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Your reference: MCUI/2020/5051 & RAL/2020/5054

20 October 2021

Gainsborough Developments Pty Ltd
C/- Saunders Havill Group
9 Thompson Street
BOWEN HILLS QLD 4006

Attention: **Liam Wiley**

Sent via email: liamwiley@saundershavill.com

Dear Liam,

RE: FURTHER ADVICE RESPONSE – TRAFFIC ENGINEERING ITEMS
PROPOSED RESIDENTIAL SUBDIVISION AT 689 TOOWOOMBA CECIL PLAINS ROAD

1.0 BACKGROUND

1.1. Introduction

Bitzios Consulting has been engaged by Gainsborough Developments Pty Ltd (applicant) to provide traffic engineering advice in relation to a proposed residential subdivision located at 689 Toowoomba Cecil Plains Road, Wellcamp (subject site). The subject site is formally described as Lots 4-8 and Lot 20-24 on A341, Lot 279-280 on AG3111, and Lot 9 and 19 on RP113281.

1.2. Application History

Relevant application history is summarised below:

- On 14th November 2019, Bitzios Consulting prepared a Traffic Impact Assessment (TIA) report for the proposed subdivision which was submitted as part of the application material
- On 20th November 2020, a development application was submitted over the subject site for a:
  - Material Change of Use (MCU) that includes a Variation Request to vary the effect of the Planning Scheme, for up to 470 residential lots
  - Development Permit for Reconfiguration of a Lot (ROL) for Stage 1 (58 residential lots).
- On 16th December 2020, Toowoomba Regional Council (Council) issued an Information Request (IR) in relation to the application, advising that further information is required to demonstrate compliance with the Toowoomba Regional Planning Scheme 2012 version 24
- On 9th March 2021, Bitzios Consulting prepared a response letter to the items raised by Council
- On 17th May 2021, Council issued a Further Advice (FA) letter in relation to the application, advising further information is required.

A copy of Council's Further Advice is included at **Attachment 1.**

1.3. Purpose of this Letter

This letter has been prepared to provide a response to the traffic engineering items in Council's FA Letter. This letter should be read in conjunction with previously submitted traffic documentation.

2.0 SURROUNDING CATCHMENT

Several items raised in Councils Further Advice relate to consideration of impacts from surrounding / adjacent developments. The plans and treatments have been updated to consider the approved Thurgoona Development which includes 314 Lots. As per previous information provided within Bitzios Consulting Information Request Response (issued 9th March 2021), it has been assumed that 50% of lots (157 lots) will use the proposed North/South Road to gain access between Hursley Road and the Thurgoona Development. This assumption has been adopted throughout our analysis.

Furthermore, it is noted that there is a sizeable available land holding to the south which is located within the current Priority Infrastructure Area (PIA) designated by Council. This could not be quantified further at this stage, as these areas are not approved and are subject to future applications. Therefore, future planning has taken into consideration the potential for increased demands as a result of subsequent approvals within the currently defined PIA.

Based on this, and that roads within the subject development will be designed to accommodate external catchments within the currently defined PIA, consideration has been given to roads that may meet the definition of "not identified Trunk infrastructure". This is detailed below.

3.0 ITEM 1: MOVEMENT NETWORK DESIGN

3.1. Item 1.1: Road Hierarchy

1.1 Aspect of Development: Road Hierarchy
The supplementary traffic advice states only low levels of internal traffic will distribute from future urban land to the west onto the north/south road proposed through the development site. Toowoomba Cecil Plains is a State-controlled road and when development occurs on the western site there is no guarantee multiple accesses will be allowed, given there are local government roads that can provide alternative access arrangements. Therefore, more traffic is likely to use the north/south road and a distributor hierarchy status is relevant for the east/west collector street and along the north/south road to Hursley Road.
Further Information Required:
Please amend the Indicative Structure Plan to include: • An east/west distributor road connection; and • A distributor road connection from the east/west road to Hursley Road.

Proposed North/South Road Hierarchy

As per SC6.2.2.2.4 of Council's Planning Scheme, a Distributor Road hierarchy is suitable to accommodate traffic volumes above 300 Lots per day (based on the threshold of Collector Roads). Based on the revised lot layout provided, Figure 3.1 illustrates the estimated daily link volumes along the internal road network (based on a total development yield of 470 residential Lots). In summary:

- The North/South Road south of the East/West Collector Road is estimated to accommodate up to 322 lots OR 2,898 daily trips based the proposed development and Thurgoona Development
- The North/South Road north of the East/West Road may ultimately accommodate 627 lots OR 5,643 daily trips (at the connection to Hursley Road)
- This does not consider any developments within the PIA that are not approved and may be subject to increases based on future development within the currently defined PIA.

It is noted that this location of connections to the North/South Road have been revised from previous iterations due to civil constraints changing potential connection locations to the North/South Road.

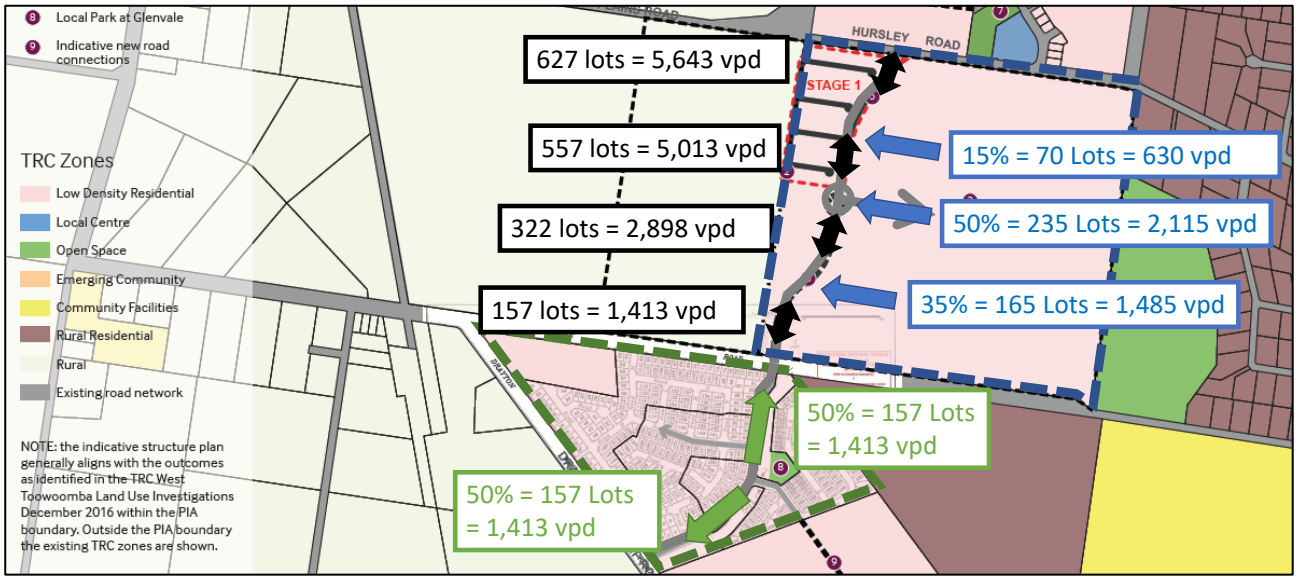


Figure 3.1: Catchment Analysis – Estimated Daily Link Volumes

Based on the above, the estimated ultimate yield (>300 lots) is consistent with Council's requirements for a Distributor standard road, for the length of the North/South Road.

In summary, the proposed hierarchy of the North/South Road as a Distributor standard road between Hursley Road and Devine Road is in accordance with Council's Planning Scheme requirements and is expected to be suitable to accommodate the full development of the catchment. This also allows for a level of future proofing once additional development to the south (within the PIA) occurs.

