GTAconsultants

Pedestrian Access Review
Forbes Street
Trundle

Client // Clean TeQ Holdings Limited
Office // NSW
Reference // N108042
Date // 14/02/18

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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1. Introduction

This Pedestrian Access Review includes a review of the pedestrian environment along Forbes Street (The Bogan Way) through Trundle, New South Wales (NSW), with regard to existing traffic conditions and forecast traffic conditions incorporating predicted Clean TeQ Sunrise Project (the Project) traffic.

A key component of this review was consultation with a range of stakeholders and local community representatives, who provided input on existing conditions, and concerns about the possible traffic and transport impacts of the Project. A representative of GTA Consultants also observed existing pedestrian and driver behaviour along Forbes Street on 13 and 14 December 2017.

This Pedestrian Access Review has been prepared with consideration of the current NSW Roads and Maritime Services (RMS) and Austroads guidelines and Australian Standards relating to pedestrians and pedestrian facilities.

References to pedestrians in this discussion paper also include people using prams, and mobility aids such as motorised scooters and wheelchairs which require an accessible path of travel.

The remainder of this Pedestrian Access Review is set out as follows:

- Section 2 describes the existing road transport environment in Forbes Street, including vehicle and pedestrian volumes, issues raised by community representatives and a review of crash history of Forbes Street over a five year period.
- Section 3 presents the forecast of vehicle traffic expected to be generated by the Project.
- Section 4 discusses the principles and options for management of the road transport environment in Trundle based on established guidelines and the desires of the local Trundle community.
- Section 5 presents the recommended options for treatment of Forbes Street.
- Section 6 provides a summary of the key conclusions of the Pedestrian Access Review.

2. Existing Conditions

2.1 Forbes Street Traffic Environment

Forbes Street forms part of a Regional Road known as The Bogan Way which extends from the Newell Highway at Forbes to Henry Parkes Way near Bogan Gate thence via Trundle and Kadungle to the Peak Hill-Tullamore Road near Tullamore (Figure 2.1). The Bogan Way (including Forbes Street) is a RMS approved road train route, permitting Type 1 A-double and Modular B-triple [with conditions] vehicles as well as B-doubles.

The speed limit on The Bogan Way is generally 100 kilometres per hour (km/h), reducing to 50 km/h along Forbes Street through Trundle (Figure 2.2). There is also a 40 km/h school zone at the southern end of Trundle near the Trundle Central School (Figure 2.2). The 40 km/h school speed zone has standard pavement markings and signs with flashing lights.

Trundle Central School (K-12) lies adjacent to Forbes Street and Croft Street at the southern end of Trundle. A 40 km/h school zone extends along Croft Street from Forbes Street for approximately 300 metres (m) (Figure 2.2). A Type 1 (with flags) Children's Crossing is provided on Croft Street.

St Patricks Primary School (K-6) is located on Austin Street (Figure 2.2). Two 40 km/h school zones on Austin Street and Gobondery Street (Figure 2.2) are associated with the St Patricks Primary School. A Type 1 (with flags) Children's Crossing is provided on Austin Street.

Forbes Street has a single travel lane in each direction (Figure 2.3), however as the reservation for Forbes Street is very wide, angle parking, substantial clear zones and service lanes are available on each side of the road. Lighting/electricity poles are located within the carriageway of Forbes Street, and street trees mark an Avenue of Remembrance along Forbes Street between Parkes Street and Hutton Street. The trees are located underneath the power lines, and a proposal has been prepared to replace the trees and relocate them closer to the travel lanes of Forbes Street (*Trundle Main Street Avenue of Remembrance Tree Replacement Proposal,* Parkes Shire Council).

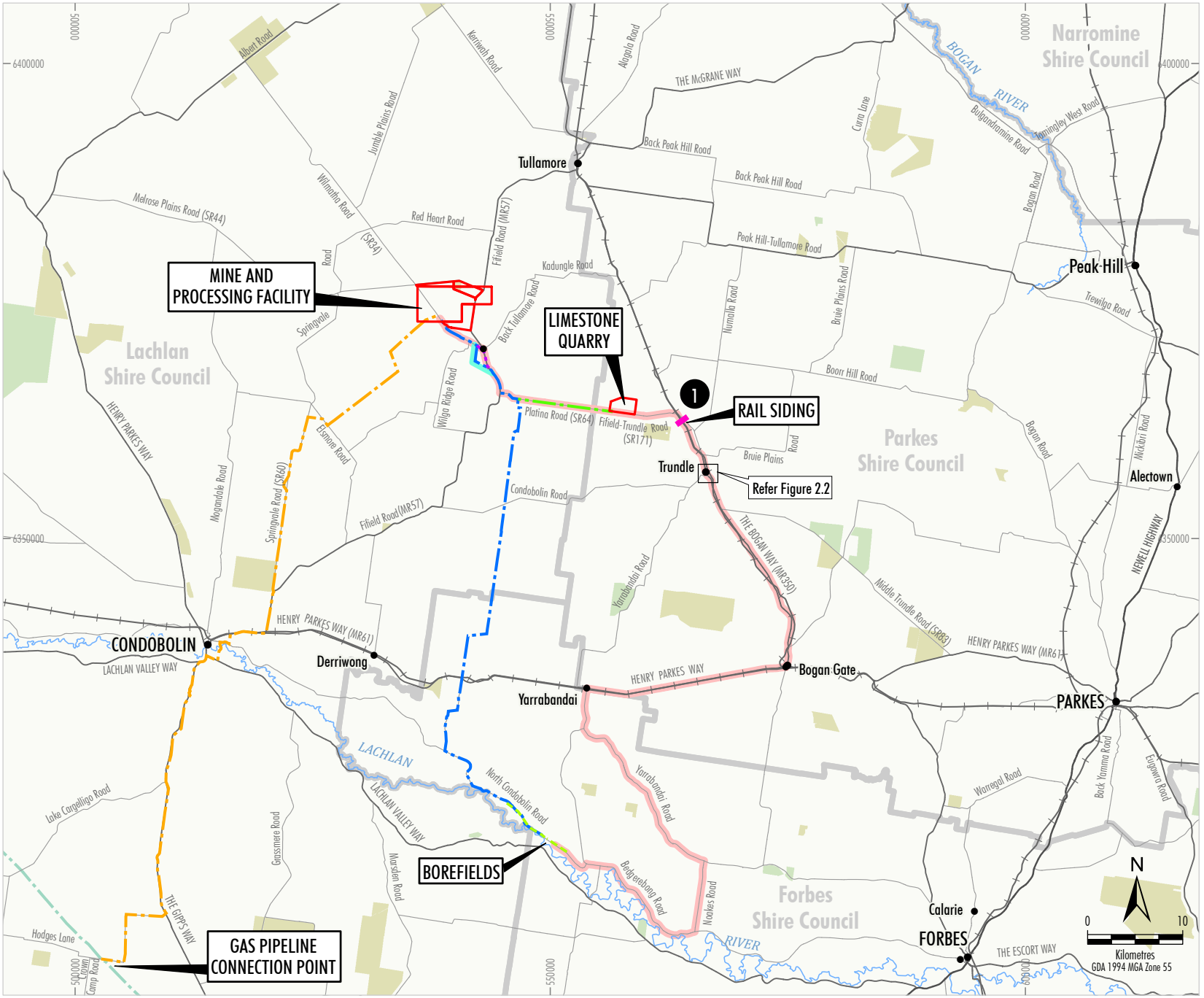
As a Regional Road, the RMS provides financial assistance to the Parkes Shire Council for the management of The Bogan Way (including Forbes Street).

