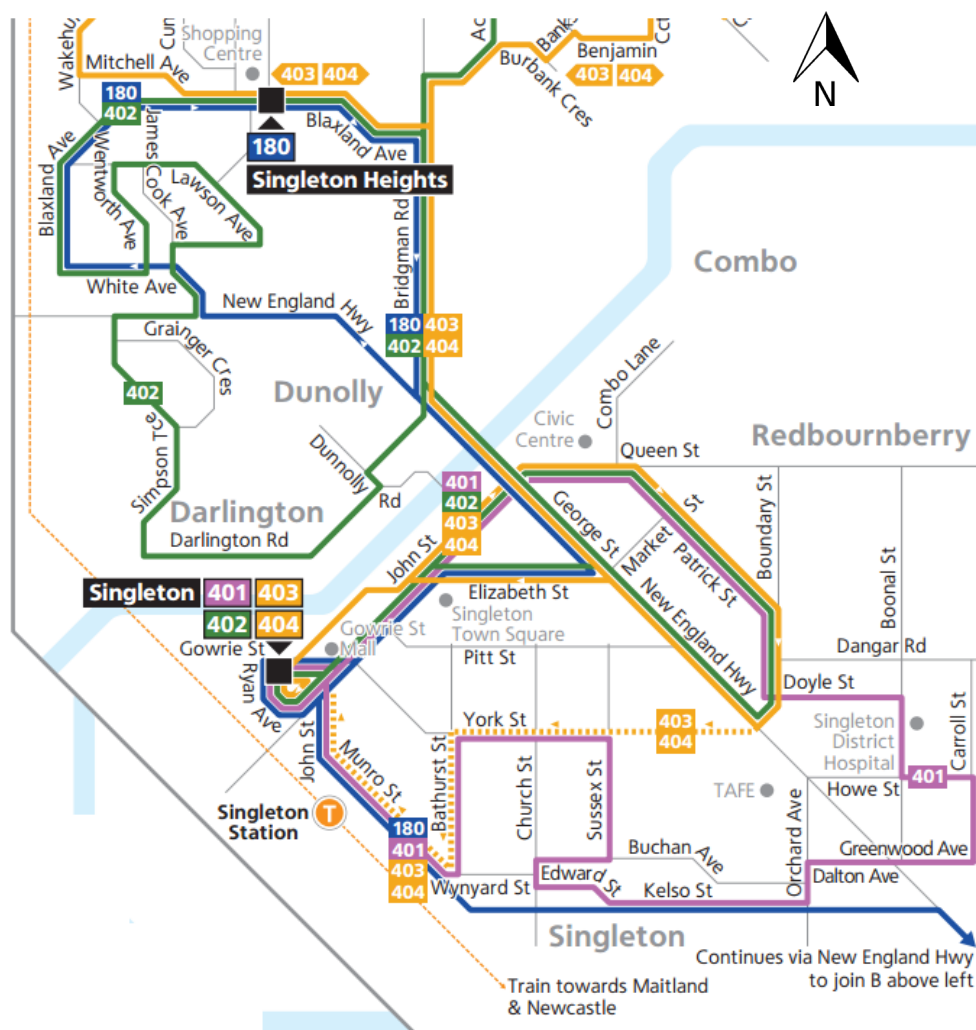


Figure 6-12: Bus routes serving Singleton and surrounding areas

Table 6-21: Bus services at Singleton

Route	Description	No. of weekday services	No. of Saturday services	No. of Sunday & Public Holiday services
180	Singleton Heights to Stockland Green Hills	4	3	0
	Stockland Green Hills to Singleton Heights	4	3	0
180X	Singleton to Maitland (Express Service)	2	0	0
	Maitland to Singleton (Express Service)	2	0	0
401	Singleton town Service (loop)	8	6	5
402	Singleton to Darlington and Hunterview (loop)	3	0	0
403	Singleton to Singleton Heights (loop)	5	4	2
404	Singleton to Singleton Heights (loop)	5	4	3

Walking and cycling facilities

Pedestrian footpaths are provided on both sides of the New England Highway (George Street and Maitland Road) as it passes through Singleton. Along the New England Highway, marked (signalised) pedestrian crossings are provided south of Market Street and Elizabeth Street and at the Maitland Road / York Street and Orchard Avenue Road / Howe Street intersections.