Proposed East/West Road Hierarchy

The provision of a Distributor standard road connection for the East/West Road is not considered warranted based on the following:

- The Rural precinct to the west has significant road frontage (2.8km) to Toowoomba Cecil Plains Road, Deuble Road, and Devine Road which are suitable to accommodate several connections
- Given the size of the precinct (82ha), multiple new connections along the frontage roads would be required to accommodate urban development within the precinct, if / when that occurs
- Whilst Toowoomba Cecil Plains Road is State-controlled, there are benefits to providing a direct connection, including increased efficiency to reach the higher order network, which is a key desirable design outcome of complete Streets. This could be designed as a controlled intersections (e.g. signals) pending future assessment
- Connections to Deuble Road, and Devine Road will also reduce the time/distance to access the higher order road network and will likely provide more desirable access locations than connection to the proposed North/South Road
- Consequently, a large proportion of the Rural precinct traffic (if developed) would not need to travel along the proposed East/West Road to gain access to the wider road network.

Whilst an indicative East/West Road link has been shown on the proposed development plans, it is likely that this connection would only accommodate low levels of internal traffic generated by Rural precinct (if developed in the future), as this traffic would use alternate external connections.

Notwithstanding this, development plans have been revised to include a 25m road corridor, which is suitable to provide a Distributor standard road. As such, the development does not preclude the provision of this standard road if warranted in the future (e.g. as not identified Trunk infrastructure), which is adequate to address Council's raised concerns.

Proposed Cross Section

The proposed North/South Road (between Hursley Road and Devine Road) has been designed as a 25m wide Distributor Road with key details provided in Table 3.1.

Table 3.1: Proposed Distributor (Hursley Road to Devine Road)

Design Element	Requirement	Proposed	Compliant
Corridor Width	25m	25m	Yes
Travel Lanes	2 x 3.5m (7m)	2 x 3.5m (7m)	Yes
Bicycle Lanes	2 x 2.5m	2 x 2.5m	Yes
Parking Lanes	Indented parking bays	2.4m wide indented parking bays	Yes
Footpath	2 x 2.0m	2 x 2.0m	Yes
Verge Width	6.5m	6.5m	Yes

As shown, the proposed Distributor Road meets Council's cross section requirements.

Direct Lot Access

Whilst the lot layout for the subject site has not been completed for future stages (beyond Stage 1), direct lot access would be considered a suitable outcome along the North/South Road (south of the East/West Road) noting the following:

- Council's Planning Scheme does not restrict direct access to Distributor Roads, except within 40m of an intersection. This access separation could be a condition of approval
- Lot access to a Distributor Road would be entirely consistent with nearby roads such as Glenvale Road, MacDougall Street and Glenwattle Street all of which are designated as Distributor Road and include direct access for density residential lots
- Based on our findings, volumes along the North/South Distributor Road will be moderate during peak hours (~300vph, or five (5) vehicles per minute). This allows sufficient time for vehicles to enter and exit the roadway without significant impacts on traffic flow.

In summary, direct lot access is considered suable for lots on the North/South Road (south of the East/West Road), subject to location and future applications.

3.2. Item 1.2: Hursley Road Intersection

1.2 Aspect of Development: Intersection Treatment at Hursley Road
The supplementary traffic advice states a 60m diameter roundabout would be required at the Hursley Road intersection including the provision of approach reverse curves. The report also states access for the land to the north could occur at locations other than Hursley Road including Toowoomba Cecil Plains Road and the existing development site to the east. If access to Hursley Road is required, it could occur by the creation of a four-way intersection that is likely to require signals. Given the projected traffic volumes and location of the intersection at the western fringe of the urban street network, a single lane roundabout is considered a more effective treatment in this location. The traffic advice is overstating the design requirements for the roundabout, and further design analysis is required to confirm an appropriate roundabout treatment.
Further Information Required:
Please amend the intersection layout plan and Stage 1 plan to include provision of additional road reserve at the development access intersection allowing for a future single lane roundabout (centred on the existing road) including sight lines.

Bitzios Response

The response to the Information Request (supplementary traffic advice) advised a roundabout is not a viable access option. This position is maintained based on the following reasons:

- Based on a the posted speed limit (70km/h) a design speed of 80km/h (posted speed limit + 10km/h would be required in accordance with Austroads / RPDM guidelines
- Based on Austroads GTRD Part 4B, the following requirements would be applicable:
  - Desirable Centre Island Diameter = 44m
  - Minimum Centre Island Diameter = 28m
  - Circulating Lane Width Requirement = 5.2m
  - Reverse curves = Desirable = would start up to 150m prior to the roundabout, before creating a 7m median separation between carriageways to accommodate required curve radii
- Based on this, and noting the verge width along Hursley Road (~7m) the total footprint of the roundabout would be 54.4m (at the edge of the roadway) OR 68.4m (boundary to boundary). This will have significant land impacts on the subject site and the lot to the north
- Furthermore, the roundabout footprint will extend ~150m in either direction to accommodate the desirable reverse curves. This will have land impacts as well as impacts on the HV powerlines on the southern side of Hursley Road
- This is entirely consistent with several similar treatments in South East Queensland, including:
  - Bribie Island Road / Bestmann Road, Ningi | 60-80km/h approach | 70m diameter
  - Eumundi Noosa Road / Caplick Way, Eumundi | 60-80km/h approach | 60m diameter
  - Eumundi Noosa Road / Emu Mtn Road, Doonan | 60-80km/h approach | 70m diameter
  - Toowoomba Cecil Plains Road / Carrington Road, Torrington | 60-80km/h approach | 100m diameter
  - Centenary Hwy / Ripley Road, Ripley | 60-100km/h approach | 80m diameter
- Based on the above, and noting that the intersection is greenfield (i.e. where desirable standards should be adopted) it is clear that ~60-70m total design radius is warranted based on the centre island diameter, typical circulating road widths and verge requirements. This results in significant land impacts which are not warranted given the suitable operational performance of a priority-controlled intersection in all design scenarios (see **Section 3.6**).

In summary, the level of design and land impacts required to provide a roundabout treatment at the Hursley Road access intersection is significant. Based on Austroads requirements, and similar treatments in SE QLD the treatments noted are required for safe roundabout operation.

Therefore, based on the access constraints outlines previously (HV power lines and posts) and the significant land impacts on the site (and opposite lot to the north) it is not considered viable to provide a roundabout treatment.

Importantly, the proposed provision of a priority-controlled intersection meets all operational and safety requirements and is the most appropriate treatment in this instance.

3.3. Item 1.3: Road Reserve Widths

1.3 Aspect of Development: Road Reserve Widths
The supplementary traffic advice states that from a traffic perspective, road reserve widths can be reduced from those stated in the Planning Scheme Policy PSP No 2. Council does not accept that argument and has designed the road reserve widths to account for a number of factors including traffic, services and landscape. These considerations include: • Provision of a 2.5m wide bike/breakdown space on distributor roads given there is direct property access proposed and the need to accommodate cyclists, parked vehicles and turn movements; • Provision of 0.5m space behind the kerb for stormwater and streetlights; • Provision of a 2m wide street tree zone; • 1.5m separation between the footpath and the property boundary where direct property access is proposed; • 0.5m separation between the footpath and water mains; and • Separation between the water main and electricity/telecommunication services. It is not accepted that the reduced road reserve width can accommodate all these considerations.
Further Information Required:
Please amend the Stage 1 lot layout to include road reserve widths consistent with PSP No 2 *Engineering Standards Roads and Drainage Infrastructure*. This needs to include all the streets including the distributor road, and the first intersecting street from Hursley Road that services the balance lot to the east of Stage 1.