2.2 Existing Traffic Volumes

Clean TeQ Holdings Limited (Clean TeQ) has been undertaking continuous traffic volume surveys throughout 2017 at a number of locations in the region, including on The Bogan Way between Trundle and Fifield-Trundle Road (Figure 2.1). The surveyed volumes at that location are considered to be indicative of volumes on Forbes Street, which are expected to be slightly higher due to local activity in Trundle.

The surveys show that between January and December 2017 (inclusive), heavy vehicles made up nearly 20 per cent of vehicular traffic on The Bogan Way. Table 2.1 summarises the average daily volumes and 85th percentile daily volumes by day of the week, being the volume exceeded on 15 per cent of days.

Peak hourly volumes are typically between 8 and 12 percent of daily volumes. The busiest days were recorded around the ABBA Festival, with a peak daily volume of 726 vehicles per day recorded on 6 May 2017. The least busy day of the year was recorded on 25 December 2017, with 160 vehicles per day.



LEGEND

- NSW National Parks and Wildlife Service
- State Forest
- Local Government Boundary
- Railway
- Existing Gas Pipeline
- Mining Lease Application Boundary
- Approved Gas Pipeline
- Approved Water Pipeline
- Approved Limestone Quarry Water Pipeline
- Approved Borefield Infrastructure Corridor
- Approved Fifield Bypass
- Proposed Water Pipeline Alignment Option (MOD 4)
- Proposed Short-term Water Transport Route (MOD 4)
- Traffic Survey Location

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land and Property Information (2017); Office of Environment and Heritage NSW (2017)

CLEAN TEQ SUNRISE PROJECT

Regional Location and Traffic Survey Location

Figure 2.1

CTL-16-02 Mod4_PedRev_201A

LEGEND

Posted Speed Limits

- 100 km/h
- 50 km/h
- 40 km/h School Zone
- 3 Vehicle Movement
- 4 Pedestrian Movement
- School Pedestrian Crossing

Source: NSW Land and Property Information (2017)
NSW Image: © Department of Finance, Services & Innovation (2017)

CLEAN TEQ SUNRISE PROJECT

Trundle Road Network

Figure 2.2

CTL-16-02 Mod4_PedRev_202A

LEGEND

Posted Speed Limits

- 100 km/h
- 50 km/h
- 40 km/h School Zone
- Viewpoint Location

Source: NSW Land and Property Information (2017)
NSW Image: © Department of Finance, Services & Innovation (2017)

CLEAN TEQ SUNRISE PROJECT

Viewpoint Photos

Figure 2.3

CTL-16-02 Mod4_PedRev_204A

Table 2.1: Daily Traffic by Day of the Week The Bogan Way North of Trundle 2017 (vehicles per day)

	Average	85th Percentile
Monday	400	451
Tuesday	422	473
Wednesday	418	471
Thursday	435	489
Friday	482	536
Saturday	346	384
Sunday	332	393
Weekdays	**431**	**488**
All Days	**405**	**478**

Traffic volumes on The Bogan Way are impacted by seasonal activity, with increased numbers of heavy vehicles occurring in response to harvesting. Table 2.2 presents the average daily traffic on The Bogan Way by month throughout 2017.

Table 2.2: Average Daily Traffic by Month The Bogan Way North of Trundle 2017 (vehicles per day)

Month	Light Vehicles	Heavy Vehicles	Total Vehicles
January	274	63	337
February	295	67	362
March	319	85	404
April	363	96	459
May	359	103	462
June	340	86	426
July	325	74	399
August	339	79	418
September	328	72	400
October	305	70	375
November	354	72	426
December	344	48	393

These results demonstrate that the average number of heavy vehicles per day peaked during May, at 103 heavy vehicles per day. The highest number of heavy vehicles recorded on any day during 2017 was 185 heavy vehicles on Friday 5 May, i.e. just prior to the ABBA Festival. The lowest number of heavy vehicles recorded on any day during 2017 was 3 heavy vehicles on Christmas Day.

Overall, vehicular traffic volumes are relatively low on Forbes Street, and do not result in any specific concerns regarding the capacity of the road or its intersections to accommodate the existing demands.

2.3 Crash History

Road crash data was obtained from RMS for Forbes Street between Bamford Street and Hutton Street. The data covers the period from 1 January 2012 to December 2017, with data being finalised for the period from 1 January 2012 to 30 March 2017, and provisional for the period from 1 April 2017. Data during the provisional period may be incomplete and subject to change. The data includes those crashes which conform to the national guidelines for reporting and classifying road vehicle crashes based on the following criteria:

- The crash was reported to the police.
- The crash occurred on a road open to the public.

- The crash involved at least one moving vehicle.
- The crash involved at least one person being killed or injured or at least one motor vehicle being towed away.

The crash data revealed one crash on Forbes Street, which occurred at 3.00 pm on Thursday 15 December 2016. The crash occurred 20 m north of Parkes Street during fine weather on a dry road surface. A southbound car travelling at 75 km/h left the carriageway to the left, and struck a west-facing parked car, a west-facing stationary truck, and a west-facing parked four wheel drive. One person was seriously injured, one person was moderately injured, and two people experienced minor injuries. Speed was nominated as a contributing factor to the crash, noting that the posted speed limit at this location is 50 km/h.

No crashes involving pedestrians were reported over the period under investigation.

2.4 Observed Traffic and Pedestrian Behaviour

A representative of GTA Consultants observed existing pedestrian and driver behaviour along Forbes Street on 13 and 14 December 2017. Two main pedestrian areas were identified during the survey, one being around the Trundle Central School and the other around the business area.

Trundle Central School Zone

On Wednesday 13 December 2017, traffic and pedestrian movements were observed near the Trundle Central School for 30 minutes at the start of the school day between approximately 8:40 am and 9:10 am. Over that time, it is estimated that the through vehicular traffic along Forbes Street was made up of approximately 70 per cent light vehicles and 30 per cent heavy vehicles, while all turning movements into and out of Croft Street with the exception of school buses were light vehicles. Some vehicles (both heavy and light vehicles) were observed to be travelling moderately in excess of the posted 40 km/h school zone speed limit.

On Forbes Street, traffic is a combination of local town-based traffic (residents of Trundle travelling around Trundle), local region traffic (residents of properties in the region travelling to and from Trundle and/or other properties in the region) and through traffic (vehicles which do not stop in Trundle and do not start or end their trip in the region). This traffic make-up is consistent with the function of Forbes Street (The Bogan Way) as a Regional Road.

During the morning before-school period in December 2017 (Figure2.2), 59 vehicles travelled on Forbes Street adjacent to the school (i.e. between Bamford Street and Croft Street) over a period of 30 minutes. Of those 59 vehicles, 22 vehicles turned into or out of Croft Street (suggesting that the driver started or ended their trip in Trundle) and 37 vehicles continued along Forbes Street. Some of those 37 vehicles would be assumed to start or end their trip in Trundle and some would be assumed to be "though" traffic. The contribution of through traffic to total traffic on Forbes Street would be expected to vary throughout the day and week.

Around school drop off and pick up times, there was some pedestrian movement across Forbes Street. However, the majority of children were either dropped off by private vehicle or by school bus. Consultation with the Principals of Trundle Central School and St Patricks Primary School indicated that only a limited number of students (approximately 15 students) walk across Forbes Street as the majority of students live on the western side of Forbes Street.

On Thursday 14 December 2017, a NSW Police officer was parked adjacent to the school zone on Forbes Street. Despite the school zone being in effect and the presence of a marked police car, some vehicles appeared to travel in excess of the speed limit and were visually cautioned by the NSW Police officer.

