SECAsolution
Ground Floor, 161 Scott St
Newcastle NSW 2300
Ph: (02) 40327979
admin@secasolution.com.au

22 April 2021

P1546 CPC Barton Highway services Yass TIA

Catalyze Property Consulting Pty Ltd
PO Box 44
Islington NSW 2296

**Attn: Craig McGaffin**

Dear Craig,

**Planning Proposal in relation to Lot 12 DP 1158637**

**Proposed Highway Service Station, Barton Highway adjacent to Longrail Gully Road, south of Yass, NSW**

Further to your request we have now completed our review of the documentation for the proposed Highway Service Centre development located to the immediate north of Longrail Gully Road on the Barton Highway, south of Yass. We have also discussed the project with Transport for NSW (TfNSW) and completed our site observations to determine the current traffic demands in this location as well as review the layout of the intersection of the Barton Highway and Longrail Gully Road. The findings our of project work are provided below.

## Background

Seca Solution was commissioned by Catalyze Property Consulting Pty Ltd on behalf of The Trustee for the Barton Highway Trust (Client) to undertake a review of traffic and access issues for the site on the Barton Highway, Murrumbateman, NSW (Lot 12 DP1158637) located in the Yass Valley Council LGA.

The applicant has been previously lodged seeking to amend Schedule 1 Additional Permitted Uses to permit a 'highway service centre' on Lot 12 DP1158637 zoned RU1 Primary Production Zone located north of Murrumbateman and fronting the Barton Highway. Prior to any approval for this rezoning application, a detailed traffic assessment is required to be undertaken to the satisfaction of TfNSW prior to public consultation.

The subject land is bounded by the Barton Highway along the eastern boundary and the old road corridor along its western boundary, with Longrail Gully Road slitting the sterilised land in half. The project site for the proposed service station is located to the immediate north of Longrail Gully Road.

