IN THE MATTER	**of the Resource Management Act 1991**
AND	**A private plan change request (Private Plan Change 11) from Bardowie Investments Limited**
FOR	**Industrial Rezoning of 56.7ha of land at Hautapu**

STATEMENT OF EVIDENCE (PLANNING)

Todd Whittaker

For Waipa District Council

22 November 2018

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1 Introduction

1. My name is Todd Whittaker and I am an independent planning consultant. I was the primary author of the S.42A report issued by Council on 5 November 2018 taking into account the input and professional opinions from other council engineering and planning staff.

2. I work as an independent planning consultant and Director of Planning Works Limited. I have a Bachelor of Resource and Environmental Planning from Massey University, 1994 and I am a full member of New Zealand Planning Institute (NZPI). I have 23 years of professional experience in the resource management field and currently serve on the Board of the NZPI.

3. I have read and complied with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 in preparing this report. I agree to comply with it in presenting this report and any evidence at the hearing. The opinions and assessment within this report are within my area of expertise, except where I have stated my reliance on other identified evidence. I have considered all material facts that are known to me which might alter or detract from the opinions I express in this evidence.

4. I have prepared this statement to complete the Council assessment and recommendations of the application taking into account the additional material which has been presented and heard during the course of the hearing and also the additional work that Bardowie Investments Limited (BIL) has completed since the initial report.

5. In summary, it is my opinion, that BIL has successfully addressed the residual matters identified in the hearings report and the plan change can be approved.

2 Scope Of Evidence

6. The Council assessment of the plan change and full recommendations for the submissions are contained in the Section 42A report and I do not intend to repeat the content of that report.

7. This statement will cover the topics;

- Kiwi Rail and Southern Entrance,
- Campus Hub,
- Henmar Trust Submission,
- Transportation and Structure Plan, and
- Rule Provisions and Design Guide.

3 Kiwi Rail and Southern Entrance

8. The S.42A report identified the need for BIL to confirm arrangements with Kiwi Rail given that the southern access crosses over the existing rail corridor. As this corridor is designated, any use of this corridor requires the express approval of Kiwi Rail.

9. Kiwi Rail has confirmed their position in correspondence dated 18 November 2018 that *good progress* has been made with the License to Occupy agreement and that they are comfortable with the Structure Plan provisions for the alternative use of the northern entrance.

10. The Hearings Panel can have confidence in the status of the current agreement, which has had input from Council staff, and that this is within the scope of the original submission relief sought by Kiwi Rail. I therefore consider that the issue with access over the existing railway corridor is sufficiently resolved to enable a favourable decision on this aspect of the plan change.

4 Campus Hub

11. The scale and function of the Campus Hub was one of the key issued raised in submissions and the S.42A report also discussed the potential range of activities and buildings that could be established and recommended that additional District Plan and Structure Plan mechanisms be incorporated with the plan change.

12. It is significant that of those submitters who raised concerns about the potential impact of the Campus Hub on the Cambridge Central Business District through submissions, their concerns have been addressed with the additional changes to the plan change provisions. Importantly, the Hearings Panel heard from the Cambridge Chamber of Commerce and the Cambridge Community Board with the verbal submissions not only fully supporting the plan change, but also promoting the positive effects on the Cambridge town centre.

13. It is noted that the Waikato Regional Council letter (15 November 2018) states support for the Plan Change including the recommendations in the original 42A report. Some of these recommendations have now been further refined by BIL.

14. In particular, BIL has provided additional rule provisions to provide further definition around the scale and nature of activities that may be established in the Campus Hub. While a Concept Master Plan has been referred to, BIL do not wish to have this form part of the Plan Change and therefore no weighting can be given to this in terms of the District Plan rules.

15. The key changes which BIL has proposed include

- Changes to the objective and policy framework to recognise the function of the Campus Hub,
- Limitation of future visitor accommodation and conference centre to one activity each (although no scale or size limit), and
- Change of status for Offices (not ancillary to a Permitted Activity) to be Restricted Discretionary and new assessment criteria.