On the New England Highway to the north of the Hunter River, there is a shared footpath on the north side of the highway between Bridgman Road and Simpson Terrace, as well as a signalised pedestrian crossing at the Bridgman Road intersection.

Cycle routes are provided in select locations close to the New England Highway as shown in Figure 6-13:

- On-road cycle routes along Bourke Street and High Street provide a north-south link through the Singleton town centre. Both on-road cycle routes link to the off-road shared path along Queen Street
- A network of off-road shared path connections is provided for the suburbs of Hunterview, Singleton Heights and Darlington, which are located to the north of Hunter River.



Figure 6-13: Bicycle network near Singleton

6.5.2 Potential impacts

Construction impacts

A qualitative construction traffic impact assessment has been completed. The results of the assessment are summarised below.

Construction footprint and construction site locations

The construction footprint for the proposal is shown in Figure 3-2 to Figure 3-6 in Chapter 3 of this REF. As indicated on these figures, construction compounds and facilities are planned at the following locations:

- Southern connection laydown area – located west of New England Highway, between White Falls Lane and Newington Lane
- Army Camp Road laydown area – located west of Army Camp Road
- Waterworks Lane construction compound – located in the area both sides of Waterworks Lane, between the Main North railway line to the east and the Putty Road connection to the west
- Gowrie Gates construction compound – located south of the existing Main North railway line bridge over the New England Highway
- Northern connection construction compound – located east of the existing New England Highway west of the Main North railway line
- McDougalls Hill facility – located within an area of vacant land in the McDougalls Hill industrial area west of the New England Highway near the proposed northern connection.

Traffic impacts

Construction vehicles would access the site via arterial roads wherever possible. Indicative construction traffic access points are shown on Figure 3-9 in Chapter 3 and would generally be via the New England Highway.

Indicative heavy vehicle haulage routes have been identified for the movement of spoil between different areas of the proposal. The routes to and from the New England Highway are also shown on Figure 3-9 in Chapter 3. The haulage routes have been designed to avoid use of local roads, where possible. As shown in Figure 6-9, both the New England Highway and Putty Road are classified as B-double routes, with the relevant section of Putty Road having a restriction of 25 to 26 metre B-double trucks only being able to travel northbound between 3am and 5am Monday to Friday.

The number of construction vehicle movements has been estimated to be up to 80 light and 140 heavy vehicles per day (up to 12 per hour) during peak construction periods across all ancillary facilities.

Heavy vehicle movements, which are likely to have the largest impact, would mainly be related to earthworks or spoil movement, but would also include other movements including girder delivery and plant delivery. The estimated 140 heavy vehicle movements described above includes movements associated with girder delivery and plant delivery, which are anticipated to be limited to around 10 per cent (14 movements per day) of the total daily heavy vehicle movements.

As noted, heavy vehicles would only access construction sites from approved heavy vehicle routes, primarily the New England Highway. Existing traffic flows on the New England Highway are substantially greater than the proposed construction traffic numbers. The existing traffic flows are over 1000 heavy vehicles from 7am to 10pm and over 300 heavy vehicles from 10pm to 7am each day. Therefore, construction traffic, including earthworks truck movement, is likely to have a minor impact on existing traffic operations.

Most construction works would be carried out separate to the existing road network, during standard working hours and so would be unlikely to impact traffic operations. It is expected that some works, including tie-in works would be undertaken outside of standard working hours under a Road Occupancy Licence (ROL) to avoid impacts during peak traffic periods.

Impacts to traffic on the New England Highway during construction would be temporary in nature. Traffic impacts would occur due to the movement of construction and service vehicles along New England Highway and access roads, for the haulage of construction materials. As described above, construction sites would be primarily accessed via approved heavy vehicle routes.

Potential traffic impacts caused by the construction of the proposal include:

- Increased travel time due to reduced speed limits around construction sites
- Increased travel time due to increased truck and construction machinery movements
- Temporary partial or complete closure of roads and altered property accesses during construction. Property access would be maintained as far as practicable throughout construction.