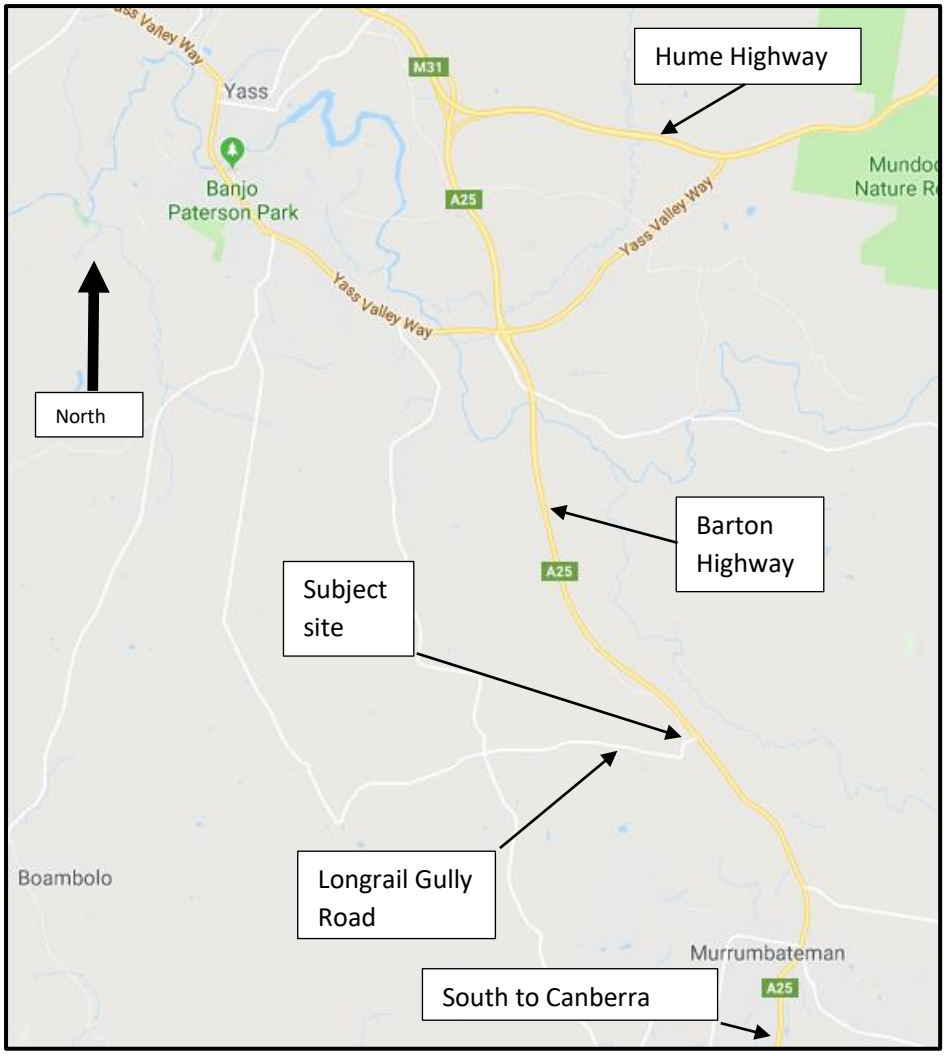



*Figure 1 – Site location*

## Current situation

The Barton Highway in this location provides an important link in the road network, providing a direct route between Canberra and Yass for connection to the Hume Highway. In the vicinity of the subject site is provides a single lane of travel in each direction with a sealed shoulder. It operates under the posted speed limit of 100 km/h and carries a mixture of local and regional traffic. As part of the project work, Seca Solution collected traffic data at the intersection of the Barton Highway and Longrail Gully Road to determine the morning peak hour flow along the Barton Highway (Thursday 1st August 2019). Between 8.00 and 9.00 AM the 2-way traffic movement was 710 vehicles, with 400 vehicles southbound (56%). Heavy vehicles represented 4.2% of the total traffic flows. A single vehicle turned right out of Longrail Gully Road and a single heavy vehicle turned right into Longrail Gully Road from the Barton Highway.

The TfNSW web page shows that in Murrumbateman the daily traffic flow in 2012 was 9,283 vehicles per day. The Barton Highway Duplication Economic Evaluation Report (dated November 2013 prepared by SKM) shows that the daily traffic flows in 2013 were 10,884 and allowed for 2-3% growth in traffic. This would indicate that current daily traffic flows on the Barton Highway could be in the order of 12,800 vehicles per day.

The intersection of the Barton Highway and Longrail Gully Road allows for all turning movements with a sheltered right turn lane for southbound traffic turning right into Longrail Gully Road and a left turn deceleration lane on the Barton Highway for traffic turning into Longrail Gully Road. The right turn lane is 175 metres long including the taper whilst the left turn slip is 145 metres long. The Barton Highway in this location provides a straight horizontal alignment and a relatively flat vertical alignment, ensuring good visibility is available for drivers turning in and out of Longrail Gully Road.

For the posted speed limit of 100 km/h, the sight distance required from Austroads Guidelines is 248 metres and for a limit of 110 km/h the sight distance requirement is 300 metres. The sight distance available at this intersection has been measured on site and exceeds 500 metres in both directions.

*Photo 1 – View to right for driver exiting Longrail Gully Road*

*Photo 2 – View to left for driver exiting Longrail Gully Road*

*Photo 3 – Existing deceleration lane for vehicles turning left into Longrail Gully Road*

*Photo 4 – Existing right turn lane for vehicles entering Longrail Gully Road*

## Consultation with RMS

As part of the project work, Seca Solution has discussed the proposal with Maurice Morgan from the TfNSW Wagga Wagga office and the following points were made:

- TfNSW are continuing to review the performance of the Barton Highway and the intention is to duplicate the full length of the Barton Highway between the ACT and Yass, to improve traffic conditions between Canberra and the Hume Highway;
- The current intersection controls at the intersection of the Barton Highway and Longrail Gully Road are considered adequate for the current traffic demands. A proposal for a service station at this location will require a detailed traffic assessment to the satisfaction of Council as the road authority and this will also be reviewed by TfNSW prior to them providing any concurrence. The assessment will need to take into account the future plans for the road upgrades in this location, in consultation with TfNSW;
- TfNSW stated that all vehicle access will be via Longrail Gully Road only and no direct vehicle access to the Barton Highway will be permitted in accordance with Clause 101 from the SEPP (Infrastructure) 2007;
- TfNSW further stated that the plans for the upgrade of the Barton Highway have not yet been fully developed and the existing controls and movements at this intersection will be reviewed as part of the upgrades at this location. The future upgrades could provide restrictions on the turns at this location especially the right turn out of Longrail Gully Road onto the Barton Highway. The upgrade may also only allow for future left in and left out turns for Longrail Gully Road;
- As part of the upgrade of the Barton Highway, TfNSW will review the various intersections along this section of the road to reduce the number of conflicts for right turns, which would then be catered for at U-turn facilities.

A review of the TfNSW webpage shows that the planning for the upgrade of the Barton Highway is on-going and there are no detailed plans nor timeframes provided for the full upgrade of the road. The September 2020 community update provides the following advice:

" Transport for NSW has formed an alliance with Seymour Whyte and SMEC to design and construct the initial length of Barton Highway duplication from the ACT border towards Murrumbateman. Qualified contractors were invited to tender in October last year to build the $100 million first stage of duplication, and Seymour Whyte and SMEC were selected as the successful candidates after a competitive tender process and participating in a series of technical workshops.

A partnership with the private sector will enable Transport for NSW to be more agile, and leverage expertise for a speedier delivery and better value for money.

It is anticipated duplication of the Barton Highway from the ACT border towards Murrumbateman will start on site later this year and be completed in 2023.

Meanwhile, a submissions report has been produced, summarising all feedback to the Review of Environmental Factors (REF) for the Barton Highway duplication project.