Business Area

The other main pedestrian area identified by GTA Consultants was associated with movement between the businesses and services located on Forbes Street centred around the intersection of Forbes Street and Parkes Street (Figure 2.2).

Some limited pedestrian activity was observed between the shops on opposite sides of Forbes Street, with an average of approximately one person crossing Forbes Street every few minutes. The highest numbers were observed during the early morning. The primary destinations for pedestrians were the general store on the western side and the newsagent on the eastern side. Pedestrians waiting to cross Forbes Street experience negligible delays as a result of passing traffic.

Some pedestrians indicated that if they need to cross the road, that they will generally drive to a parking spot on the opposite side of the road.

2.5 Community Consultation

GTA Consultants met with various community representatives to gain an appreciation of existing issues for pedestrians in Trundle and the surrounding roads. The community representatives included:

- various business owners on Forbes Street;
- the Principal of Trundle Central School;
- the Principal of St Patricks Primary school;
- a NSW Police officer;
- representatives of the Trundle Progress Association; and
- members of the general public.

Overwhelmingly, it appeared that the community representatives support the Project in principle, however, there were a number of issues raised regarding the potential impact of the increase in traffic to Forbes Street. Key issues and concerns identified by the community representatives included:

- concern about the volume of vehicles (particularly heavy vehicles) moving along Forbes Street;
- concern about the safety of people crossing the road in Trundle, particularly children and elderly pedestrians and users of mobility scooters;
- there is a poor sightline for school children crossing Forbes Street due to a crest in Forbes Street between East Street and Little Lane (Figure 2.2);
- the lack of a tapering of the speed limit entering Trundle, which changes from 100 km/h to 50 km/h (or 40 km/h during school zone hours) without warning or an intermediate speed limit for northbound vehicles into Trundle; and
- issues with adherence to speed limits, especially by heavy vehicles, particularly at the school zone.

Other issues raised outside the scope of this Pedestrian Access Review included:

- concern with the safety of stock crossing the road on roads outside of Trundle; and
- the perceived narrowness of roads between towns, particularly when passing heavy vehicles.

2.6 Summary of Existing Conditions

- The Bogan Way (including Forbes Street) is a Regional Road and is a RMS approved road train (Type 1 A-double and Modular B-triple [with conditions]) and B-double route.
- Vehicular traffic volumes are relatively low on Forbes Street, and do not result in any specific concerns regarding the capacity of the road or its intersections to accommodate the existing demands.
- Consistent with its function as Regional Road, Forbes Street accommodates the movement of "through" traffic that does not start or end its trip in Trundle. Some of the perceived "through" traffic would be intra-regional traffic with an origin or destination in the surrounding region, while some would be inter-regional traffic.
- RMS crash data over the period January 2012 to December 2017 reports:
  - no crashes involving pedestrians; and
  - one speed-related crash in the vicinity of the intersection of Forbes Street and Parkes Street.
- Two main pedestrian areas were identified during the survey, one being near the Trundle Central School and the other being in the business area.
- Although there is some pedestrian movement across Forbes Street before and after school, the majority of children are dropped off by private vehicle or by school bus.
- Limited pedestrian activity was observed between businesses and services located on Forbes Street centred around the intersection of Forbes Street and Parkes Street.
- There is poor sightline for school children crossing Forbes Street due to a crest in Forbes Street between East Street and Little Lane.
- The existing layout of Forbes Street tends to prioritise vehicle movements over pedestrian movements and the road width does not actively encourage drivers to slow their vehicle to the posted speed limit when driving through Trundle.
- There is a perceived speed limit compliance issue, and specifically, the entries to Trundle from The Bogan Way do not actively encourage drivers to reduce their vehicle speed by way of physical means or visual treatments.

Overall, the review found that the existing pedestrian and vehicular environment in Forbes Street is generally satisfactory, with no major issues which would require immediate upgrading to meet current standards. Some aspects of the pedestrian and vehicular environment could however be improved to mitigate the issues identified and described above.

3. Clean TeQ Sunrise Project Traffic

3.1 Background

Development Consent DA 374-11-00 for the Project was issued under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* in 2001.

The Project is a nickel cobalt scandium mining project and includes the establishment and operation of the following (Figure 2.1):

- mine (including the processing facility);
- limestone quarry;
- rail siding;
- gas pipeline;
- borefields and water pipeline; and
- associated transport activities and transport infrastructure (e.g. the Fifield Bypass, road and intersection upgrades).

Scandium21 Pty Ltd owns the rights to develop the Project. Scandium21 Pty Ltd is a wholly owned subsidiary of Clean TeQ.

In November 2017, Clean TeQ lodged a modification application to improve the overall efficiency of the Project (Modification 4). Modification 4 involves the implementation of a number of opportunities to improve the overall efficiency of the Project and would result in changes to Project traffic movements on the road network. A detailed description of Modification 4 is provided in the modification application.

The NSW Department of Planning and Environment is currently assessing the Modification 4 application.

3.2 Forecast Project Traffic Movements

Approved Project

The approved Project will generate traffic on the road network (including Forbes Street) as a result of the movement of employees, deliveries of raw materials, and transport of product. Forecast traffic movements for the approved Project are described in *Traffic Report Syerston Nickel Cobalt Project* (Masson Wilson Twiney, 2005). Table 3.3 summarises the forecast daily traffic for the approved Project in Trundle as outlined in Masson Wilson Twiney (2005).

Table 3.1: Approved Project Daily Traffic in Trundle (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Approved Project[A]	**188**	**34**	**222**
Employees	154	-	154
Limestone	-	-	-
Lime	-	-	-
Other	34	34	68

Source: Masson Wilson Twiney (2005)

Modified Project (Modification 4)

GTA Consultants (2017) prepared a Road Transport Assessment for Modification 4, which examines the implications of the modified Project on the operation of the road network. Table 3.2 summarises the forecast daily traffic for the modified Project in Trundle as outlined in GTA Consultants (2017).

Table 3.2: Modified Project Daily Traffic in Trundle (vehicles per day)

	Light Vehicles	Heavy Vehicles	Total Vehicles
Modified Project[B]	**256**	**90**	**346**
Employees	236	-	236
Limestone	-	72	72
Lime	-	8	8
Other	20	10	30

Source: GTA Consultants (2017)

The Road Transport Assessment adopted conservatively high forecasts of Project-generated traffic to assess the maximum case potential impacts of the Project on the road network. Based on these conservative forecasts, Modification 4 would result in the following key changes to traffic movements in Trundle compared with the approved Project (Table 3.1):

- Increased employee light vehicle movements (from 154 to 236 vehicles per day) due to conservative assumptions of the number of employees present per day and the level of car pooling being assumed for the modified Project compared with the approved Project, as well as variations in the assumed residential distribution of the workforce.
- Increased heavy vehicle movements (from 34 to 90 vehicles per day) due to the proposed transport of limestone and lime from external suppliers via the Bogan Way[1].

Employee traffic would tend to occur during the periods immediately prior to the start of a shift and after the end of a shift. With two 12-hour shifts expected, employee traffic would thus occur over two distinct peaks of half of the daily traffic occurring during the early morning 6.00 am to 7.00 am and half during the evening 6.00 pm to 7.00 pm. Employee traffic would not coincide with school peak periods. Materials transport would be permitted to occur throughout the day and night, although the majority would tend to occur during daylight hours. The heavy vehicle volume generated by the modified Project is equivalent to an average of under four heavy vehicles per hour on Forbes Street.