Measures to manage potential construction traffic impacts are listed in Section 6.5.3.

Public transport

The proposal is not expected to disrupt public transport. All existing bus and train services would be maintained during construction, with potential for minor delays on bus services due to construction speed limits or detours. Through the implementation of the community engagement plan, the community, including public transport operators, would be informed of upcoming activities that may affect the operation of public transport.

Walking and cycling facilities

A separated shared pedestrian and cyclist path is located next to the New England Highway where the New England Highway passes beneath the Main North railway line, providing connectivity under the rail bridge. This shared path, west of the Main North railway bridge, would be temporarily impacted during activities required for the construction of the bridge over the New England Highway and southern entry ramp at Gowrie Gates. Connectivity would be maintained through localised diversions where feasible, however temporary diversion of the shared path into the road shoulder, with temporary concrete barriers for protection, may be required.

There is an informal pedestrian access to the Hunter River beneath the Main North railway line near Rose Point Road. The informal access is used primarily to access the Hunter River for recreational activities. This access would be closed during the construction of the proposal due to the work required for the bridge over the Hunter River.

Recreational users of the Hunter River would continue to have the option to use an existing access to the river east of the proposal area, to the north of Rose Point Park.

It is anticipated that construction works would be carried out in a manner to ensure that public access routes are maintained and pedestrian diversions are minimised. This would be documented in the Construction Traffic Management Plan (CTMP) that would be developed for the proposal.

Operational impacts

Traffic impacts

The traffic assessment modelled the impact of the proposal. Modelling was undertaken for an assumed opening year of 2026 and future years of 2036 and 2046. The following future scenarios were modelled:

- **Base:** The future Base scenarios assume no changes or upgrades to the current road and public transport networks

- **Do Minimum:** The future Do Minimum scenario assumes the proposal has not been built. It is called Do Minimum rather than Do Nothing as it assumes ongoing improvements would be made to the broader road and public transport network including some new infrastructure and intersection improvements to improve capacity and cater for traffic growth
- **Design:** The future Design scenarios assume the proposal is complete and open to traffic. Two Design options were assessed as shown in Figure 6-14 – with and without south facing ramps from Putty Road.

To understand the impacts of the proposal, the modelling outcomes for 2036 (10 years after the proposed opening) are summarised in this chapter. The full traffic assessment is contained in Appendix L.