Thanks to the responses received during the submission period, a key design improvement has been made by adding a dedicated right turn from the highway to Kaveneys Road to improve safety."

This community update indicates that the section of the highway north of Murrumbateman that covers the area in the vicinity of the subject site is still being assessed and determined in terns of upgrade requirements etc.

## The Proposal

The proposal will allow for a highway service centre to be provided on the site, providing a fuel outlet, together with food / retail outlet and parking for light and heavy vehicles. All vehicle access will be provided on Longrail Gully Road only and the footprint of the site will allow all vehicles to be able to enter and exit the site in a forward direction.

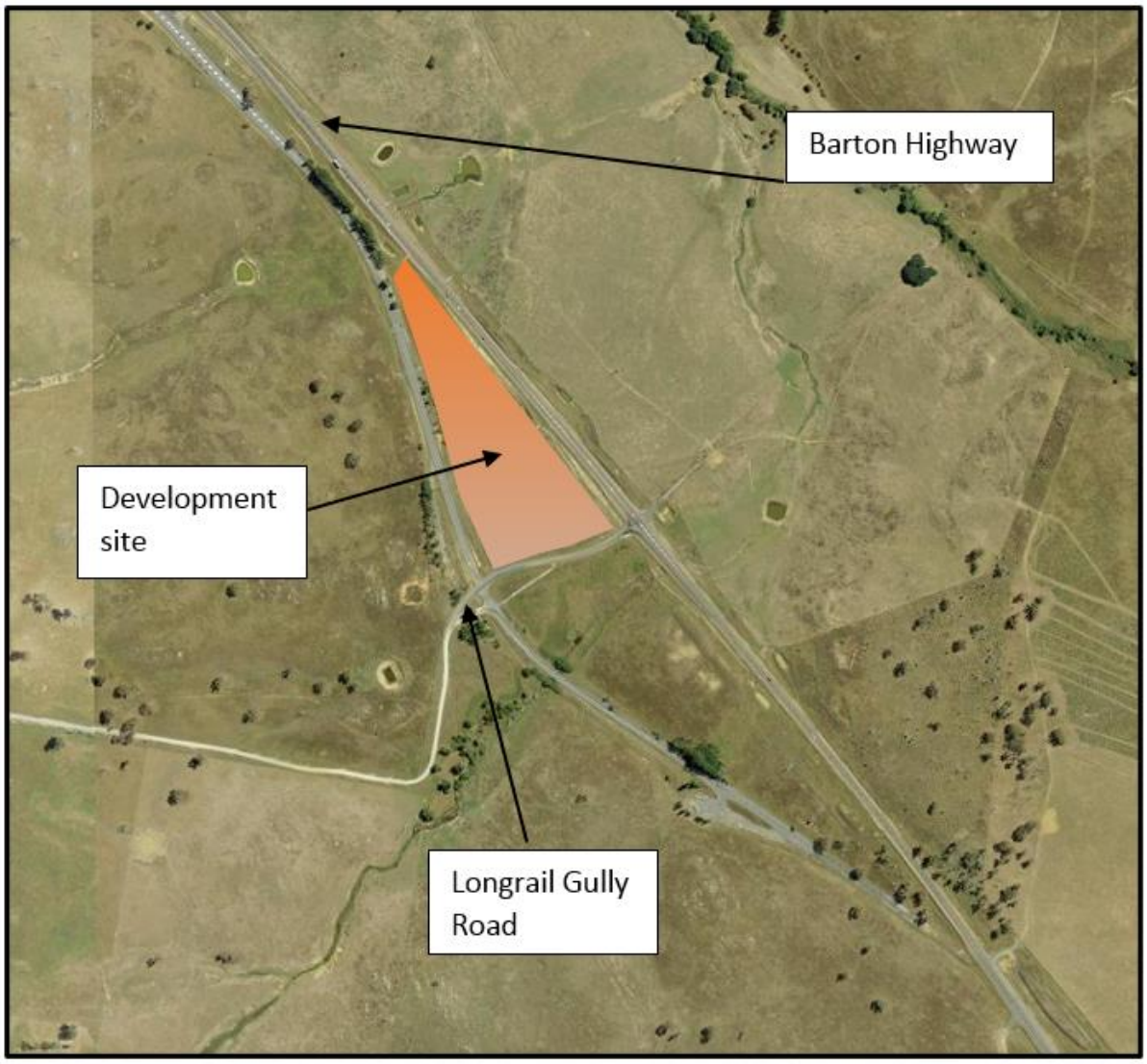



*Figure 2 - Site location relative to intersection of Barton Highway and Longrail Gully Road*

A concept plan for the project has been developed and allows for the following to be provided on site:

- Fuel retail shop
- Quick service restaurant
- Quick service restaurant with drive-thru facility
- Fuel canopy with 4 pumps for light vehicles
- Fuel canopy with 3 pumps for trucks
- 30 car parking spaces
- 5 car with caravan parking spaces
- 1 waiting bay associated with the drive-thru facility
- 6 truck parking bays to accommodate B-doubles

When determining the traffic impacts of the project it is important to note that the vast majority of the traffic will be passing trade and as such the project will not generate any significant additional traffic movements. The site is relatively remote and will predominantly service the needs of passing motorists on the Barton Highway. While the majority of the movements will be left in and left out, the traffic southbound on the Barton Highway will require right turn movements in and out. As discussed with TfNSW, the future upgrade of the Barton Highway in this location may restrict the movements at this location to left in and left out only. If this restriction is imposed, then the development will typically only service the northbound traffic movements along the highway, depending on where U-turn facilities are provided.