Modified Project (Modification 4) with Higher Capacity Vehicles

As described in Section 4.2.1 of the Road Transport Assessment, Clean TeQ was investigating the feasibility of operating shuttle bus services for employees to and from the Project. Based on this investigation, Clean TeQ has determined that it would operate shuttle buses to and from Parkes, Forbes and Condobolin to the mine. This initiative would significantly reduce Project light vehicles on Forbes Street.

[1] The number of vehicle movements associated with limestone transport assessed in the Road Transport Assessment relates to a scenario in which the maximum amount of limestone is transported from external suppliers to the mine (i.e. 560,000 tonnes per annum), and those vehicles travel through Trundle. If the maximum amount of limestone is transported from the Project limestone quarry, the amount from local quarries would be reduced below that assessed, and the number of limestone truck trips on Forbes Street would also be reduced.

Clean TeQ obtained Heavy Vehicle Authorisation Permit 119039 to operate higher capacity vehicles from Parkes to the mine in January 2018. Clean TeQ would therefore also use higher capacity vehicles to transport limestone to the mine than was assumed in the Road Transport Assessment. The use of higher capacity vehicles would reduce Project heavy vehicles on Forbes Street by approximately 20 heavy vehicle trips per day.

Table 3.3 summarises the forecast daily traffic for the modified Project in Trundle with use of employee shuttle buses and higher capacity trucks for limestone transport.

Table 3.3: Modified Project Daily Traffic in Trundle with Higher Capacity Vehicles (vehicles per day)

	Light Vehicles	Heavy Vehicles	Shuttle Buses	Total Vehicles
Modified Project – With Higher Capacity Vehicles	**70**	**70**	**6**	**146**
Employees	50	-	-	50
Employee Shuttle Buses	-	-	6	6
Limestone (with higher capacity trucks)	-	52	-	52
Lime	-	8	-	8
Other	20	10	-	30

With implementation of employee shuttle buses and the use of higher capacity vehicles to transport limestone, the modified Project would result in the following key changes to traffic movements in Trundle (Table 3.3) compared with the approved Project (Table 3.1):

- reduced employee light vehicle movements (from 154 to 50 vehicles per day);
- increased heavy vehicle movements (from 34 to 70 vehicles per day); and
- increased shuttle bus movements (from 0 to 6 vehicles per day).

The modified heavy vehicle movements (i.e. 70 vehicles per day) is equivalent to an average of approximately three heavy vehicles per hour on Forbes Street.

In addition to the above, it is understood that Clean TeQ is considering employing approximately one-third of the Project operational workforce (i.e. approximately 100 personnel) in a Regional Operations Centre in Parkes rather than working at the mine site (subject to separate approval). If this occurs, this would result in a significant reduction in the number of light vehicle trips through Trundle from that assessed by GTA Consultants (2017) (Table 3.2) and below that estimated with shuttle bus services (Table 3.3).

3.3 Traffic Management Plan

Condition 45, Schedule 3 of Development Consent DA 374-11-00 requires that a Traffic Management Plan be developed for the Project, which includes:

- details of all transport routes and traffic types to be used for development-related traffic;
- a program to monitor and report on the amount of limestone and product transported;
- the measures that would be implemented to minimise traffic safety issues and disruption to local users of the transport route/s;
- and a Road Transport Protocol for all drivers transporting materials to and from the site with measures to:
  - ensure drivers adhere to the designated transport routes;
  - verify that these heavy vehicles are completely covered whilst in transit;

- co-ordinate the staggering of heavy vehicle departures to minimise impacts on the road network, where practicable;
- minimise disruption to school bus timetables and rail services;
- ensure travelling stock access and right of way to the adjacent travelling stock route;
- maintain radio communications between all school buses and heavy vehicle operators operating on the transport route between the rail siding and mine;
- manage worker fatigue during trips to and from the site;
- manage appropriate driver behaviour including adherence to speed limits, safe overtaking and maintaining appropriate distances between vehicles (i.e. a Driver Code of Conduct);
- inform drivers of relevant drug and alcohol policies;
- regularly inspect vehicles maintenance and safety records;
- implement contingency procedures when the transport route is disrupted;
- respond to emergencies;
- transport processing reagents safely; and
- ensure compliance with and enforcement of the protocol.

The Road Transport Assessment for the modified Project (GTA Consultants, 2017) recommends that a Traffic Management Plan be prepared for the modified Project. This would include appropriate consideration of protocols for vehicles travelling through Forbes Street at Trundle.

3.4 Potential Impacts of the Modified Project on Forbes Street Environment

The modified Project would result in increased numbers of light and heavy vehicles on Forbes Street as described above. The light vehicle traffic would generally occur at the shift change-over times, with the morning peak occurring prior to the school peaks, and the evening peak occurring later than the school peaks. Outside of the times during which employees travel to and from the modified Project, the number of light vehicle trips generated by the Project would be very low. Heavy vehicle traffic would be spread throughout the day, with an average of under four heavy vehicles per hour on Forbes Street generated by the modified Project assuming no use of higher capacity vehicles. If higher capacity vehicles are used, the average would reduce to three heavy vehicles per hour on Forbes Street. Heavy vehicle driver behaviour would be managed via the Traffic Management Plan and Road Transport Protocol required as conditions of the Project approval.

Considering the forecast modified Project traffic in the context of the review of the existing pedestrian and vehicular environment in Forbes Street, it is considered unlikely that a significant deterioration in the safety of that environment would result with the modified Project. As for the existing conditions, no major issues are anticipated which would require immediate upgrading to meet current standards. Some aspects of the pedestrian and vehicular environment could however be improved to mitigate the existing issues identified and described previously (Section 2.6). Options for such improvements and the principles underlying them are discussed in Section 4.

4. Potential Management Options

4.1 Management Principles for Trundle

Based on the Austroads *Guide to Traffic Management Part 7: Traffic Management in Activity Centres* (2015) Forbes Street at Trundle would be classified as a mixed function centre with through traffic, consistent with a "Type II corridor" where both traffic and frontage activities are important. The relative importance of the activities may change during the day, week or year. The traffic functions include local and through vehicular traffic and pedestrian traffic, on-street parking and delivery, and parking manoeuvres. The frontage activity functions include the retail shops, schools, services and special buildings which attract people and their vehicles to the centre.

Austroads (2015) identifies the following key traffic management objectives and elements for an activity centre with through traffic such as Trundle:

- sharing the main street;
- moderating traffic speeds;
- providing priority to on-road public transport (where relevant); and
- maintaining adequate traffic capacity.

Traffic service expectations tend to be lower through activity centres, meaning that lower speeds and some delays are expected and accepted by drivers, and can be used as management tools. At lower speeds, lane widths can be reduced, noting that in Trundle, lane widths are not constrained but need to allow for heavy vehicles to safely pass each other travelling in opposite directions. A single travel lane in each direction will provide adequate capacity for the traffic volumes expected along Forbes Street, and observations suggest that auxiliary turn lanes are not required at the intersections along Forbes Street for capacity reasons or to reduce delays to through vehicles.

While existing and forecast traffic and pedestrian volumes are relatively low and do not require consideration of road or intersection capacity, adaption of the environment to encourage appropriate vehicle speeds would better serve pedestrians and other frontage activity in Forbes Street.

4.2 Speed Environment

The fundamental principle in setting the speed limit for a road is that the speed limit should reflect the safety risk to the road users while maintaining mobility and amenity. RMS is responsible for reviewing and setting speed limits on all roads in NSW. The default speed limits in urban built-up areas in NSW is 50 km/h, and 100 km/h in rural non built-up areas. The speed limit for a school zone in NSW is 40 km/h during the before and after school periods. The posted speed limits on The Bogan Way and Forbes Street are therefore consistent with RMS standards and drivers' expectations.