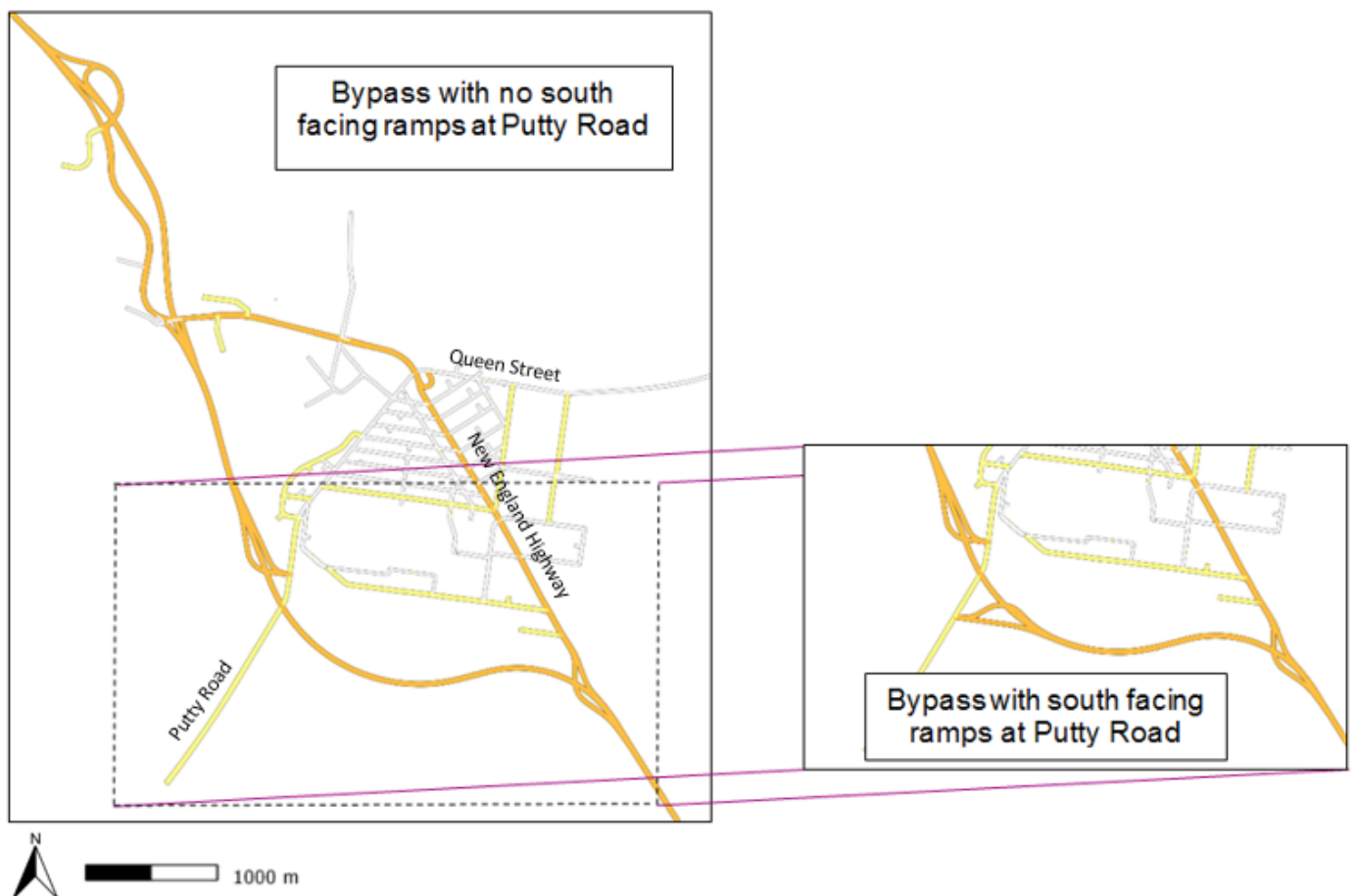


Figure 6-14: Bypass options with and without south facing ramps at Putty Road

In 2036, the introduction of the proposal (with and without Putty Road ramps) is forecast to remove:

- AM peak hour (5.30am to 6.30am):
 - Up to 1500 vehicles per hour (two-way) from the New England Highway through Singleton when compared to the Do Minimum scenario
 - Up to 300 vehicles per hour (two-way) in the Town Centre along John Street compared to the Do Minimum scenario.
- AM peak hour (8.30am to 9.30am):
 - Up to 1000 vehicles per hour (two-way) from the New England Highway through Singleton when compared to the Do Minimum scenario
 - Up to 450 vehicles per hour (two-way) in the Town Centre along John Street compared to the Do Minimum scenario.

- PM peak hour (4pm to 5pm):
 - Up to 1250 vehicles per hour (two-way) from the New England Highway through Singleton when compared to the Do Minimum scenario
 - Up to 400 vehicles per hour (two-way) in the Town Centre along John Street compared to the Do Minimum scenario.

The shift of these vehicles from the road network within Singleton to the bypass should provide additional capacity for vehicles undertaking more local trips and the reduction should provide greater amenity within the Town Centre.

Future intersection performance

The modelling indicates that with the proposal an overall improvement in the performance of key intersections is forecast in 2036, with most forecast to operate at LoS C or better during the peak periods assessed, except for the New England Highway / Bridgman Road intersection.

The performance of the New England Highway / Bridgman Road intersection is forecast to decrease slightly during the 2036 AM peak hour (5.30am to 6.30am) compared to the 2036 Do Minimum scenario. This performance is comparable to the 2036 Base scenario during the AM peak hour (5.30am to 6.30am). Improvements during the AM peak hour (8:30am to 9.30am) and PM peak hour (4pm to 5pm) are forecast.

