[redacted]

[redacted]

3 December 2024
Project #: WGA241858
Doc. WGA241858-LT-TT-0002_B
[redacted]

Dear Gracie,

PLANNING PROPOSAL | PROPOSED SERVICE STATION DEVELOPMENT
LOT 1 DP507141 254 TAREAN ROAD, KARUAH
SIDRA INTERSECTION MODELLING | ADDENDUM TO TRAFFIC & PARKING ASSESSMENT

1. INTRODUCTION

WGA has been engaged by Perception Planning on behalf of Coastal Earthmoving to undertake a traffic engineering assessment to supplement the previous Traffic and Parking Assessment report prepared by Intersect Traffic dated March 2022.

The following assessment has been prepared in response to preliminary comments received from Transport for NSW (TfNSW) (file no: NTH24/00398/001), and the subsequent receipt of in principle agreement from TfNSW regarding the proposed assessment methodology.

2. REFERENCED DOCUMENTATION

In the course of preparing the following assessment the following information and documentation has been referenced:

- Traffic movement count surveys between Wednesday 16 October and Tuesday 22 October 2024 by Northern Transport Planning and Engineering.
- Traffic and Parking Assessment report prepared by Intersect Traffic dated March 2022.
- Scoping Proposal report prepared by Perception Planning (PP Ref: J002455) dated April 2022.
- Transport for New South Wales Guide to Transport Impact Assessment.
- Roads and Maritime Trip Generation Surveys: Service Stations Data Report
- Austroads Guide to Traffic Management (AGTM) Part 12: Integrated Transport Assessments for Developments
- Nearmap aerial imagery and Google Streetview imagery, as required.

3. PROPOSED DEVELOPMENT

The proposed development comprises a service station across approximately 400sqm with provisions for up to six (6) double sided fuel bowsers.

It is understood that following preliminary conversations with Council, the development scheme detailed within the Scoping Proposal and Traffic and Parking Assessment reports has been amended to remove the commercial tenancies previously contemplated as part of the proposal.

4. EXISTING TRAFFIC VOLUMES

To gain an understanding of the prevailing traffic conditions along the site frontage, WGA commissioned pneumatic tube counts on Tarean Road across a typical seven (7) day period.

A review of the surveyed traffic volumes suggests that the vehicular movements along the site frontage peak at the following times:

- **Weekday Peak:**
  - AM Peak: 8:00am – 9:00am.
  - PM Peak: 3:00pm – 4:00pm.
- **Weekend Peak:** 10:00am – 11:00am.

A summary of the existing peak hour traffic volumes along the Tarean Road frontage are shown in Table 1.

Table 1: Surveyed Existing 2024 Tarean Road Traffic Volumes

DIRECTION	WEEKDAY PEAK		WEEKEND (SAT) PEAK
	AM PERIOD	PM PERIOD	
Eastbound	81 vph	147 vph	207 vph
Westbound	132 vph	117 vph	144 vph
Both Directions	213 vph	264 vph	350 vph

5. FUTURE TRAFFIC CONDITIONS

To determine the extent of background growth along Tarean Road, historical traffic volume surveys undertaken in 2019 and detailed within the previous Traffic and Parking Assessment prepared by Intersect Traffic have been referenced and compared against the existing traffic volumes detailed in Table 1.

A comparison of the surveyed volumes is detailed in Table 2.

Table 2: Surveyed Tarean Road Traffic Volumes - 2019 vs 2024 (PM Peak)

DIRECTION	2019 SURVEYED VOLUMES	2024 SURVEYED VOLUMES	CALCULATED ANNUAL GROWTH RATE
Eastbound	58 vph	147 vph	+ 20%
Westbound	69 vph	117 vph	+ 11%
Both Directions	127 vph	264 vph	+ 16%

To gain an understanding of the anticipated future traffic volumes, the calculated growth rate outlined within Table 2 has been applied to the surveyed Tarean Road traffic volumes in accordance with the *Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments*.

The following factors have been used to determine the future base traffic volumes (pre-development):

- **Applied growth rate:** 16%.
- **Estimated year of development completion:** 2026.
- **Design period:** 5 years.
- **Assessed design year:** 2031.

It is noted that due to the large compound annual growth rate calculated within Table 2, a reduced design period of five (5) years has been adopted as to not over-estimate the potential future traffic volumes along Tarean Road.