The design of the highway service centre will be completed in accordance with the road authority requirements and AS2890. The design will allow for all vehicles to enter and exit the site off Longrail Gully Road only in a forward direction and allow for safe and appropriate circulation around the site.

It is noted that Longrail Gully Road currently does not permit the use of B-doubles. A separate application for B-double access shall be submitted to Council to allow for B-double access between the Barton Highway and the site access. Any associated road or pavement upgrades will be agreed with Council (as the road authority) and will form part of any future DA consent for the project.

The design of the service station is at a preliminary stage only at this point. Based on comments from TfNSW, the design allows for the entry into the site to be furthest away from the Barton Highway, to reduce any risk of the right turn queue into the site extending back into the highway. The entry to the site is approximately 80 metres form the intersection of Longrail Gully Road and the Barton Highway, which would be sufficient for a B-double and / or a semi trailer to be propped waiting to turn into the and 5 or more cars to be behind this truck and still not queue back to the Barton Highway. The internal layout of the site allows vehicles to enter the site and move away from the entry point, with no parking or queues expected in the site to block the site entry off Longrail Gully Road. Given the negligible traffic flows on Longrail Gully Road it is considered that there will not be any queues forming on Longrail Gully Road for vehicles entering the site. The exit is nearest the Barton Highway and the traffic will generally all be left turning out of the site on to Longrail Gully Road which avoids any cross over of movements.

## Traffic Impacts

The RMS Guide to Traffic Generating Developments provides advice on the potential traffic movements associated with the project with the following rates provide for the project site:

- McDonalds Drive-thru restaurant a rate of 180 vehicles per hour
- KFC restaurant a rate of 100 vehicles per hour
- Service station rate of 0.04 x site area plus 0.3 x area of the convenience store or a rate of 0.66 times the area of the convenience store.

It is considered that applying the rate for a KFC type facility is appropriate in this location and the 2 outlets could therefore generate 200 vehicle movements per hour, with 100 inbound and 100 outbound. For the service station, there is no separation between the service station and the balance of the site but applying the whole of the site footprint to determine the extent of traffic is not considered appropriate. The convenience store provides an area of 244m$^2$ and applying the rate of 0.66 x floor area would give 161 trips, split 80 inbound and 80 outbound.

Thus, for the overall site, the total flows could be 180 vehicles inbound and 180 vehicles outbound (360trips). This is considered a worst-case scenario, as it is proposed that there would be significant overlap in use, with drivers fuelling their vehicles and also choosing to have a break for food etc. It can also be seen that 180 inbound vehicles represents 25% of the existing traffic flows on the Barton Highway i.e. using this rate, 1 in 4 drivers would look to access this site, which is considered to be excessive.

It can be seen that the traffic impacts for the project will need to take into account the current intersection layout as well as the future layout / controls. The current at-grade intersection allows for all turning movements, with a sheltered right

turn lane. Allowing for this current layout, it has been assumed that 60% of the traffic would be left in and left out of Longrail Gully Road i.e. northbound and the Barton Highway and 40% would turn right in and right out of Longrail Gully Road to access the site i.e. southbound.

The impact of the above traffic demands at this location have been assessed with Sidra and the results are presented below. The morning traffic flows, including the heavy vehicle percentage observed as part of these surveys surveyed by Seca Solution in August 2019 have been used, with the PM flows assumed to be the same as the AM peak with the directional split reversed.

*Table 1 – **2020** traffic flows plus development flows with existing intersection controls*

| Approach | Level of service | Delay (seconds) | Queue (metres) |
|---|---|---|---|
| Barton Highway northbound | A / A | 5.6 / 5.6 (left turn) | 0.0 / 0.0 |
| Barton Highway southbound | A / A | 7.7 / 8.4 (right turn) | 2.4 / 2.7 (right turn) |
| Longrail Gully Road | A / A (left turn)<br>B / B (right turn) | 8.9 / 9.8 (left turn)<br>21.1 / 21.3 (right turn) | 13.8 / 14.3 |

Note: results for the AM / PM peak.

The above results show that with the projected traffic flows of 180 vehicles inbound and outbound the existing intersection controls at the intersection of the Barton Highway and Longrail Gully Road will allow for minimal delays for road users.