Bitzios Response

The proposed road reserve widths have been updated to match Council's requirements. Refer to the town planning and design report responses prepared by others for further details

3.4. Item 1.4: Hursley Road Frontage

1.4 Aspect of Development: Hursley Road Frontage
The supplementary traffic advice states there is no need to provide additional road reserve on Hursley Road due to the constraints posed by the overhead power lines and the impracticality of relocating these services. Council has no intention of relocating the power poles and needs the additional road reserve width to provide for footpaths, bus stops and auxiliary lanes on Hursley Road.
Further Information Required:
Please amend the Stage 1 lot layout to include the provision of an additional 4.5m of road reserve along the full development frontage with Hursley Road.

Bitzios Response

Site plans have been updated to include the provision of an additional 4.5m road reserve along the full frontage of Hursley Road. Refer to the town planning and design report responses prepared by others for further details.

3.5. Item 1.5: Pedestrian and Cycle Connection

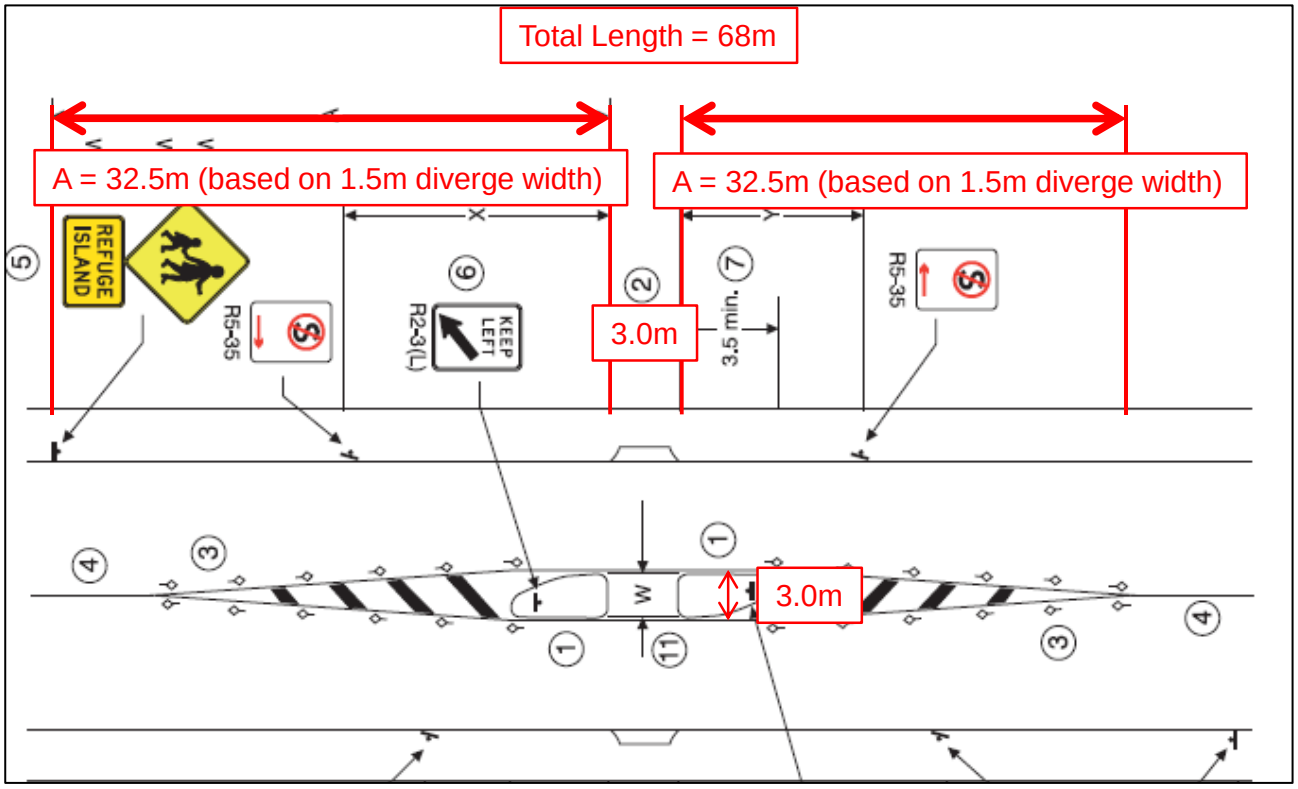
1.5 Aspect of Development: Pedestrian and Cycle Connection
The supplementary traffic advice states active transport connections can be conditioned. Council requires proof of concept for how the connection will be made including the provision of a pedestrian/cycle refuge on Hursley Road.
Further Information Required:
Please provide plans showing how a 2m wide path connection could be provided on Hursley Road from the development access intersection to the Sovereign Hills development including a 3m wide pedestrian/cycle refuge on Hursley Road as per MUTCD Part 9 Figure 3.7.3.

Refuge Island Treatment

The provision of a refuge island 3.0m wide can be provided along Hursley Road to accommodate pedestrian and cyclist demands.

It is noted that Figure 7 of MUTCD Part 10 states that a 2.0m wide minimum treatment may be suitable where there are not high volume pedestrian or cyclist demands. Given the location of the crossing on the edge of the urban area, it is expected that demands will be low and a 2.0m wide treatment would be appropriate. However, at this initial stage, we have considered a 3.0m treatment.

The provision of the refuge will have a footprint of 68m in length including the provision of a 32.5m lateral movement (based on 1m/second lateral movement) as shown in Figure 3.2.



Source: AS1742.10 Pedestrian Control and Protection

Figure 3.2: Refuge Island Layout

Hursley Road Impacts

As future planning of the subject site has not confirmed where pedestrian connections will occur, we are unable to confirm the specific location of the refuge island treatment at this stage. This will be subject to future reviews and operation works applications which will confirm the location (based on active transport desire lines) and the required works to accommodate the crossing.

However, the following key points are noted:

- The treatment requires 1.0-1.5m pavement widening on each side of Hursley Road
- This can occur at any location along Hursley Road without impacts to the HV Powerlines, which are located ~4.0m from the edge of pavement
- The Sovereign Hills development includes a kerb set back 1.5m from the edge line of Hursley Road. Therefore, the lateral shift can likely be accommodated without requiring kerb works
- Furthermore, near the London Circuit intersection, the spacing of the HV powerline posts are ~100m. The treatment can be designed to be within the span of the posts, if necessary, subject to confirmation of active transport desire lines

In summary, whilst the specific location of the pedestrian refuge treatment cannot be confirmed at this stage, a complaint treatment can be provided in the future with minimal impacts along Hursley Road, subject to further review of desire lines etc. Importantly, the crossing can be located clear of HV power lines and does not require any further works from the proposed development at this stage.

3.6. Item 1.6: Development Access Analysis

1.6 Aspect of Development: Development Access
The supplementary traffic advice has analysed the Hursley Road/Site Access at the 10-year design horizon (2039) for the ultimate 470 lots. However, the analysis does not allow for a 1% traffic growth rate on Hursley Road or traffic from existing approved development to the south.
Further Information Required:
Please confirm the development access tee intersection treatment has sufficient capacity for the ultimate development including 1% pa traffic growth on Hursley Road and the traffic likely to use the north/south development access when connected to land south of the development site. Please confirm the auxiliary lane treatment required to accommodate ultimate development under the above scenario.

Overview

As requested, an updated 2039 analysis has been undertaken to include traffic generated from the south of the development. The supplementary traffic advice included a 1.0% growth rate along Hursley Road as outlined in Section 2.8 of the Letter. This confirmed that all intersections west of Boundary Road adopted a 1% future year growth rate for 2029 and 2039 scenarios.