Buffer or transition zones, where a gradual reduction in speed limit is imposed (such as an 80 km/h speed limit between a 100 km/h rural limit and a 50 km/h urban limit) are not recommended in NSW. The use of an intermediate speed limit may be considered by RMS where adjacent roadside development supports the intermediate speed limit. The adjacent roadside development leading into Trundle (northbound or southbound) is not likely to support an intermediate speed limit between the 100 km/h rural speed limit and the 50 km/h urban speed limit.

The speed restriction ahead sign (G9-79) (Figure 4.1) is used by RMS to provide advance warning of changes in speed limits, notably where there is a speed reduction of 30 km/h or more. There are currently no speed restriction ahead signs to the north or south of Trundle. The use of speed restriction ahead signs is considered appropriate to alert both northbound and southbound drivers on The Bogan Way prior to entering Trundle.

Figure 4.1: Speed Restriction Ahead Sign

Awareness of posted speed limits may be enhanced by installation of radar speed signs (on either a temporary or permanent basis). These signs detect the speed of approaching vehicles, and display an alert if the posted speed limit is exceeded. Such speed signs are more regularly used in circumstances such as road works, however, the use of such technology can also be used in problematic area of speed limit compliance.

4.3 Pedestrian Facilities

Creating crossing points on Forbes Street will concentrate the movement of pedestrians to selected locations where facilities exist to improve the safety and amenity of the environment and accessibility for pedestrians. Any treatments need to effectively manage conflicts between vehicles and pedestrians, and be readily identifiable by all road users as a crossing point.

The potential conflict between pedestrians and vehicles can typically be managed by means of:

- time separation, including marked footcrossing (zebra crossings), raised marked footcrossings (wombat crossings), children's crossings, mid-block traffic signals, pelican crossings, signalised intersection crossings;
- spatial separation, including pedestrian refuges, traffic islands, medians, kerb extensions, pedestrian fencing, chicanes;
- grade separation, including subways and bridges; and/or

- advance warning of the presence of pedestrian and pedestrian facilities ahead, including user-activated warning signs, similar to those which have been piloted[2] in the Cootamundra region.

The choice of facility will be dependent on a number of factors, the first of which is the demand. Infrequently used facilities come to be ignored, hence RMS publishes warrants for pedestrian and vehicular volumes which need to be met before provision of time separation facilities will be considered. The observed pedestrian volumes across Forbes Street, observed traffic volumes along Forbes Street and surveyed traffic volumes on The Bogan Way north of Trundle are well below the levels required to meet the standard warrants for installation of a zebra crossing or children's crossing, and well below the special warrant levels which may be used to consider installation of a zebra crossing in special circumstances. The additional traffic forecast to travel along Forbes Street with the approved Project (Table 3.1) or modified Project (Table 3.2) would not be sufficient to increase demands to a point where the requirements of the warrants would be met.

Similarly, grade separation of pedestrians and vehicles would not be justified by the observed vehicle and pedestrian volumes, and would not be practical for a main street such as Forbes Street.

Spatial separation of pedestrians and vehicles is considered the most appropriate treatment in a rural activity centre which includes through traffic such as Trundle. Appropriate spatial separation treatments for Trundle may include pedestrian refuges, traffic islands, medians, and kerb extensions. Pedestrian fencing is not considered appropriate on Forbes Street, and chicanes are not considered appropriate due to the need to permit access by heavy vehicles.

4.3.1 Medians and Refuge Islands

Due to the width available in Trundle, wide medians or pedestrian refuges may be used along Forbes Street to provide "shelter" for pedestrians, and visually reduce the width of the carriageway to encourage lower vehicle speeds. Landscaping or pocket park treatments may be incorporated into such treatments. Median islands and pedestrian refuges often result in some loss of on-street parking due to the need to divert traffic lanes around the island, and the need for "no stopping" restrictions typical of pedestrian crossing locations. Due to the layout of Forbes Street, significant loss of on-street parking may not necessarily be required, due to the availability of the clear zones on each side of the traffic lanes, and the ability to restrict access to some parking bays from the main road and permit access from the service lane. The Trundle Progress Association developed an option for an oversize median island/pedestrian refuge treatment for Forbes Street, which is presented in Appendix A.

While space is available for such a treatment, or other median or centre refuge treatments, consultation with the community suggests that while some members of the community were in support of this concept, others did not support it due to the impact on the streetscape of the iconic wide main street.

[2] https://www.cootamundraherald.com.au/story/3453750/cyclists-light-up/, accessed 19 December 2017 (See 0)

4.3.2 Kerb Extensions

Kerb extensions provide shelter for pedestrians adjacent to the travel lanes, reduce their exposure to moving traffic, may improve visibility of pedestrians, and visually reduce the width of the street for drivers. They thus improve pedestrian safety and reduce vehicle speeds (Austroads, 2016). They can be used in conjunction with refuges or median islands, but also as a standalone facility. Kerb extensions would still require pedestrians to cross two lanes of traffic in one movement, but allows them to wait close to the edge of the travel lanes. They are likely to be less intrusive to the wide streetscape of Forbes Street. Installation of kerb extensions is generally likely to result in some localised loss of on-street parking, and the adequacy of street lighting should be considered. Typical examples of kerb extensions are presented in Appendix B.

Due to the layout of Forbes Street, with service lanes, angle parking, clear zones and travel lanes, kerb extensions would need to be installed in a modified format, to allow pedestrians to cross the service lanes, then be sheltered across the width of the parking and clear zones. The kerb extension would thus effectively form an island between the main carriageway lanes and the service lanes, and be constructed with a raised surface, requiring kerb ramps on the island and footpath to provide an accessible path of travel for all users. If desired, the pedestrian path across Forbes Street at the crossing point may be highlighted by use of a contrasting pavement surface, giving an additional visual cue to drivers of the presence of pedestrians.

4.3.3 Pedestrian-Activated Warnings

While this is not a current standard treatment, the concept of user-activated warning signs has been trialled for cyclists (Appendix C) and may be adapted for use by pedestrians by way of flashing lights combined with the standard pedestrian (W6-1) sign. The design of such a system would need to be developed with consideration of the specific needs of the location, to determine how the warning lights would be activated and where the lights would be appropriately located. Unless installed at a marked pedestrian crossing, any such system should not suggest to pedestrians that they have right of way over vehicles.

4.4 Threshold Treatments

Threshold treatments aim to alert approaching drivers that they are entering an environment that is different from the one they have just left, and may incorporate contrasting colour or textured road surface treatments, raised or flush median treatments, and signage and "statement" landscaping as a visual cue to the new road environment. Textured pavement surfaces at an entry threshold may also provide an auditory cue to drivers, however may not be appropriate with heavy loadings such as on major rural roads, and may create stability issues for motorcyclists and cyclists.

In rural towns, an entry threshold often incorporates a town entry statement, with Shire branding or local features highlighted. Austroads (2016) suggests a threshold pavement treatment should extend for a minimum of 5 m to create adequate visual impact. Coloured pavement thresholds used in conjunction with speed signage can assist to reduce vehicle speeds (Center for Transportation Research and Education, 2007).

Examples of typical threshold treatments in rural environments are presented in Appendix D.