With consideration of the factors outlined above, the projected 2031 future Tarean Road traffic volumes (existing traffic volumes plus background network growth) across the AM, PM and weekend peak periods (pre-development) are shown in Table 3.

Table 3: Tarean Road Projected Future Traffic Volumes - Design Year 2031

DIRECTION	2024 SURVEYED VOLUMES			2031 PROJECTED VOLUMES		
	AM PEAK	PM PEAK	SAT PEAK	AM PEAK	PM PEAK	SAT PEAK
Eastbound	81 vph	147 vph	207 vph	168 vph	306 vph	349 vph
Westbound	132 vph	117 vph	130 vph	274 vph	243 vph	570 vph
Both Directions	213 vph	264 vph	350 vph	443 vph	549 vph	921 vph

6. TRAFFIC GENERATION

6.1 Service Station Traffic Generation Rates

The TfNSW *Guide to Transport Impact Assessment* outlines typical traffic generation rates for various land uses, including service stations, and provides guidance for proposed trip generating developments.

The traffic generation rates for a service station use are informed by detailed traffic volume surveys and subsequent analysis undertaken in 2013 by TEF Traffic, Environmental & Forensic Engineers on behalf of RMS (now TfNSW).

These surveys supersede the previous rates contained within the *RTA Guide to Traffic Generating Developments* and note the following characteristics of the surveyed service stations when compared to the previous surveys:

- Service stations are now much larger.
- Service stations now also offer convenience items and groceries.
- Service stations are often attached to fast food outlets.
- Much petrol retailing is now allied to large supermarket chains and loyalty schemes.
- Petrol pricing is highly variable day-to-day, with consequent wide variations in customer patronage.

With this noted, Chapter 5 of the Guide goes on to outline the following vehicle generation equations to determine the likely vehicular movements anticipated to be associated with the site:

- **AM peak hour:** $0.2815(N)^2 + 14.047(N) + 16.715$
- **PM peak hour:** $0.205(S) + 88.52$

Where (N) refers to the number of service channels at the service station and (S) refers to the total site area.

Application of the details of the proposed development outlined within Section 3 result in the following peak hour movements (inbound and outbound):

- **AM peak hour:** 142 vph
- **PM peak hour:** 171 vph

Application of the traffic generation rates outlined within the Guide suggest that the site may generate up to 171 vehicular movements during peak periods, representing up to approximately 30% of the projected 2031 Tarean Road traffic volumes.

Given a large percentage of vehicular movements generated by service stations is associated with passing trade, the number trips generated by service station developments are considered to be largely a function of the traffic volumes passing the site.

Therefore, with consideration of relatively minor Tarean Road projected 2031 traffic volumes, a further assessment has been undertaken to supplement the above analysis.

6.2 Composition of Site Generation Traffic

Austroads *Guide to Traffic Management (AGTM) Part 12: Integrated Transport Assessments for Developments* states that vehicular movements generated by a site consists of a variety of trip types including:

- **New trips:** Trips attracted to the development and without the development would not have been made.
- **Diverted drop-in trips:** A linked trip from an origin to a destination that has made a significant network diversion to use the new development.
- **Undiverted drop-in trips:** A linked trip from an origin to a destination that has previously passed the development site. It is also referred to as a pass-by trip and the new development as an intermediate stop on a trip that is made from an origin to a destination.

Commentary 8 of AGTM Part 12 provides a commentary on linked trips that states at the local level, undiverted drop-in trips to developments on roads of regional significance can be regarded as already on the local network.

Section 5.5.6 of the Guide also states that for certain land uses, such as service stations, linked trips represent a significant proportion of the trips generated by the development. The Guide goes on to state that as these trips will have already existed on the network without the development, a discount may be applied to account for this.

The survey data contained within the *Roads and Maritime Trip Generation Surveys: Service Stations Data Report* have been reviewed further to determine the relationship between the traffic generation of service stations and the traffic volumes along the frontage road of the site for the following three (3) identified regional sites:

1. Caltex Heathcote, New South Wales.
2. Caltex Riverstone, New South Wales.
3. 7-Eleven, Bargo, New South Wales.

A summary of the individual site characteristics and the relationship between frontage road traffic volumes and site traffic generation is shown in Table 4.