Figure 3.3 presents the estimated ultimate traffic volumes at the intersection. This includes:

- 1% growth rate along Hursley Road to a 2039 design horizon
- Traffic from 470 Development Lots with a trip generation of 0.85 trips per lot
- Traffic from 157 Lots of the Thurgoona Development (i.e. 50% approved yield) with a trip generation of 0.85 trips per lot (in Scenario 2)
- Consistent distribution for all lots has been adopted as per the TIA.

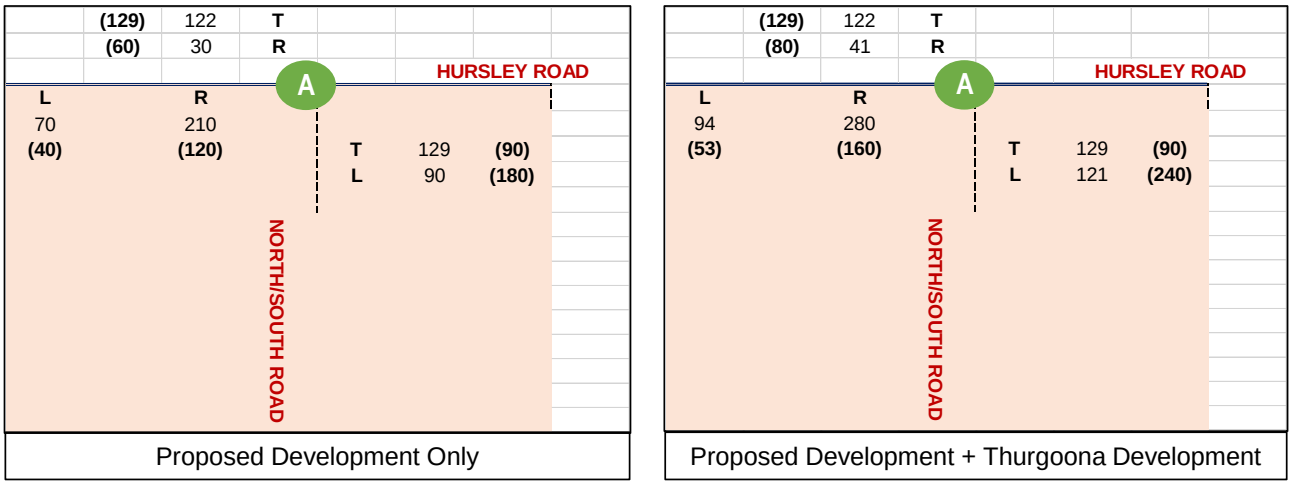


Figure 3.3: Access Intersection 2039 Volumes

Turn Warrants Assessment

Table 3.2 provides a summary of the turn warrants assessment.

Table 3.2: Ultimate (2039) Turn Warrants Assessment

Scenario	Time Period	Left Turn			Right Turn		
		Q_M	Q_L	Required	Q_M	Q_R	Required
Proposed Development	AM	129	90	BAL	341	30	CHR(s)
	PM	90	180	BAL	399	60	CHR(s)
Proposed Development + Thurgoona Development	AM	129	121	BAL	372	41	CHR(s)
	PM	90	240	BAL	459	80	CHR

Based on the above, the following treatments are required:

- Basic Left (BAL) treatment – consistent with what has been proposed
- Short Channelised right (CHR(s)) turn treatment is required in the Proposed Development case
- Full Length Channelised Right (CHR) treatment is required in the Proposed Development + Thurgoona Development case. This exceeds what has been previously proposed (CHR(s)).

Based on the above, a full length CHR treatment is required at the Hursley Road / North/South Road intersection to accommodate the entire catchment. This is proposed to be provided in accordance with Austroads GTRD Part 4A and will include a minimum length of 110m (including tapers).

Refer to documentation prepare by others for the full extents of the CHR treatment.

SIDRA Assessment

Table 3.3 provides a summary of the SIDRA results. Refer **Attachment 2** for detailed outputs.

Table 3.3: SIDRA Results: Hursley Road / Site Access Intersection

Year	Peak	Scenario	Degree of Saturation (DOS)	Average Delay (s)	Level of Service	95th Percentile Queue Length (m)
2039	AM	Proposed Development	0.310	4.3	A	10.3
	PM		0.184	4.2	A	5.5
2039	AM	Proposed Development + Thurgoona Development	0.425	5.3	A	19.5
	PM		0.259	4.8	A	8.1

As shown, the access intersection is expected to perform within acceptable performance threshold limits 10 years from the final stage of opening of the ultimate development. The intersection will perform at or below 43% capacity in all scenarios with minimal delays (all movements under 10 second in all scenarios) and queueing (maximum of 20m).

In summary, no further upgrades or control treatments are warranted for the intersection.

4.0 SUMMARY

In summary:

- Catchment analysis has confirmed that the proposed North/South Road will ultimately accommodate >300 lots and therefore has been provided as a Distributor standard road
- Catchment analysis has confirmed that the proposed East/West Road will ultimately accommodate low levels of traffic and will not be required to be a Distributor standard road. However, to address Council's concerns, a 25m road corridor has been proposed to future proof the site in the unlikely event that higher demands occur
- The proposed Distributor Road corridor complies with Council's cross section requirements
- As noted previously, the provision of a roundabout is not feasible at the access intersection due to the footprint requirements based on the existing road conditions. This has been confirmed through review of Austroads requirements and similar roundabouts in SE QLD. Furthermore, the proposed priority control intersection operates well below thresholds which further supports not warranting significant land dedication and cost (relocation of HV power lines) to provide a roundabout access treatment
- Internal road reserve widths have been updated in accordance with Council's requirements
- The provision of an additional 4.5m road reserve has been provided along the full frontage of Hursley Road as per Council's request
- Whilst the specific location of the pedestrian refuge treatment cannot be confirmed at this stage, a complaint treatment can be provided with minimal impacts along Hursley Road once active transport desire lines are confirmed
- Revised traffic analysis at the Hursley Road / North/South Road intersection indicates that a full length CHR is warranted, which has been included in proposal plans
- Traffic analysis indicates that the Hursley Road / North/South Road intersection will operate well below acceptable thresholds for a 2039 scenario considering 1% growth and the traffic generation from the Thurgoona Development.

I trust the above response is sufficient to address the traffic and transport related queries raised and will allow Council to prepare reasonable and relevant conditions of approval.

Yours faithfully

Mark Davidson
Senior Traffic Engineer / Transport Planner
Bitzios Consulting

Attachments:
1: Council's Further Advice
2: SIDRA Outputs

Attachment 1: Council's Further Advice

TOOWOOMBA REGION

Rich traditions. Bold ambitions.

Our Reference: MCUI/2020/5051
CS Portal Reference: N/A
Contact Officer: Rodney O'Brien
Contact: (07) 4688 6379
Email: development@tr.qld.gov.au

FURTHER ADVICE
Planning Act 2016 Section 68
Development Assessment Rules Section 35

Gainsborough Developments Pty Ltd
C/- Saunders Havill Group
9 Thompson Street
BOWEN HILLS QLD 4006

Email: liamwiley@saundershavill.com

17 May 2021

Dear Sir/Madam,

Application for:	**Preliminary Approval for Material Change of Use – Impact – Variation Request and Development Permit for Reconfiguring a Lot – Fourteen (14) Lots into Fifty-Eight (58) Lots and Balance Lot (in Two (2) Stages)**
Location:	**689 Toowoomba Cecil Plains Road, WELLCAMP QLD 4350**
Property Description:	**Lots 3-8, 10, 16, 18, & 20-24 on A341; Lots 9 & 19 on RP113281; Lot 2 on AG1969; Lot 279 on AG3110 and Lot 280 on AG3111**
Relevant Planning Scheme:	***Toowoomba Regional Planning Scheme 2012* (Version 24)**

I refer to the further information provided in response to Council's Information Request dated 16 December 2020 and Further Advice dated 24 December 2020, which was received on 15 March 2021.