4.5 Traffic Bypass of Trundle

Community representatives raised the idea of Project heavy vehicles using a bypass route to avoid travelling through Trundle:

- a regional bypass via Fifield Road, Condobolin Road, Condobolin-Trundle Road to The Bogan Way; or
- a local bypass around the eastern side of Trundle from The Bogan Way via Numulla Road, Bruie Plains Road and Ravenswood Lane to The Bogan Way.

These routes are unclassified local roads, with the exception of Fifield Road, that include unsealed sections with sub-standard intersection layouts. These local roads are not designed for heavy vehicle transport movements and significant road upgrades would be required to carry heavy vehicles.

Use of the regional bypass route would not impact the use of Forbes Street by non-Project heavy vehicles, which would continue to use The Bogan Way. The local bypass route may be used by all heavy vehicles using The Bogan Way which do not have need to stop in Trundle, which would result in significant proportional increases in traffic along that route, with adverse impacts for users of these roads and its residents.

The adoption of either of the proposed bypasses would result in the diversion of heavy vehicle traffic from an existing Regional Road that functions as a regional connector road to local roads that are principally for local access and currently do not experience any significant traffic volumes. Use of the Regional Road by the heavy vehicles is consistent with Parkes Shire Council's submission in response to the Modification 4 application, which requests that the transport of materials use the National, State, Regional and then local roads in order of priority.

In addition, an economic evaluation of town bypasses (NSW Roads and Traffic Authority, 2012) used Gunning as an example of a small town which is broadly similar in its composition and structure to Trundle. The study concluded that "*small towns (less than 2,500 persons) were shown to be more at risk of adverse economic impacts than medium or larger size towns.*"

Overall it is considered that the existing and forecast heavy vehicle volumes on Forbes Street would not justify construction of a bypass route.

5. Recommendations

After consultation with the community, it is clear that there are a range of views of the impacts of traffic on the town of Trundle that would result from the modified Project. There is a need to retain the iconic streetscape, but appropriately manage the existing and future traffic conditions. This is particularly relevant to the elderly population and school students.

The review has found that no major issues are anticipated for the pedestrian and vehicular traffic environment of Forbes Street as a result of the Project that would require immediate upgrading to meet current standards. Some aspects of the pedestrian and vehicular environment could however be improved to mitigate the existing issues identified and described previously.

5.1 Recommended Treatments

Although median island or central pedestrian refuge treatments would improve conditions for pedestrians by allowing for staged crossing of Forbes Street, these treatments are not preferred for Forbes Street due to the impacts on the iconic streetscape.

A kerb extension treatment would improve existing conditions for pedestrians, and is the preferred treatment as the impact on the streetscape would be less significant. Kerb extension treatments will potentially result in some loss of on-street parking, however observations indicate that there is adequate capacity to accommodate a small loss.

Any kerb extensions should be designed and located with consideration of the relocation of street trees proposed under the Parkes Shire Council's Trundle Main Street Avenue of Remembrance Tree Replacement Proposal.

Kerb extensions can be supplemented by road markings, warning signs and potentially the installation of rumble strips, although the latter would need to consider the potential for noise impacts to residents and businesses. Subject to further discussion with the community, Parkes Shire Council and RMS, the suggested location for a kerb extension would be near the northern end of the Trundle Hotel, in line with 61/63 Forbes Street (Figure 5.1). This links the relevant businesses in Trundle, but is set back adequately from the major intersection with Parkes Street. The kerb treatment would be modified to suit the conditions of Forbes Street, effectively forming an island between the edge of the service lane and the edge of the carriageway (across the angle parking), with kerb ramps on the footpath, and each side of the island/extension. Minor loss of parking is anticipated.

It is also recommended that a kerb extension treatment be considered on Forbes Street south of Parkes Street, to serve not only general pedestrian activity but also to assist those school students who need to cross Forbes Street (Figure 5.1). A treatment close to the school would make use of the narrower carriageway and good sightlines near Croft Street, while a treatment close to Little Lane may assist to slow vehicles in the vicinity of the crest, and thus mitigate the sight distance concerns. Either option would thus result in some improvement for pedestrians, however on balance, provision of a defined pedestrian route near the school and within the 40 km/h school speed zone is considered the preferred location. As there are grassed verges on each side of Forbes Street, the kerb extension would need to be modified from a standard design, and may therefore be constructed by providing sealed footpaths directed towards the carriageway, with kerb ramps on each side. This provides a clear cue to students that this is the preferred crossing location, which would be located between East Street and Croft Street.

It is recommended that consideration be given to installing threshold treatment at the entries to the built-up area of Trundle (Figure 5.1). The purpose of these treatments would be to announce the entry into Trundle and act as a visual reminder to all drivers that they have left the high-speed rural environment and are entering the low-speed urban environment. The form of such an entry should ultimately be decided by the Trundle community. The threshold treatments may incorporate contrasting pavement surfaces, lighting and landscaping, and location branding.

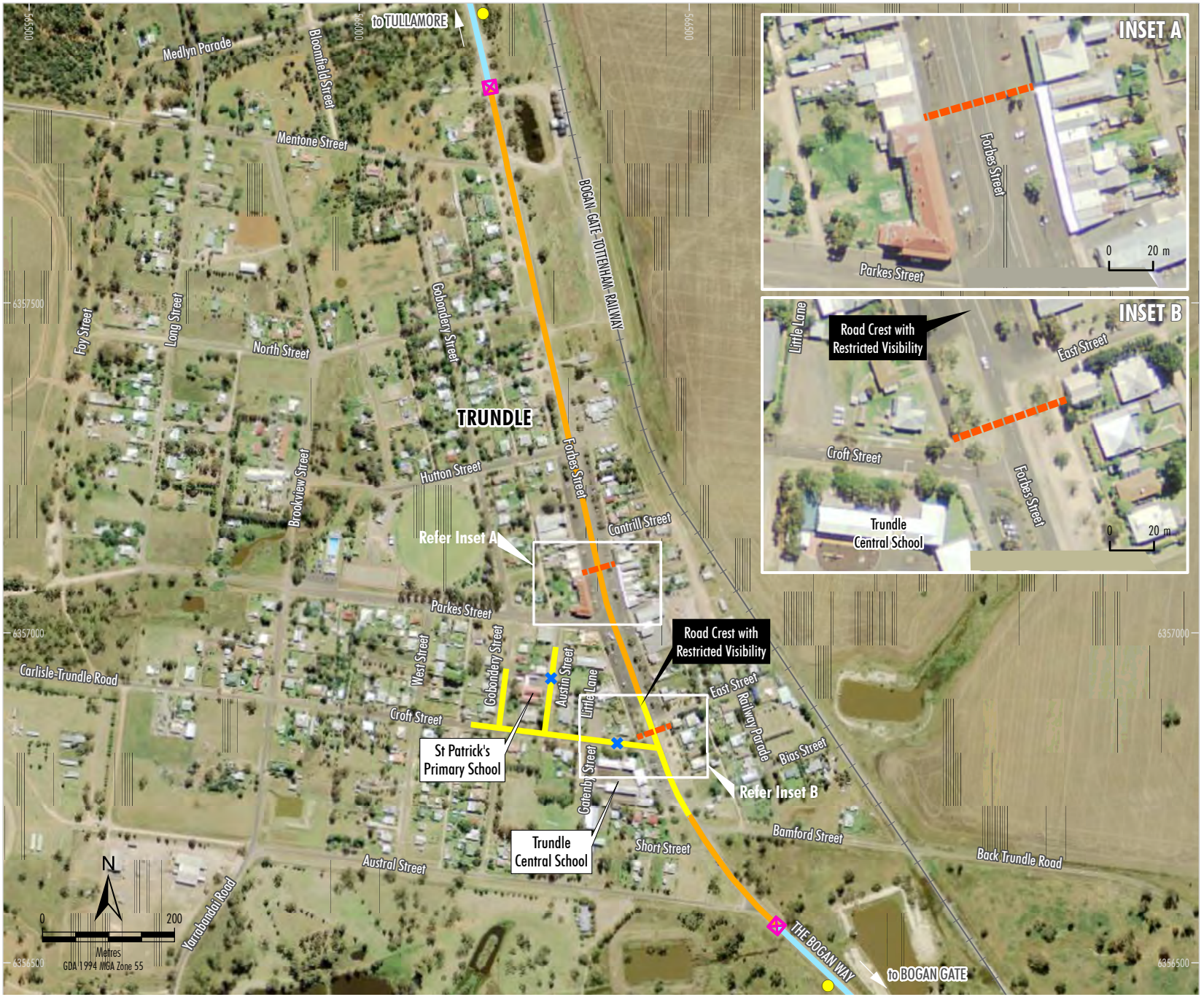
The installation of speed reduction warning signs on The Bogan Way to alert drivers to the reduction in the posted speed limit is recommended (Figure 5.1). These should be placed in accordance with RMS guidelines, i.e., between 110 m and 170 m from the speed zone change for vehicles travelling in a 100 km/h speed zone.