Table 4: Regional Service Station Traffic Generation and Frontage Road Volumes

SITE LOCATION	FRONTAGE ROAD VOLUMES	PEAK TRAFFIC GENERATION	PERCENTAGE OF LINKED TRIPS
Heathcote	1,509 vph	159 vph	10.5%
Riverstone	1,400 vph	143 vph	10.2%
Bargo	1,067 vph	318 vph	29.8%

It is noted that the surveyed Bargo location was considered to be substantially different from all other surveyed sites due to its remote location from the metropolitan area, large site area and its function as a rest / refresh stopping point on a major highway.

Therefore, the Bargo location has been considered an outlier and has not been referenced within the following assessment. Instead, an average percentage of linked trips in the order of 10% has been adopted to inform the following assessment.

6.3 Site Generated Traffic Volumes

Application of the specified proportion of linked trips to the projected 2031 Tarean Road traffic volumes (outlined within Section 5) results in the following peak hour movements (comprising inbound and outbound movements):

- **AM peak hour:** 44 vph
- **PM peak hour:** 55 vph
- **Weekend peak hour:** 92 vph

This peak traffic generation is considered to be more reflective of the likely traffic generating characteristics of the site, when compared to the guidance outlined within the Guide, and have therefore been used in the subsequent assessment.

Furthermore, during peak periods it is expected the site generated traffic will comprise 50% inbound movements and 50% outbound movements.

Based on the preceding discussions, the peak hour traffic volumes anticipated to be generated by the subject site are summarised within Table 5.

Table 5: Anticipated Site Generated Traffic Volumes

PEAK PERIOD	INBOUND MOVEMENTS	OUTBOUND MOVEMENTS	TOTAL MOVEMENTS (TWO-WAY)
AM Peak	22 vph	22 vph	44 vph
PM Peak	28 vph	27 vph	55 vph
Weekend Peak	46 vph	46 vph	92 vph

7. POST DEVELOPMENT TRAFFIC VOLUMES

Application of the calculated site generated traffic volumes outlined within Section 6.3 to the projected 2031 traffic volumes discussed in Section 5 results in the following post development 2031 traffic volumes outlined in Figure 1.

Figure 1: Year 2031 Post Development Peak Hour Traffic Volumes

8. POST DEVELOPMENT TRAFFIC CONDITIONS

An assessment of the proposed site access from Tarean Road has been undertaken using SIDRA Intersection 9.0 modelling software for the following scenarios:

- 2024 Post Development Conditions (i.e. no network background growth).
- 2031 Post-Development Conditions (existing conditions plus 5-year background growth from year of completion).

SIDRA Intersection 9.0 is a computer-based modelling tool that allows for the capacity of an intersection or a number of intersections to be analysed in terms of a range of parameters, as described below.

The most commonly used measure of intersection performance is Degree of Saturation (D.o.S), which is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various degrees of saturation and their rating are shown in Table 6

Table 6: Ratings of Degrees of Saturation

DEGREE OF SATURATION (D.o.S)	RATING
Up to 0.6	Excellent
0.6 to 0.7	Very Good
0.7 to 0.8	Good
0.8 to 0.9	Fair
0.9 to 1.0	Poor
Above 1.0	Very Poor

It is considered acceptable for some critical movements in an intersection to operate with a D.o.S up to 0.95 during peak periods, reflecting actual conditions in a significant proportion of suburban signalised intersections. Beyond a D.o.S of 0.95 queuing and delays begin to increase disproportionately.

Additionally, Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Methods refers to target 'practical degrees of saturation' for a number of intersection configurations, as follows:

- Signals: 0.90
- Roundabouts: 0.85
- Unsignalised Intersections: 0.80

95th Percentile (95%ile) Queue represents that maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour.

Average Delay is the delay time, in seconds, which can be expected over all vehicles making a particular movement in the peak hour.

The results of the SIDRA analysis outlining a comparison between the existing operating conditions and the subsequent post-development conditions has been summarised in Table 7.