Council provides the following further advice in relation to certain aspects of your proposal that require additional clarification/information to enable proper consideration and determination of your application. This further advice letter is the first of two (2) letters. A separate letter will be issued primarily relating to details of the proposed Variation Scheme Document (VSD).

1. MOVEMENT NETWORK DESIGN

1.1 Aspect of Development: Road Hierarchy
The supplementary traffic advice states only low levels of internal traffic will distribute from future urban land to the west onto the north/south road proposed through the development site. Toowoomba Cecil Plains is a State-controlled road and when development occurs on the western site there is no guarantee multiple accesses will be allowed, given there are local government roads that can provide alternative access arrangements. Therefore, more traffic is likely to use the north/south road and a distributor hierarchy status is relevant for the east/west collector street and along the north/south road to Hursley Road.
Further Information Required:
Please amend the Indicative Structure Plan to include: • An east/west distributor road connection; and

- A distributor road connection from the east/west road to Hursley Road.

1.2 Aspect of Development: Intersection Treatment at Hursley Road

The supplementary traffic advice states a 60m diameter roundabout would be required at the Hursley Road intersection including the provision of approach reverse curves. The report also states access for the land to the north could occur at locations other than Hursley Road including Toowoomba Cecil Plains Road and the existing development site to the east. If access to Hursley Road is required, it could occur by the creation of a four-way intersection that is likely to require signals.

Given the projected traffic volumes and location of the intersection at the western fringe of the urban street network, a single lane roundabout is considered a more effective treatment in this location. The traffic advice is overstating the design requirements for the roundabout, and further design analysis is required to confirm an appropriate roundabout treatment.

Further Information Required:

Please amend the intersection layout plan and Stage 1 plan to include provision of additional road reserve at the development access intersection allowing for a future single lane roundabout (centred on the existing road) including sight lines.

1.3 Aspect of Development: Road Reserve Widths

The supplementary traffic advice states that from a traffic perspective, road reserve widths can be reduced from those stated in the Planning Scheme Policy PSP No 2. Council does not accept that argument and has designed the road reserve widths to account for a number of factors including traffic, services and landscape. These considerations include:

- Provision of a 2.5m wide bike/breakdown space on distributor roads given there is direct property access proposed and the need to accommodate cyclists, parked vehicles and turn movements;
- Provision of 0.5m space behind the kerb for stormwater and streetlights;
- Provision of a 2m wide street tree zone;
- 1.5m separation between the footpath and the property boundary where direct property access is proposed;
- 0.5m separation between the footpath and water mains; and
- Separation between the water main and electricity/telecommunication services.

It is not accepted that the reduced road reserve width can accommodate all these considerations.

Further Information Required:

Please amend the Stage 1 lot layout to include road reserve widths consistent with PSP No 2 *Engineering Standards Roads and Drainage Infrastructure*. This needs to include all the streets including the distributor road, and the first intersecting street from Hursley Road that services the balance lot to the east of Stage 1.

1.4 Aspect of Development: Hursley Road Frontage

The supplementary traffic advice states there is no need to provide additional road reserve on Hursley Road due to the constraints posed by the overhead power lines and the impracticality of relocating these services. Council has no intention of relocating the power poles and needs the additional road reserve width to provide for footpaths, bus stops and auxiliary lanes on Hursley Road.

Further Information Required:

Please amend the Stage 1 lot layout to include the provision of an additional 4.5m of road reserve along the full development frontage with Hursley Road.

1.5 Aspect of Development: Pedestrian and Cycle Connection

The supplementary traffic advice states active transport connections can be conditioned. Council requires proof of concept for how the connection will be made including the provision of a pedestrian/cycle refuge on Hursley Road.

Further Information Required:

Please provide plans showing how a 2m wide path connection could be provided on Hursley Road from the development access intersection to the Sovereign Hills development including a 3m wide pedestrian/cycle refuge on Hursley Road as per MUTCD Part 9 Figure 3.7.3.

1.6 Aspect of Development: Development Access

The supplementary traffic advice has analysed the Hursley Road/Site Access at the 10-year design horizon (2039) for the ultimate 470 lots. However, the analysis does not allow for a 1% traffic growth rate on Hursley Road or traffic from existing approved development to the south.

Further Information Required:

Please confirm the development access tee intersection treatment has sufficient capacity for the ultimate development including 1% pa traffic growth on Hursley Road and the traffic likely to use the north/south development access when connected to land south of the development site. Please confirm the auxiliary lane treatment required to accommodate ultimate development under the above scenario.

2. STORMWATER

2.1 Aspect of Development: Stormwater Management Plan

As advised in the information request, Council will not accept a contribution in lieu of providing on-site stormwater quality treatment. The applicant needs to demonstrate where the bio-retention basin will be provided. Easements also need to be shown for the detention basin and the connecting flow paths from Stage 1 of the development to the lawful point of discharge as defined by QUDM.

The Stormwater Management Plan is inconsistent with the Geotechnical Report – Slope Stability Assessment which recommends in section 6.6:

- That all stormwater shall be collected using appropriate methods to minimise the ingress into the subsurface and prevent all erosion;
- Roof water should not be discharged to the allotment and should be piped to the road drainage system (if possible) or to an appropriately engineered and lawful point of discharge; and
- Any overflow from water storage tanks should also be piped to the road drainage system (if possible) or to an appropriately engineered drainage system or soaked out to achieve sheet flow.

Council's expectation is that stormwater will be either discharged to the street or an inter-allotment drainage system. There may be some exceptions required for the hilltop development but not applied to every lot as suggested in the Stormwater Management Plan.

Further Information Required:

Please provide details about where the bio-retention basin will be provided for the Stage 1 works and the easements required for the temporary basin and flow paths from the development to the lawful point of discharge. The applicant can elect to provide these details now or Council can condition that plan amendments for easements be presented and approved prior to the issue of an operational works permit.

3. BUSHFIRE HAZARD

3.1 Aspect of Development: Bushfire Management

A number of the issues raised in the information request have been addressed within Appendix H – Response prepared by Rob Friend & Associates and the associated revised Bushfire Report in Appendix I. The revised report provides better representation of fuel loads and site slopes, indicating that the Hilltop Precinct may be able to comply with requirements, subject to conditions and further assessment of individual lots once details design commences.

There is concern that the assumptions in the report indicate a lower than expected BAL and there is inadequate justification to remove all trees from the development footprint area of the Hilltop Precinct for the purposes of mitigating or managing bushfire risk. The following provides further details in relation to the assumptions made by the author of the revised report. It is also considered that a ring road should be utilised in the Hilltop Precinct to better manage bushfire risk and to further reduce the extent of tree loss in the Environmental Significance Overlay area (further detail is outlined in item 4.1).

Canopy fuel load was not included in the assessment of risk. RE11.8.8 and VHC 11.2 has a total fuel load of 13t/ha. Only surface fuel load of 11.5t/ha was used. The author noted:

> *"… given the status of the vegetation within the development site and the potential for the residual area to be managed for both biodiversity outcomes in terms of the Regional ecosystem and for bushfire hazard mitigation outcomes, it is reasonable to conclude that any fire entering this area will remain as a ground fire and not involve any of the mid or upper canopies."*

It is unclear how the vegetation can be managed such that no canopy fires will occur. As such, the use of only 11.5.t/ha for surface fuel and not the 13t/ha total fuel is not accepted.