Travel times

With the bypass proposed to be posted for 100 kilometres per hour, the travel time savings for through traffic that switch from the New England Highway to the bypass are forecast to range from about 6 minutes to 9 minutes in 2026 and 2036, respectively.

In addition, improvements in travel time in the local area (along John Street / Queen Street) are forecast as a result of the bypass, with savings of about 4 minutes forecast for northbound traffic on John Street in 2036.

On-street parking

The operation of the proposal would not impact on-street parking.

Public transport

There are no anticipated impacts on local public transport because of the proposal. No dedicated bus facilities would be removed or provided by the proposal.

Some bus services could experience travel time improvements due to the reduction in traffic volumes along the New England Highway.

Pedestrian and cycling facilities

There are minor impacts on existing pedestrian and cyclist facilities because of the proposal. The proposal would modify the shared path west of the Main North railway bridge, adjacent to the New England Highway, to pass beneath the southern entry ramp to the bypass at Gowrie Gates.

The reduction of traffic along the New England Highway through Singleton could improve traffic conditions for cyclists, potentially allowing this section of the New England Highway to form part of the on-road cycle route. Cyclists would be able to use the road shoulders on the bypass.

Road user safety

The safety of all road users including pedestrians, cyclists and motorists would be expected to improve once the bypass is operational. The diversion of traffic, in particular heavy vehicles, to the bypass would reduce the volume of traffic through Singleton and this in turn is expected to reduce the number of crashes.

Property access

All properties would be provided with access, including properties that may be subdivided or had access altered because of acquisition. Impacts would be limited to changes to the location and length of access routes for some properties compared to existing access arrangements.

Council access to the water pump station infrastructure in its altered location would be provided.

6.5.3 Safeguards and management measures

Table 6-22 provides management measures to be implemented to minimise potential impacts on traffic and transport.

Table 6-22: Summary of potential impacts and environmental safeguards – traffic and transport

Impact	Environmental management measures	Responsibility	Timing
Traffic and transport	Disruptions to property access and traffic will be notified to landowners at least five days prior in accordance with the relevant community consultation processes outlined in the TMP	Roads and Maritime	Detailed design
Traffic and transport	Where any legal access to property is permanently affected, arrangements for appropriate alternative access will be determined in consultation with the affected landowner and local road authority.	Construction contractor and Roads and Maritime	Detailed design
Traffic and transport	Access to properties will be maintained during construction. Where that is not feasible or necessary, temporary alternative access arrangements will be provided following consultation with affected landowners and the relevant local road authority.	Construction contractor and Roads and Maritime	Construction
Traffic and transport	<p>A detailed construction traffic management plan will be prepared in accordance with <i>Traffic Control at Work Sites Manual Version 4</i> (RTA, 2010) and <i>Specification G10 - Control of Traffic</i>. The plan will be approved by Roads and Maritime before implementation to provide a comprehensive and objective approach to minimise any potential impacts on road network operations during construction. The plan will include:</p> <ul style="list-style-type: none">• Access and haulage routes• Measures to maintain access to local roads and properties• Site specific traffic control measures (including signage) to manage and regulate traffic movement• Measures to maintain pedestrian and cyclist access• Requirements and methods to consult and inform the local community of impacts on the local road network• Access to construction sites including entry and exit locations and measures to prevent	Construction contractor	Pre-construction

	<p>construction vehicles queuing on public roads.</p> <ul style="list-style-type: none"> • A response plan for any construction traffic incident • Consideration of other developments that 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. 		
Traffic and transport	Where practical, heavy vehicle movements would be outside the traffic peak hours to minimise impacts on the existing road network operation during construction.	Construction contractor	Construction
Traffic and transport	Preparation of pre-construction and post construction road condition reports for local roads likely to be used during construction. Any damage resulting from construction (not normal wear and tear) will be repaired unless alternative arrangements are made with the relevant road authority. Copies of road condition reports will be provided to the local roads authority	Construction contractor	Pre and post construction
Traffic and transport	Pedestrian and cyclist access will be maintained throughout construction. Where that is not feasible or necessary, temporary alternative access arrangements will be provided following consultation with affected landowners and the local road authority.	Construction contractor	Construction