The traffic modelling completed for the upgrade of the Barton Highway project shows that traffic is projected to increase along the Barton Highway at an annual rate of 3.5% (Barton Highway Duplication Business case dated October 2019). For the future design year of 2030 this would indicate that the traffic volumes will increase by 38.5% over those surveyed by Seca Solution in 2018.

The impact of the above traffic demands at this location have been assessed with Sidra for the future design year of 2030 and the results are presented below. This assessment below assumes that the existing intersection controls remain in place and all turning movements are permitted.

*Table 2 - **2030** traffic flows plus development flows with existing intersection controls*

| Approach | Level of service | Delay (seconds) | Queue (metres) |
|---|---|---|---|
| Barton Highway northbound | A / A | 5.6 / 5.6 (left turn) | 0.0 / 0.0 |
| Barton Highway southbound | A / A | 8.7 / 10.1 (right turn) | 2.8 / 3.3 (right turn) |
| Longrail Gully Road | B / B (left turn)<br>C / C (right turn) | 16.5.9 / 18.7 (left turn)<br>41.3 / 42.1 (right turn) | 25.6 / 26.4 |

Note: results for the AM / PM peak.

The future scenario for the design year of 2030 has also been assessed with Sidra allowing for the duplication of the Barton Highway in this location. It has been assumed that the upgrade will allow for the right turn in to Longrail Gully Road, but the right turn out will be banned and drivers would proceed north to then complete a U-turn to the north of the location. The distribution of trips northbound and southbound has remained as per the above assessment. The operation of this intersection has been assessed with Sidra for the future design year of 2030, with background traffic growth along the Barton Highway applied in accordance with the modelling prepared for the upgrade of the Barton Highway.

*Table 3 - **2030** traffic flows plus development flows with upgraded intersection controls*

| Approach | Level of service | Delay (seconds) | Queue (metres) |
|---|---|---|---|
| Barton Highway northbound | A / A | 5.6 / 5.6 (left turn) | 0.0 / 0.0 |
| Barton Highway southbound | A / A | 10.4 / 12.4 (right turn) | 3.7 / 4.5 (right turn) |
| Longrail Gully Road | A / A (left turn) | 6.7 / 7.0 (left turn) | 5.2 / 3.2 |

Note: results for the AM / PM peak.

The above Sidra modelling demonstrates that the future upgrade, allowing for the 2 through lanes in each direction on the Barton Highway and no right turn out of Longrail Gully Road will provide good access for all traffic using Longrail Gully Road. The delays and queues are very low and well within acceptable limits.

With the removal of the right turn out, all traffic exiting Longrail Gully Road will need to turn left. Traffic then wishing to head south will need to use the U-turn facility to the north of this location. The report prepared for the upgrade of the Barton Highway identifies that the upgrade will generally reduce the right turn opportunities for traffic, to improve road safety. Right turn movements would then be catered for at U-turn facilities. These turn facilities will be designed in accordance with Austroads Guidelines, which allow for deceleration lane and acceleration lanes as required.

As part of the project work, the left turn out acceleration lane from Longrail Gully Road will need to be reviewed to allow for the increased left turn movement out of the side road. The existing left turn acceleration lane is not adequate for increased demands and will need to be lengthened in accordance with Austroads Guidelines. This road upgrade to allow for this left turn acceleration lane will be completed under a WAD process requiring review and concurrence with TfNSW.

With TfNSW still assessing the upgrade requirements along the length of the Barton Highway, the turning movements or restrictions at the intersection with Longrail Gully Road have not been determined. If the right turn continues to be permitted, then the project site may require the provision of a right turn acceleration lane to cater for the heavy vehicles in particular exiting the side road. This will be assessed and determined as part of any future DA for the project and the intersection controls and requirements will be agreed with TfNSW, as at that stage of the project the plans for the upgrade of the Barton Highway in this location may have been finalised by TfNSW.

## Right Turn from Longrail Gully Road

We understand that there has been feedback from the residents who live along Longrail Gully Road that they are concerned the development will cause the removal of the righthand turn to the Highway from Longrail Gully Road.

Our analysis, in the event that the Highway Service Centre was developed and Barton Highway was not upgraded, the intersection will operate at a satisfactory level and there is no reason to remove the right hand turn out of Longrail Gully Road to the Highway due to this development.

We do note that the stated intention of TfNSW is to upgrade the Barton Highway, however at this point there are no detailed plans nor timeframes for this work.

If this upgrade does proceed, we would expect the number of right turn movements onto the Highway to be limited due to safety reasons. However, the development of a Highway Service Centre on the proposed site will not influence TfNSW decision to include or remove a right hand turn from Longrail Gully Road to the Highway. That is, there is no basis to the concern that the development of a Highway Service Centre at this location will be the reason for removal of the right hand turn from Longrail Gully Road to the Highway.