Based on the 11.5t/ha fuel load, the author notes the Hilltop Precinct can meet a BAL 29 maximum if an APZ of 15m is established (taken from Tables 2 to 9). The Author notes:

> *"Based on the above calculations, an Asset Protection Zone within the Private open space area of 15 metres is to be established."*

Upon further assessment, using the same setback distances and slopes in Tables 2 to 8, it is calculated that BAL40 would be required for all Transects (A to G) if total fuel of 13t/ha was used.

Retention of trees in the Hilltop Precinct has not occurred. Refer to the Environmental Assessment Report (SHG). Council consider that individual trees can be retained in the footprint of the Hilltop Precinct as they would be classed as "managed vegetation" against exclusions in AS3595 along with provisions for no overlapping canopies etc.

Please note that approval of the revised Bushfire Hazard Assessment and Management Plan is not supported unless it is amended addressing these outstanding requirements. The Author notes:

> *"Within regard to road separations between lots and adjacent vegetation, the Bushfire Hazard Assessment and Management Plan is proposing a 15 metre wide Asset Protection Zone around the Hill Top precinct and within the proposed Private Open Space area. With the function of a road around residential development abutting hazardous vegetation, it serves two purposes, one to separate future buildings from the hazard and two, to provide access for Emergency Services. The proposed APZ will also provide for those two functions and as such it has been provided in lieu of a private roadway."*

Notwithstanding the above, the variation request does not indicate a ring road around the Hilltop Precinct. It is noted that the Concept Overall Site Layout Plan (Drawing No C-E035 – A) prepared by RMA shows a conceptual subdivision layout for the precinct which only includes a partial ring road. The proposed concept layout and bushfire management plan should align, and it should be demonstrated that a ring road can be achieved.

Information Required:

Please provide the following further information including:

- A revised Bushfire Hazard Assessment and Management Plan which:
    - Describes how the vegetation within the proposed Private Open Space areas can be managed such that only surface fires will occur and no canopy fires;
    - Revise Tables 2 to 9 to include total fuel load of 13t/ha;
    - Removes any reference to total clearing of trees within the Hilltop Precinct - Note, individual trees can be retained within the Hilltop Precinct without negatively affecting bushfire hazard risk; and
    - Amends the layout to provide a perimeter road constructed within the APZ (note, an alternative option is unlikely to be supported); and
- Updated relevant plans and documents to reflect a perimeter road in the Hilltop Precinct and additional (potential) tree retention. Please note that any master plan or structure plan that forms part of the Variation Scheme Document will require amendment. Note, this issue will also be raised in the second Further Advice Letter.

4. ECOLOGICAL SIGNIFICANCE OVERLAY

4.1 Aspect of Development: Tree Retention

The following reports were submitted to address the information request item regarding the Ecological Significance Overlay:

- Appendix J – Response from SHG Envm; and
- Appendix K – revised Tree Retention and Removal Plan, including 47 sub-plans showing tree retention.

Following on from the comments in relation to Bushfire Hazard, it is considered that the proposal has not fully demonstrated compliance with the Ecological Significance Overlay Code. In particular, it has not been fully demonstrated that tree loss has been minimised in the Hilltop Precinct. The following outlines this issue in further detail:

- Inside the Hilltop Precinct:
    - the 651 trees marked for retention are all on land that would be very difficult to build on (steep land / land slip);
    - the 166 trees marked for removal comprise almost all trees within the developable Hilltop Precinct space;
    - 152 of these 166 trees marked for removal (92%) are listed as Non-Juvenile Koala Habitat Trees (NJKHT); and
    - There has been no consideration of retention of any trees on developable land in the Hilltop Precinct;
- Inside Council's Environmental Significance Overlay area outside the Hilltop Precinct or proposed open space:
    - Approximately 222 NJKHTs are marked for removal; and
    - No trees marked for retention;
- Table 6 of the Ecological Assessment Report notes the site includes 1,200 trees greater than 100mm DBH. This means that 549 (1200 – 651) trees on developable land will be removed;
- In light of these figures, the application does not meet the following planning and design principals of The Koala-sensitive Design Guideline (DES 2020):
    - retain and protect koala habitat values in their natural state to allow koalas to feed, rest and move around;

- achieve permeability for koalas through the landscape to ensure the safe movement of koalas within and across a site;
- retaining, enhancing or creating large contiguous patches of koala habitat; and
- avoiding clearing non-juvenile koala habitat trees on the site, including individual, isolated trees;

- The Tree Retention and Removal Plan (App K) does not include indicative lot boundaries or nominated building footprints / Building Location Envelopes (BLEs) per lot. The revised Bushfire Management Plan (App H) also does not include indicative lot boundaries or BLEs. Specifically, App H notes the following:

  "With regard to lots and potential Building Location Envelopes (BLEs), the Hill Top Precinct is part of the Material Change of Use application and the Reconfiguring a Lot, however at this stage it is just an area and as such will be subjected to an additional Reconfiguring a Lot application at a later date."

- The application does not demonstrate that impacts on areas of ecological significance shown on the Environmental Significance Overlay Maps have been avoided or minimised by:

  - minimising the total footprint within which activities, buildings, structures, driveways and other works or activities are contained;
  - avoiding further fragmentation of areas of ecological significance;
  - strengthening internal linkages where possible;
  - retention of habitat trees for fauna of conservation significance; and
  - maintaining areas of ecological significance in patches of greatest possible size and with the smallest possible edge to area ratio; and

- Individual trees retained in the footprint of the Hilltop Precinct would be excluded from a bushfire assessment as they would be classed as "managed vegetation" against exclusions in AS3595.

It is noted that references to BLEs in the Variation Scheme Document (VSD) were requested to be removed in the Information Request, with consideration to be given to using Plans of Development as a suitable mechanism to regulate, where required, future building locations. However, indicative building envelopes are necessary at this assessment stage to demonstrate proof of concept and compliance with the overlay code.

Please note that the proposed Gainsborough Lodge Environmental Significance Overlay map (which is included in the VSD) should include requirements in the developable area of the Hilltop Precinct to ensure that future development complies with the overlay code, to the extent practicable considering suitable housing lots and road layouts which mitigate and manage the bushfire hazard.

Information Required:

Please provide the following further information including:

- A concept site plan should be provided for both the Hilltop Residential Precinct with clearly defined lots and access roads, vehicle access and potential BLEs;

- Figure 2 Development Assessment of the Tree Retention Plan is to be updated to show the information (as above);

- BLEs based on results of the revised Bushfire Risk Assessment as well as constraints for locally significance trees or habitat trees;

- The display of 'Trees to be Removed' and 'Trees to be retained' in Figure 2 is to be amended to show only those trees within the BLEs, road network and access, as trees to be removed;

- Plans should be updated to clearly define these areas as vegetation to be retained – this should be reflected in the provisions of VSD; and

- The report and site plans should clearly detail how the Koala-sensitive Design Guidelines are to be implemented across the site, with particular regard to:
    - retention and protection of koala habitat values in their natural state to allow koalas to feed, rest and move around;
    - how the lot design and retention of trees achieves permeability for koalas through the development site to ensure the safe movement of koalas within and across a site;
    - retention and enhancement of contiguous patches of koala habitat; and
    - demonstration that the development has avoided clearing non-juvenile koala habitat trees on the site, including individual, isolated trees.

Please note that any master plan or structure plan that forms part of the Variation Scheme Document will require amendment. Note, this issue will also be raised in the second Further Advice Letter with a focus on ensuring there are provisions applying to future development of the Hilltop Precinct to better achieve compliance with the current (and VSD version) Environmental Significance Overlay Code.