5.2 Operational Review

The management of potential road transport impacts would be managed in accordance with the Traffic Management Plan (Section 3.3).

It is recommended that the Traffic Management Plan include an audit of heavy vehicle movements on Forbes Street and for Clean TeQ to consult with the Trundle community regarding the traffic and pedestrian environment impacts within 12 months of commencement of operations at the Project. Such consultation would aim to identify any unforeseen issues which may have arisen, and the need for any further management or monitoring of heavy vehicles through Trundle. Further management measures may include (but are not limited to):

- temporary or permanent installation of radar speed signs which detect the speed of approaching vehicles, and display an alert if the posted speed limit is exceeded; and/ or
- pedestrian-activated flashing signage at crossing points. The concept of user-activated warning signs has been trialled (Appendix C) and may be adapted to pedestrians in Trundle by way of flashing lights combined with the standard pedestrian (W6-1) sign.



LEGEND

Posted Speed Limits

- 100 km/h
- 50 km/h
- 40 km/h School Zone
- School Pedestrian Crossing
- Proposed KerbTreatment
- Proposed Threshold Treatment
- Proposed Speed Reduction Warning Sign

Source: NSW Land and Property Information (2017)

NSW Image: © Department of Finance, Services & Innovation (2017)

CLEAN TEQ

CLEAN TEQ SUNRISE PROJECT

Recommended Treatments

Figure 5.1

CTL-16-02 Mod4_PedRev_203B

6. Summary

Overall, the review found that the existing pedestrian and vehicular environment in Forbes Street is generally satisfactory, with no major issues which would require immediate upgrading to meet current standards. Some aspects of the pedestrian and vehicular environment could however be improved to mitigate the issues identified and described in this report.

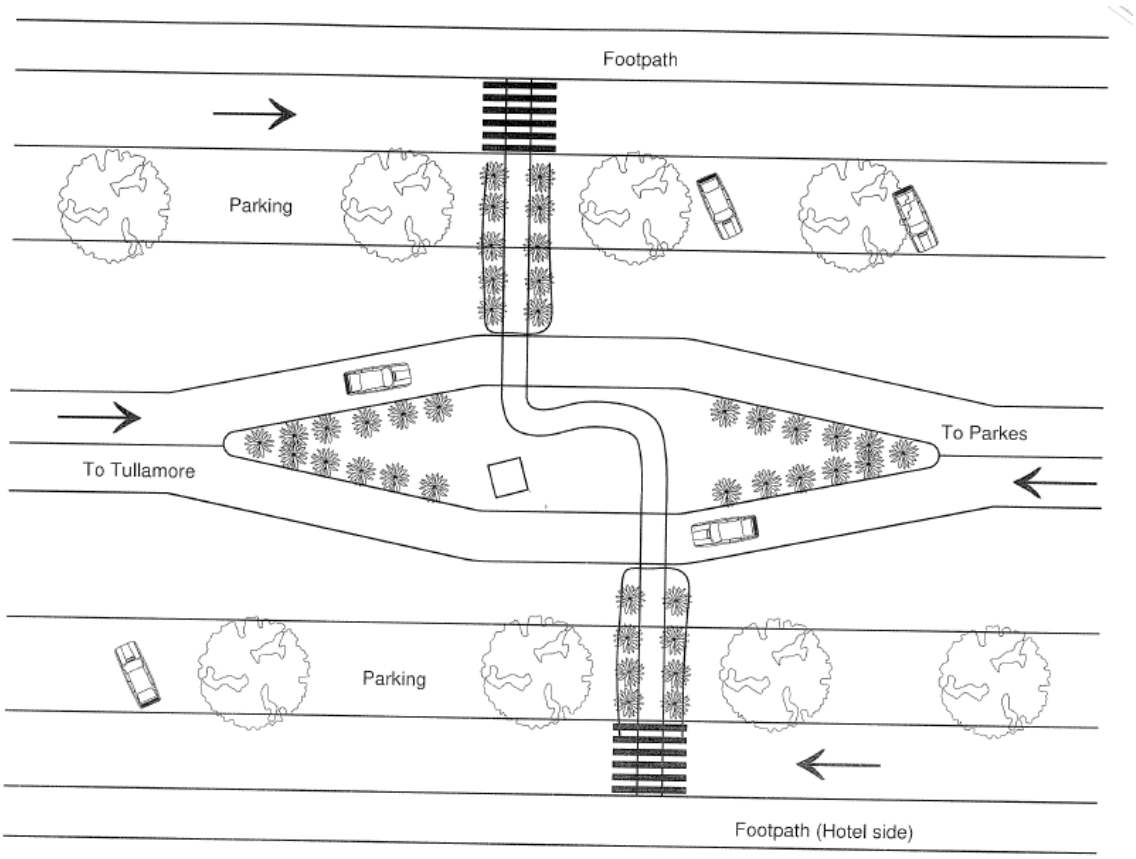
Considering the forecast modified Project traffic in the context of the review of the existing pedestrian and vehicular environment in Forbes Street, it is considered unlikely that a significant deterioration in the safety of that environment would result with the modified Project. No major issues are therefore anticipated which would require immediate upgrading to meet current standards.

As for the existing conditions, some aspects of the pedestrian and vehicular environment could however be improved to mitigate the existing issues identified and described in this report. The recommended treatments are:

- a modified kerb extension treatment near 61/63 Forbes Street;
- a modified kerb extension treatment between Croft Street and East Street;
- threshold treatments at the northern and southern entries to Trundle;
- speed reduction warning signs on the northern and southern approaches to Trundle; and
- audit of heavy vehicles and consultation with the Trundle community within 12 months of commencement of operations at the Project.

Appendix A

Trundle Progress Association Oversize Median Proposal



Appendix B

Kerb Extension Examples

City of Yarra, Victoria

City of Glenorchy, Tasmania

Source: Austroads (2016)

Source: http://www.victoriawalks.org.au/crossings/ accessed 12 January 2018

Source: http://engage.burnside.sa.gov.au/eastwood-local-area-traffic-management-latm/news_feed/treatment-options-include accessed 12 January 2018

Appendix C

User-Activated Warning Sign

From https://www.cootamundraherald.com.au/story/3453750/cyclists-light-up/, accessed 21 December 2017

CYCLISTS LIGHT UP

INNOVATION: Rod Holder demonstrates the new bicycle safety warning sign he has produced, and hopes to soon see around Cootamundra Shire. Picture: Harrison Vesey

ROD Holder is breaking new ground in cyclist safety with what may be a world-first innovation.