## Conclusion

From our study work it is concluded that the proposed highway service centre could be approved by the road authority, with the no issues associated with the capacity of the road network to accommodate the turning movements associated with the project site. The operation of the intersection of the Barton Highway and Longrail Gully Road has been assessed with Sidra, for the current 2020 flows and the future 2030 flows and demonstrates that the intersection will operate well with minor delays and queues. The modelling has been completed for the current layout and the future layout, allowing for the duplication of the Barton Highway and the removal of the right turn out of Longrail Gully Road.

The site can be designed to accommodate the swept path movements of the appropriate design vehicles with adequate space to provide suitable parking for the service centre, including for car / caravan combinations and B-doubles. For B-double access a separate application for B-double access shall be submitted to Council as part of any future DA for the project.

Overall, it is considered that the proposal can be provided to the satisfaction of the road authority with traffic, access and parking being able to be provided in a safe and acceptable manner.

Please feel free to contact me on (02) 40327979 should you have any further queries.

Yours sincerely,

**Sean Morgan**
*Director*

Sidra output

# MOVEMENT SUMMARY

## Site: 101 [2020 AM base+dev]

Barton Hwy and Longrail Gully Road
2020 AM plus dev existing layout
Site Category: (None)
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Barton Hwy | | | | | | | | | | | | |
| 1 | L2 | 105 | 4.2 | 0.058 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 50.8 |
| 2 | T1 | 326 | 4.2 | 0.172 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 432 | 4.2 | 0.172 | 1.4 | NA | 0.0 | 0.0 | 0.00 | 0.14 | 0.00 | 58.0 |
| North: Barton Hwy | | | | | | | | | | | | |
| 8 | T1 | 421 | 4.2 | 0.223 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| 9 | R2 | 76 | 4.2 | 0.086 | 7.7 | LOS A | 0.3 | 2.4 | 0.47 | 0.70 | 0.47 | 48.1 |
| Approach | | 497 | 4.2 | 0.223 | 1.2 | NA | 0.3 | 2.4 | 0.07 | 0.11 | 0.07 | 58.3 |
| West: Longrail Gully Road | | | | | | | | | | | | |
| 10 | L2 | 114 | 4.2 | 0.389 | 8.9 | LOS A | 1.9 | 13.8 | 0.61 | 0.86 | 0.82 | 44.0 |
| 12 | R2 | 76 | 4.2 | 0.389 | 21.1 | LOS B | 1.9 | 13.8 | 0.61 | 0.86 | 0.82 | 43.7 |
| Approach | | 189 | 4.2 | 0.389 | 13.8 | LOS A | 1.9 | 13.8 | 0.61 | 0.86 | 0.82 | 43.9 |
| All Vehicles | | 1118 | 4.2 | 0.389 | 3.4 | NA | 1.9 | 13.8 | 0.14 | 0.25 | 0.17 | 55.8 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 101 [2020 PM base+dev]

Barton Hwy and Longrail Gully Road
2020 PM plus dev existing layout
2-way floweversed from AM surveys
Site Category: (None)
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Barton Hwy | | | | | | | | | | | | |
| 1 | L2 | 105 | 4.2 | 0.058 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 50.8 |
| 2 | T1 | 421 | 4.2 | 0.222 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 526 | 4.2 | 0.222 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.12 | 0.00 | 58.4 |
| North: Barton Hwy | | | | | | | | | | | | |
| 8 | T1 | 326 | 4.2 | 0.174 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| 9 | R2 | 76 | 4.2 | 0.097 | 8.4 | LOS A | 0.4 | 2.7 | 0.53 | 0.75 | 0.53 | 47.4 |
| Approach | | 402 | 4.2 | 0.174 | 1.6 | NA | 0.4 | 2.7 | 0.10 | 0.14 | 0.10 | 57.8 |
| West: Longrail Gully Road | | | | | | | | | | | | |
| 10 | L2 | 114 | 4.2 | 0.404 | 9.8 | LOS A | 2.0 | 14.3 | 0.65 | 0.93 | 0.91 | 43.5 |
| 12 | R2 | 76 | 4.2 | 0.404 | 21.3 | LOS B | 2.0 | 14.3 | 0.65 | 0.93 | 0.91 | 43.3 |
| Approach | | 189 | 4.2 | 0.404 | 14.4 | LOS A | 2.0 | 14.3 | 0.65 | 0.93 | 0.91 | 43.4 |
| All Vehicles | | 1118 | 4.2 | 0.404 | 3.6 | NA | 2.0 | 14.3 | 0.15 | 0.26 | 0.19 | 55.6 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 101 [2030 AM base+dev]