5. PROVISION OF PARKLAND AND STREETSCAPE PLANTING PALLETTE

5.1 Hilltop Precinct Open Space Tenure

The Gainsborough Lodge Design Strategy identifies 'retained existing hilltop vegetation' containing resting nodes, viewpoints, signage and pedestrian trails. Section 3.4 Open Space Strategy talks generally about this area as performing a 'park and open space' function but it is not clear if this area is intended to perform a private open space function or be dedicated to Council. Should the later be intended, it should be noted that Council has no interest in additional area for Council owned and managed open space and the Design Report be amended to make clear the functionality and ownership intent of this space.

Information Required:

Please:

- Amend Section 3.4 Open Space Strategy and other sections of the Gainsborough Lodge Design Report to clarify the functionality and ownership of the 'retained existing hilltop vegetation' adjacent to the Hilltop Residential Precinct as being retained in private ownership associated with the community title intent of the Hilltop Residential Precinct; and

- Identify the proposed tenure of the open space and amend all relevant documents and plans.

5.2 Aspect of Development: Planting Details

The Gainsborough Lodge Design Plan identifies several variations from Council's standard documents and processes. In particular the following are of concern:

- Page 27 references 25L pots for street trees. Council preference is 45L pots;

- Page 29 proposes multiple planting avenues within the road reserve of the Entry Distributor Cross-section which are not supported. Council's preference is to provide adequate space for a single avenue of large trees;

- The proposal for gardens and moundings in the North / South Distributor Cross-section, the Entry Distributor Cross-section and the East / West Collector Cross section are not supported. Please remove all references to these planting areas; and

- Pages 35, 36 and 38 propose entry statement gardens on Council road reserve along Hursley Road which is not supported. All gardens to be contained within private land.

	Street Trees need to be provided along Hursley Road with the following species being preferred by Council, namely Pyrus 'Korean Sun', Lagerstroemia 'Lipan' or Acer beurgeranium. Remove associated planting palette for this area from Design Report.
Information Required:	
Please provide an amended Design Report addressing the comments above.	
5.3 Aspect of Development: Interim Local Park Strategy	
Section 3.5 of the Interim Local Park Strategy proposed delivery of an equivalent Local Recreation Park within Councils Harvey Court Open Space, in order to service the development site prior to Council's intended future upgrade to a District Recreation Park. Generally, Council is not supportive of park infrastructure being delivered earlier than required as it has an increased maintenance and asset lifecycle cost burden which cannot be accommodated within existing resources.	
Information Required:	
Further information is required to support consideration of the request. Information identifying proposed delivery timing linked to a staging plan is required to understand the cost and other implications to Council should this proposal be adopted. Supporting information in relation to further understanding the need and reasons as to why the existing parks network cannot service the proposed development is also required.	

Responding to the Further Advice

Please advise within two (2) business days of the receipt of this letter whether you intend to respond to Council's further advice and if so, a proposed timeframe for your response to Council.

You may wish to consider stopping a current period in the development assessment process in accordance with Section 32 of the Development Assessment Rules if you require additional time to consider this letter and any actions you may wish to take in response.

Should you not agree to respond to the further advice contained in this letter, Council will proceed to determine the application in accordance with the original decision-making period on the basis of the information supplied.

If you require clarification of any of the above and in particular specific details of the further advice, please contact Council's Senior Planner, Rodney O'Brien, on the above number.

Yours faithfully

Richard Green
Senior Planner, Development Services

C/C Charles Calthrop Pty Ltd
As Trustee
PO Box 398
BEENLEIGH QLD 4207

Attachment 2: SIDRA Outputs

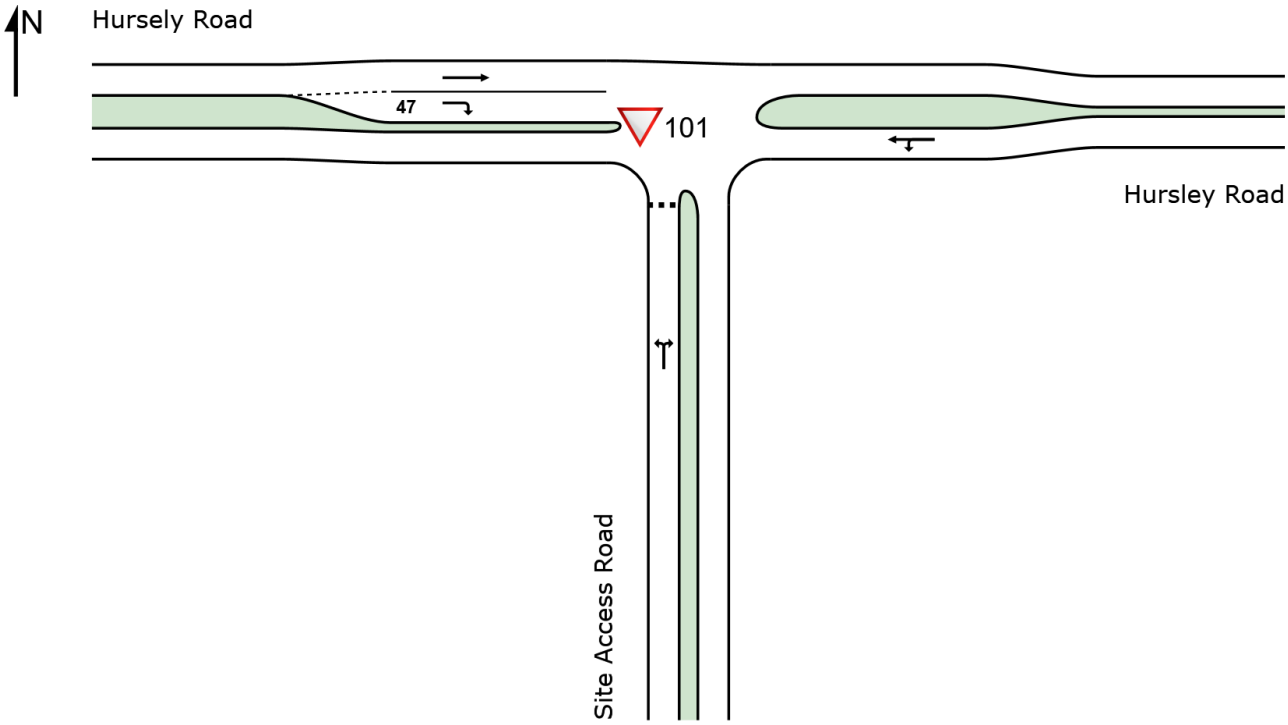
SITE LAYOUT

Site: 101 [Access - 2039 (470 Lots) - AM (Site Folder: General)]

P4107 - Gainsborough Lodge Residential TIA

Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Access - 2039 (470 Lots) - AM (Site Folder: General)]

P4107 - Gainsborough Lodge Residential TIA

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Site Access Road														
1	L2	70	3.0	70	3.0	0.310	6.1	LOS A	1.4	10.3	0.42	0.67	0.42	51.9
3	R2	210	3.0	210	3.0	0.310	8.1	LOS A	1.4	10.3	0.42	0.67	0.42	51.4
Approach		280	3.0	280	3.0	0.310	7.6	LOS A	1.4	10.3	0.42	0.67	0.42	51.5
East: Hursley Road														
4	L2	90	3.0	90	3.0	0.117	5.6	LOS A	0.0	0.0	0.00	0.24	0.00	56.1
5	T1	129	3.0	129	3.0	0.117	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	57.8
Approach		219	3.0	219	3.0	0.117	2.3	NA	0.0	0.0	0.00	0.24	0.00	57.1
West: Hursely Road														
11	T1	122	3.0	122	3.0	0.064	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	30	3.0	30	3.0	0.021	6.2	LOS A	0.1	0.6	0.32	0.57	0.32	52.1
Approach		152	3.0	152	3.0	0.064	1.2	NA	0.1	0.6	0.06	0.11	0.06	58.2
All Vehicles		651	3.0	651	3.0	0.310	4.3	NA	1.4	10.3	0.19	0.40	0.19	54.8