The keen cyclist has been working for 12 months on his idea for a user-activated warning sign.

“The main complaint motorists have is when they’re coming over a hill or around a corner and a cyclist is right there, it shocks them,” Rod said.

The solar-powered warning signs are similar to those in place around school zones. Rather than running during set hours though, they are activated by a cyclist who hits the trigger as they ride past.

The warning lights can be set to flash for a set amount of time, depending on how long it takes the average cyclist to navigate that section.

Rod's dream is for the signs to be placed in hazardous sections of road around the shire.

"Cootamundra is a cyclist-friendly town, I want to see what we can do to make it even more friendly and safe."

Whilst he is hesitant to call it a world first, Rod has not come across any similar designs in his research or in conversations with other cyclists around the country.

The first signs have been set up on either end of Berthong Rd for a six-month trial period, thanks to the support of Cootamundra Shire Council (CSC).

CSC Engineering Services director Gary Arthur said the council was happy to support the local initiative.

"It sounds like a good idea. It may not be used everywhere, but it could be a good thing for hill areas and dangerous corners," he said.

The council is now monitoring the signs to "see what happens" and decide whether the design has a place.

Cootamundra Cycle Club president Mark Loiterton agrees it is a "brilliant" proposal.

"I'm fully in agreement with the whole thing, it's got to be a great idea from a safety perspective," he said.

Berthong Rd was selected for the trial due to its popularity with local cyclists. The road is also heavily used by trucks during harvest.

The signs light up for 25 minutes after being turned on, and the timer resets if another cyclist hits the trigger.

Rod is now urging all local cyclists to use the signs so he can keep track of their usage and report back to council.

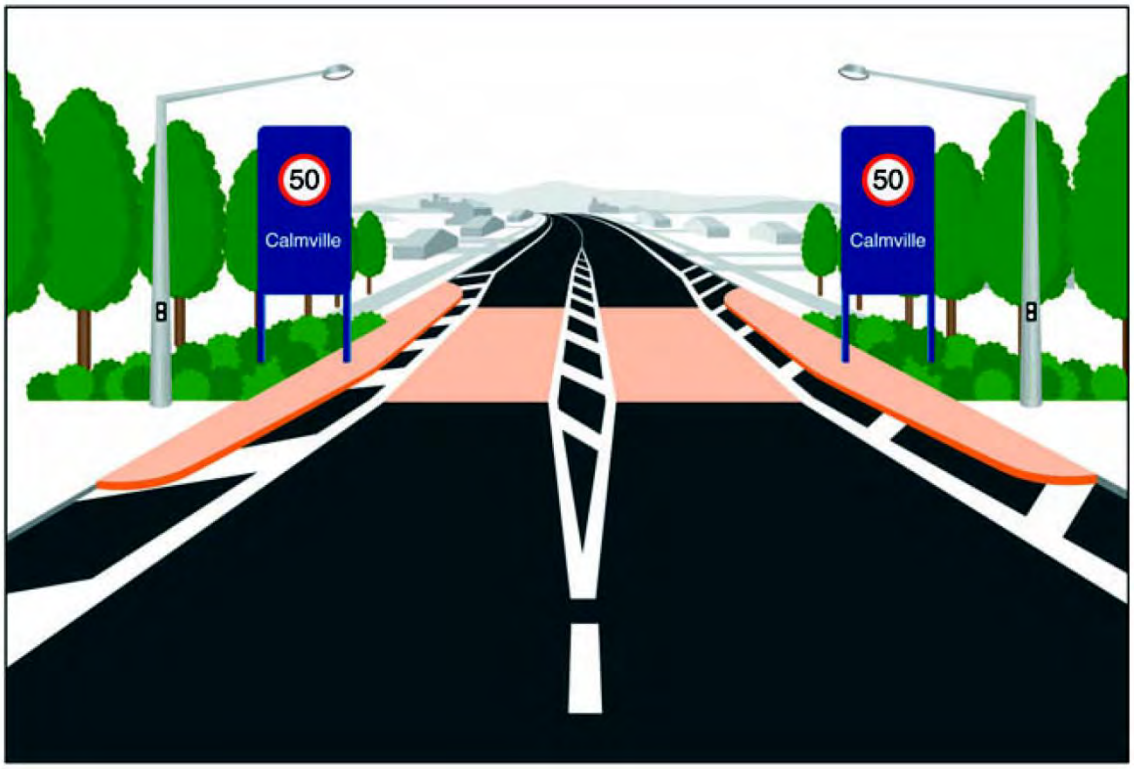
Rod estimates ten signs would be enough for shire roads.

He is currently in talks with Roads and Maritime Sevices regarding the possibility of signs on Gundagai Rd.

For any feedback, positive or negative, is welcome at rod.holder@agland.com.au.

Appendix D

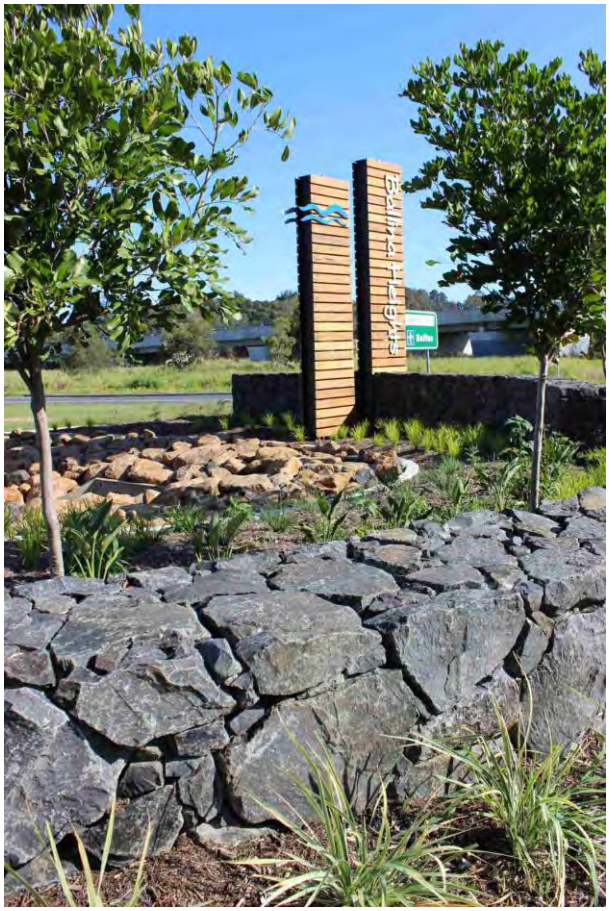
Entry Threshold Examples



Source: *Guidelines for urban-rural speed thresholds,* Land Transport Safety Authority (2002)


BURRURUNDI


WELCOME
TOWN OF
PARADISE VALLEY



Source http://www.designteamink.com/ballina-heights-drive-landscaping-and-entry-treatment/ accessed 21 December 2017

Source: http://static.panoramio.com/photos/large/50156146.jpg, accessed 21 December 2017

Source: https://www.google.com.au/maps/@-35.3428802,150.4655385,3a,75y,126.09h,92.53t/data=!3m6!1e1!3m4!1sO-u4HyCpOBcEQmR8GEO6Zg!2e0!7i13312!8i6656, accessed 21 December 2017

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