Barton Hwy and Longrail Gully Road
2030 AM plus dev existing layout
Site Category: (None)
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Barton Hwy | | | | | | | | | | | | |
| 1 | L2 | 105 | 4.2 | 0.058 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 50.8 |
| 2 | T1 | 452 | 4.2 | 0.238 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 557 | 4.2 | 0.238 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 58.5 |
| North: Barton Hwy | | | | | | | | | | | | |
| 8 | T1 | 583 | 4.2 | 0.309 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 9 | R2 | 76 | 4.2 | 0.102 | 8.7 | LOS A | 0.4 | 2.8 | 0.54 | 0.76 | 0.54 | 47.2 |
| Approach | | 659 | 4.2 | 0.309 | 1.0 | NA | 0.4 | 2.8 | 0.06 | 0.09 | 0.06 | 58.6 |
| West: Longrail Gully Road | | | | | | | | | | | | |
| 10 | L2 | 114 | 4.2 | 0.623 | 16.5 | LOS B | 3.5 | 25.6 | 0.79 | 1.14 | 1.50 | 36.1 |
| 12 | R2 | 76 | 4.2 | 0.623 | 41.3 | LOS C | 3.5 | 25.6 | 0.79 | 1.14 | 1.50 | 36.0 |
| Approach | | 189 | 4.2 | 0.623 | 26.5 | LOS B | 3.5 | 25.6 | 0.79 | 1.14 | 1.50 | 36.1 |
| All Vehicles | | 1405 | 4.2 | 0.623 | 4.5 | NA | 3.5 | 25.6 | 0.14 | 0.24 | 0.23 | 55.0 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 101 [2030 PM base+dev]

Barton Hwy and Longrail Gully Road
2030 PM plus dev existing layout
2-way floweversed from AM surveys
Site Category: (None)
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Barton Hwy | | | | | | | | | | | | |
| 1 | L2 | 105 | 4.2 | 0.058 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 50.8 |
| 2 | T1 | 583 | 4.2 | 0.307 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 688 | 4.2 | 0.307 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.09 | 0.00 | 58.7 |
| North: Barton Hwy | | | | | | | | | | | | |
| 8 | T1 | 452 | 4.2 | 0.239 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 9 | R2 | 76 | 4.2 | 0.124 | 10.1 | LOS A | 0.5 | 3.3 | 0.60 | 0.84 | 0.60 | 46.0 |
| Approach | | 527 | 4.2 | 0.239 | 1.5 | NA | 0.5 | 3.3 | 0.09 | 0.12 | 0.09 | 58.1 |
| West: Longrail Gully Road | | | | | | | | | | | | |
| 10 | L2 | 114 | 4.2 | 0.654 | 18.7 | LOS B | 3.6 | 26.4 | 0.85 | 1.17 | 1.63 | 35.3 |
| 12 | R2 | 76 | 4.2 | 0.654 | 42.1 | LOS C | 3.6 | 26.4 | 0.85 | 1.17 | 1.63 | 35.2 |
| Approach | | 189 | 4.2 | 0.654 | 28.0 | LOS B | 3.6 | 26.4 | 0.85 | 1.17 | 1.63 | 35.3 |
| All Vehicles | | 1405 | 4.2 | 0.654 | 4.8 | NA | 3.6 | 26.4 | 0.15 | 0.25 | 0.25 | 54.7 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 101 [2030 AM base+dev with intersection upgrade]

Barton Hwy and Longrail Gully Road
2030 AM plus dev upgraded layout
Site Category: (None)
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Barton Hwy | | | | | | | | | | | | |
| 1 | L2 | 105 | 4.2 | 0.058 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 50.8 |
| 2 | T1 | 452 | 4.2 | 0.119 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 557 | 4.2 | 0.119 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 0.00 | 58.5 |
| North: Barton Hwy | | | | | | | | | | | | |
| 8 | T1 | 583 | 4.2 | 0.155 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| 9 | R2 | 76 | 4.2 | 0.151 | 10.4 | LOS A | 0.5 | 3.7 | 0.54 | 0.81 | 0.54 | 46.1 |
| Approach | | 659 | 4.2 | 0.155 | 1.2 | NA | 0.5 | 3.7 | 0.06 | 0.09 | 0.06 | 58.5 |
| West: Longrail Gully Road | | | | | | | | | | | | |
| 10 | L2 | 189 | 4.2 | 0.182 | 6.7 | LOS A | 0.7 | 5.2 | 0.35 | 0.62 | 0.35 | 49.7 |
| Approach | | 189 | 4.2 | 0.182 | 6.7 | LOS A | 0.7 | 5.2 | 0.35 | 0.62 | 0.35 | 49.7 |
| All Vehicles | | 1405 | 4.2 | 0.182 | 1.9 | NA | 0.7 | 5.2 | 0.08 | 0.17 | 0.08 | 57.4 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 101 [2030 PM base+dev with intersection upgrade]