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
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 [Access - 2039 (470 Lots) - PM (Site Folder: General)]

P4107 - Gainsborough Lodge Residential TIA

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Site Access Road														
1	L2	40	3.0	40	3.0	0.184	5.9	LOS A	0.8	5.5	0.34	0.65	0.34	51.9
3	R2	120	3.0	120	3.0	0.184	8.2	LOS A	0.8	5.5	0.34	0.65	0.34	51.4
Approach		160	3.0	160	3.0	0.184	7.6	LOS A	0.8	5.5	0.34	0.65	0.34	51.6
East: Hursley Road														
4	L2	180	3.0	180	3.0	0.146	5.6	LOS A	0.0	0.0	0.00	0.39	0.00	54.9
5	T1	90	3.0	90	3.0	0.146	0.0	LOS A	0.0	0.0	0.00	0.39	0.00	56.5
Approach		270	3.0	270	3.0	0.146	3.8	NA	0.0	0.0	0.00	0.39	0.00	55.4
West: Hursely Road														
11	T1	129	3.0	129	3.0	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	60	3.0	60	3.0	0.044	6.4	LOS A	0.2	1.4	0.36	0.59	0.36	52.0
Approach		189	3.0	189	3.0	0.068	2.0	NA	0.2	1.4	0.12	0.19	0.12	57.2
All Vehicles		619	3.0	619	3.0	0.184	4.2	NA	0.8	5.5	0.12	0.40	0.12	54.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
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Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

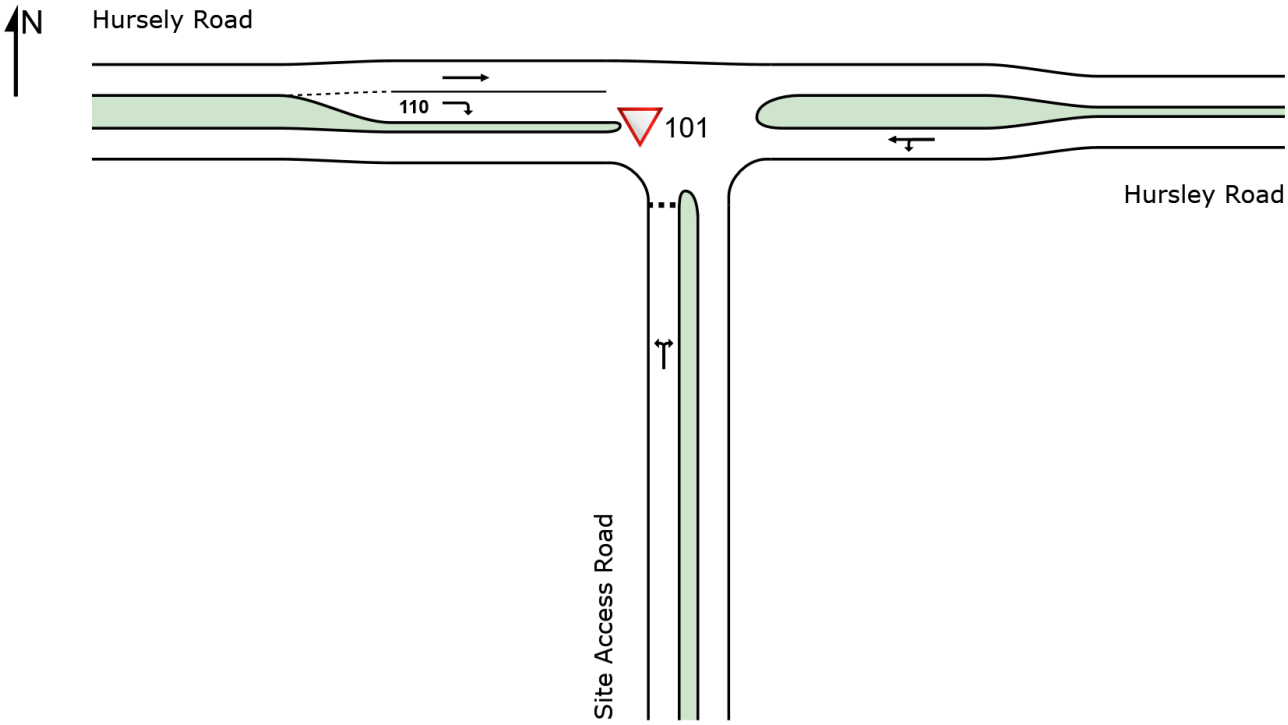
SITE LAYOUT

Site: 101 [Access - 2039 (470 Lots + Thurgoona) - AM (Site Folder: General)]

P4107 - Gainsborough Lodge Residential TIA

Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Access - 2039 (470 Lots + Thurgoona) - AM (Site Folder: General)]

P4107 - Gainsborough Lodge Residential TIA

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Site Access Road														
1	L2	94	3.0	94	3.0	0.425	6.7	LOS A	2.7	19.5	0.46	0.73	0.56	51.1
3	R2	280	3.0	280	3.0	0.425	9.3	LOS A	2.7	19.5	0.46	0.73	0.56	50.7
Approach		374	3.0	374	3.0	0.425	8.7	LOS A	2.7	19.5	0.46	0.73	0.56	50.8
East: Hursley Road														
4	L2	121	3.0	121	3.0	0.134	5.6	LOS A	0.0	0.0	0.00	0.29	0.00	55.8
5	T1	129	3.0	129	3.0	0.134	0.0	LOS A	0.0	0.0	0.00	0.29	0.00	57.4
Approach		250	3.0	250	3.0	0.134	2.7	NA	0.0	0.0	0.00	0.29	0.00	56.6
West: Hursely Road														
11	T1	122	3.0	122	3.0	0.064	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	41	3.0	41	3.0	0.029	6.3	LOS A	0.1	0.9	0.35	0.58	0.35	52.1
Approach		163	3.0	163	3.0	0.064	1.6	NA	0.1	0.9	0.09	0.15	0.09	57.8
All Vehicles		787	3.0	787	3.0	0.425	5.3	NA	2.7	19.5	0.24	0.47	0.28	53.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
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 [Access - 2039 (470 Lots + Thurgoona) - PM (Site Folder: General)]

P4107 - Gainsborough Lodge Residential TIA

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Site Access Road														
1	L2	53	3.0	53	3.0	0.259	5.9	LOS A	1.1	8.1	0.37	0.67	0.37	51.6
3	R2	160	3.0	160	3.0	0.259	8.9	LOS A	1.1	8.1	0.37	0.67	0.37	51.1
Approach		213	3.0	213	3.0	0.259	8.1	LOS A	1.1	8.1	0.37	0.67	0.37	51.2
East: Hursley Road														
4	L2	240	3.0	240	3.0	0.179	5.6	LOS A	0.0	0.0	0.00	0.43	0.00	54.6
5	T1	90	3.0	90	3.0	0.179	0.0	LOS A	0.0	0.0	0.00	0.43	0.00	56.2
Approach		330	3.0	330	3.0	0.179	4.1	NA	0.0	0.0	0.00	0.43	0.00	55.1
West: Hursely Road														
11	T1	129	3.0	129	3.0	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	80	3.0	80	3.0	0.062	6.7	LOS A	0.3	1.9	0.41	0.62	0.41	51.9
Approach		209	3.0	209	3.0	0.068	2.6	NA	0.3	1.9	0.16	0.24	0.16	56.6
All Vehicles		752	3.0	752	3.0	0.259	4.8	NA	1.1	8.1	0.15	0.44	0.15	54.3

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.