Table 7: SIDRA Intersection Analysis Results Summary

APPROACH	2024 POST DEVELOPMENT CONDITIONS			2031 POST DEVELOPMENT CONDITIONS		
	D.o.S	AVERAGE DELAY (s)	95TH %ILE QUEUE (m)	D.o.S	AVERAGE DELAY (s)	95TH %ILE QUEUE (m)
Weekday AM Peak						
Site Access (N)	0.02	5	1	0.03	6	1
Tarean Road (E)	0.07	1	0	0.15	0	0
Tarean Road (W)	0.04	1	0	0.09	0	0
Weekday PM Peak						
Site Access (N)	0.03	5	1	0.05	8	1
Tarean Road (E)	0.06	1	0	0.13	0	0
Tarean Road (W)	0.07	1	0	0.16	0	0
Weekend Peak						
Site Access (N)	0.07	7	2	0.14	14	4
Tarean Road (E)	0.14	1	0	0.31	0	0
Tarean Road (W)	0.08	1	1	0.18	1	1

The results of the SIDRA assessment outlined in Table 7 suggest that the proposed development will have a negligible impact on the operation of Tarean Road under both scenarios, with all site generated traffic volumes able to be readily absorbed by the surrounding network.

9. APPROPRIATENESS OF EXISTING SITE ACCESS ARRANGEMENTS

WGA understands that the site previously functioned as a service station, with two (2) crossovers provided to Tarean Road. The site is accessed via auxiliary left and right turn lanes provided on the east and west approaches, respectively. An acceleration lane is also provided for vehicles turning right out of the site and travelling eastbound.

The auxiliary right turn lane into the site is situated back-to-back with an auxiliary lane providing access to The River Road. In order to reduce the likelihood of conflicting movements, it is recommended to restrict right turn entry movements to the western crossover only, with the indicative access arrangements shown in Figure 2.

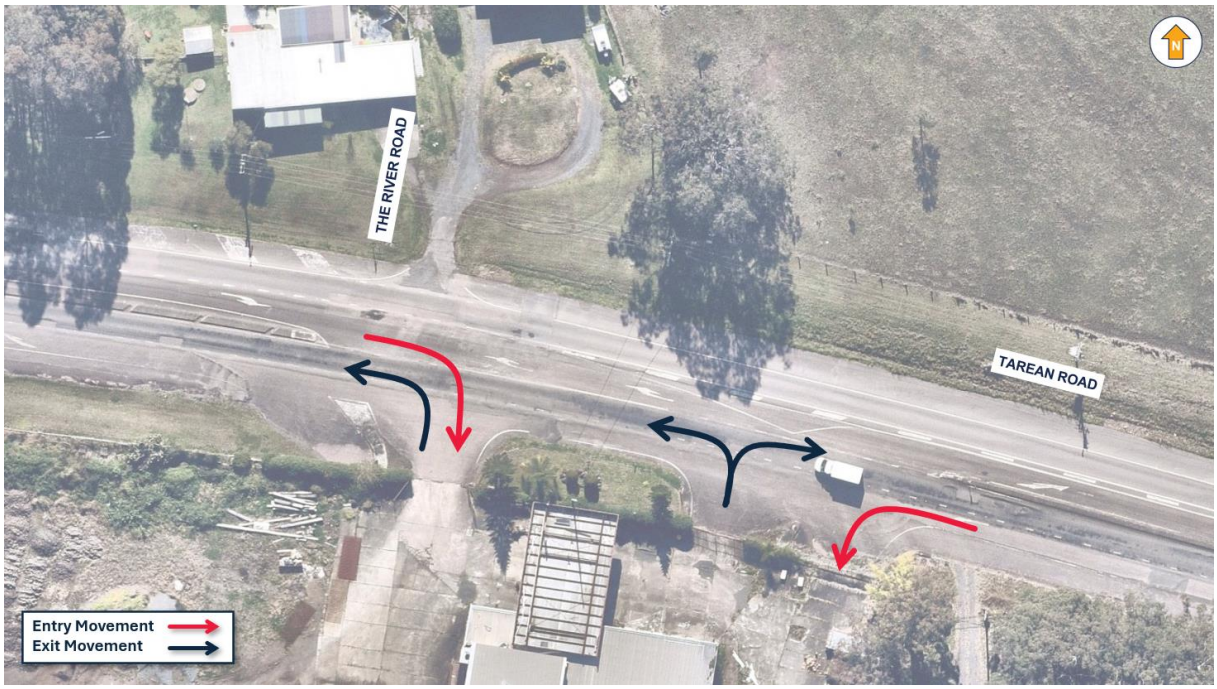

Figure 2: Recommended Access Arrangements

It is recommended that the access arrangements be supported by implementing signage on the western approach to the site. It is also advised to consider extending the existing median kerbing to improve compliance of the banned right turn movement into the eastern crossover.