Barton Hwy and Longrail Gully Road
2030 PM plus dev upgraded layout
2-way floweversed from AM surveys
Site Category: (None)
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Barton Hwy | | | | | | | | | | | | |
| 1 | L2 | 105 | 4.2 | 0.058 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 50.8 |
| 2 | T1 | 583 | 4.2 | 0.154 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| Approach | | 688 | 4.2 | 0.154 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.09 | 0.00 | 58.8 |
| North: Barton Hwy | | | | | | | | | | | | |
| 8 | T1 | 452 | 4.2 | 0.120 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| 9 | R2 | 76 | 4.2 | 0.183 | 12.4 | LOS A | 0.6 | 4.5 | 0.64 | 0.85 | 0.64 | 44.6 |
| Approach | | 527 | 4.2 | 0.183 | 1.8 | NA | 0.6 | 4.5 | 0.09 | 0.12 | 0.09 | 57.9 |
| West: Longrail Gully Road | | | | | | | | | | | | |
| 10 | L2 | 114 | 4.2 | 0.117 | 7.0 | LOS A | 0.4 | 3.2 | 0.38 | 0.64 | 0.38 | 49.6 |
| Approach | | 114 | 4.2 | 0.117 | 7.0 | LOS A | 0.4 | 3.2 | 0.38 | 0.64 | 0.38 | 49.6 |
| All Vehicles | | 1329 | 4.2 | 0.183 | 1.8 | NA | 0.6 | 4.5 | 0.07 | 0.15 | 0.07 | 57.7 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

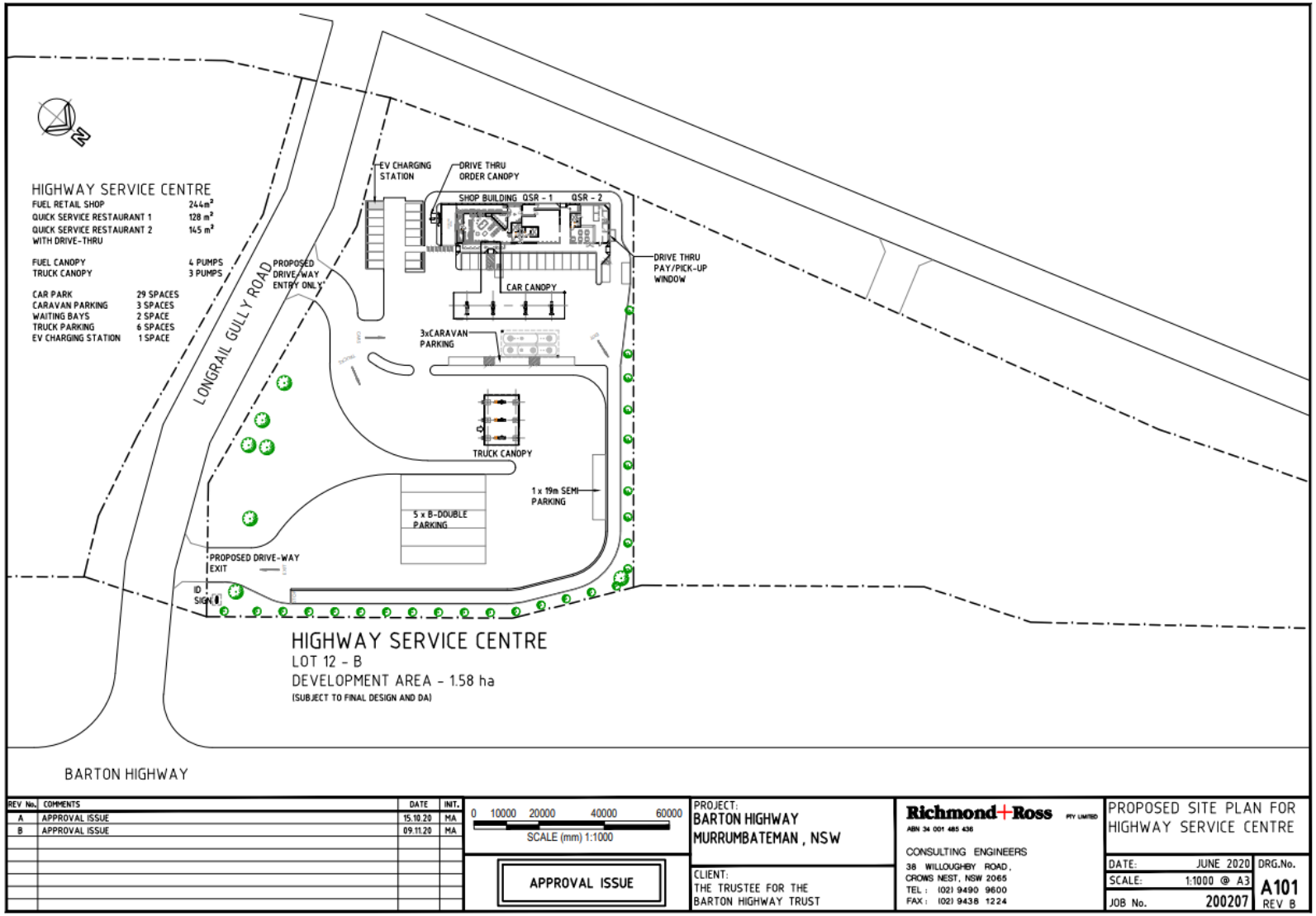
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

## Attachment B – site plan



## Attachment C – design plans by Lindsay Dynan