10. SUMMARY AND CONCLUSIONS

Based on the preceding discussions and analysis, the proposal is considered appropriate from a traffic engineering and safety perspective subject to the adoption of the proposed access measures and is not expected to adversely affect the operation of Tarean Road or the surrounding network.

Yours sincerely,

Jake Miller
Senior Traffic Engineer
WALLBRIDGE GILBERT AZTEC

Appendix A TfNSW Correspondence

APPENDIX A
TfNSW CORRESPONDENCE

[redacted]

Subject: RE: TfNSW Response - 254 Tarean Road, Karuah - Traffic Modelling Assumptions and Methodology Response [Filed 25 Oct 2024 09:30]

Categories: Filed by Mail Manager

[redacted]

TfNSW is satisfied with the responses below indicating that there will no longer be a fast food or retail component for this proposed development, and that existing traffic + development generated traffic will be also assessed.

Thank you for working with us to complete this. Feel free to reach out if you have any questions.

[redacted]

[redacted]

[redacted]

W transport.nsw.gov.au

6 Stewart Avenue, Newcastle NSW 2302
Locked Bag 2030, Newcastle NSW 2302

Working days Monday to Friday, 8:30am – 4:00pm

Transport for NSW

I acknowledge the Aboriginal people of the country on which I work, their traditions, culture and a shared history and identity. I also pay my respects to Elders past and present and recognise the continued connection to country.

Please consider the environment before printing this email.

[redacted]>
Subject: RE: TfNSW Response - 254 Tarean Road, Karuah - Traffic Modelling Assumptions and Methodology Response

[redacted]

Thanks for providing the below comments. Please see below our responses in blue.

Could you please review and advise if the below is considered satisfactory prior to WGA commencing the modelling in support of the previous Traffic and Transport Strategy.

If you have any further comments or queries, please let us know.

Regards,

[redacted]

Australia | New Zealand

[redacted]

[redacted]

Subject: TfNSW Response - 254 Tarean Road, Karuah - Traffic Modelling Assumptions and Methodology Response

Hi Kevin

I refer to your email dated 06 September 2024 requesting Transport for NSW (TfNSW) advice on the Traffic Modelling Assumptions and Methodology Paper prepared by WGA dated 05 September 2024 to support the Traffic and Transport Strategy for future development at 254 Tarean Road Karuah.

TfNSW has reviewed the Traffic Modelling Assumptions and Methodology Paper, and provides the following comments:

1. The paper identifies that a large number of trips will come from 'passing trade', however it does not appear to have taken into account trips made for the retail component or takeaway food and drink premises. Further consideration may need to be given to this to ensure the full impact of the development on the road

network is understood.

The retail component or takeaway food & drink premises are no longer included as part of this proposal. Therefore the development will be assessed as a 'service station' use only.

2. A scenario which includes the existing traffic plus development generated traffic should be assessed.

Noted. The assessment will include an analysis of the existing traffic conditions (i.e. no growth) plus development generated traffic.

TfNSW is available to review any further information submitted or to meet with Council and the Applicant to further discuss TfNSW comments, if needed.

[redacted]

[redacted]

T 1300 207 783 **M** 0429 155 086 **E** shelby.wells@transport.nsw.gov.au

W transport.nsw.gov.au

6 Stewart Avenue, Newcastle NSW 2302
Locked Bag 2030, Newcastle NSW 2302

Transport for NSW

I acknowledge the Aboriginal people of the country on which I work, their traditions, culture and a shared history and identity. I also pay my respects to Elders past and present and recognise the continued connection to country.

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[redacted]

Subject: 254 Tarean Road, Karuah - Traffic Modelling Assumptions and Methodology Response

[redacted]

[redacted]

We are assisting our client to prepare a traffic modelling assumptions and methodology paper to support the Traffic and Transport Strategy in response to the referral response (attached) for this project on 254 Tarean Road, Karuah.

Please refer to the document (WGA241858-LT-TT-0001_A) attached.

Feel free to reach out if you have any queries. Otherwise, looking forward to your comments and agreement.

[redacted]

Australia | New Zealand

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