16. BIL also made a change to the Campus Hub through their own submission on the Plan Change which proposed a limit on *other retail* to a combined maximum of 400m2 GFA.

17. The proposed amendments by BIL do provide further certainty around the type of activities that may be developed and the restriction on *other retail* activities will ensure that a retail precinct will not be developed.

18. Council planning staff fully support the concept of the Campus Hub and we also recommended recognition within the objective and policy framework that the future activities will not necessarily be linked to the industrial activities in the precinct. We share the vision set out in the evidence of Mr Vincent and Mr Chrisp that the Campus Hub will allow for the establishment of a range of activities that will support the health and welfare of people working within the Bardowie Industrial Precinct and the wider Hautapu Industrial area and also cater for a motel and a conference centre.

19. The Committee however need to be mindful of the size of the Campus Hub being 5.5 hectares. Given the commitment of BIL to the design and amenity of activities in the Campus Hub taking into account the Urban Design Guidelines and referring to park like grounds, open space and areas for the enjoyment and benefit of BIL employees and other users and a relatively low density of buildings it is unlikely the entire area will be developed in buildings.

20. The Hearings Panel will need to consider whether the appropriate balance has been achieved in terms of efficient rule mechanisms and certainty in terms of the type and nature of future activities given that the concept master plan will have no status in terms of the District Plan provisions.

21. BIL has proposed to reduce the setback for the 10m maximum height control and the BIL proposal will provide for 20m high buildings approximately 15m inside the property boundary (being 40m from the Victoria Road frontage). Apart from the Henmar Trust, no other party has raised this matters in submissions and the Hearings Panel will need to be comfortable with this proposed level of bulk and location.

4 Henmar Trust Submission

22. The Henmar Trust has made extensive submissions and further submission across the plan change and provided evidence and submissions to the Hearings Panel on Monday. Following the request from the Chair of the Hearings Panel, BIL, the Henmar Trust and Council representatives held a very constructive meeting to discuss the overall concerns of the Henmar Trust, how they will be involved with the development of the C10 growth cell and the outstanding matters discussed in their submissions and evidence.

23. I am pleased to update the Hearings Panel that agreement has been reached between the parties on the outstanding matters and this is recorded in the signed minutes from the meeting (**Appendix 1**). The agreement includes matters of connectivity of the C10 growth cell, stormwater and the zone interface which were three of the key concerns for the Henmar Trust.

24. BIL has undertaken to update the set of plan provisions including the structure plan stormwater plan, wastewater plan and water plan to reflect the agreed outcomes.

5 Transportation and Structure Plan

25. In the earlier S.42A report, reference was made to a technical peer review of the access design concepts. This work has now been completed and the report from WSP Opus Consultants dated 12 November 2018 (**Appendix 2)**.

26. While the technical review identifies a number of matters which will need to be addressed through the master planning and design selection process, Council's Roading Corridor Manager, Mr Bryan Hudson, is comfortable with the peer review and is assured that BIL has demonstrated appropriate design options for both the northern and southern access including any future need to close the southern access.

27. In response to the matters raised in the S.42A report and in the Henmar Trust submission, further amendments to the Structure Plan have been agreed with BIL which include amendments to the notation of the future roading and services linkages.

28. Subject to these final changes, I consider that the Structure Plan which incorporates the roading pattern can now be included in the District Plan along with the associated Plan linkage and rule mechanisms.

6 Rule Provisions and Design Guide

29. A number of changes have also been proposed to the Plan provisions and the Design Guide in response to S.42A report and submissions. BIL has also provided further explanation on the purpose of the rule mechanism where the full set of recommendations provided in the S.42A report have not been adopted. Fonterra has also provided additional context and background on the rule mechanism for activities requiring an air discharge.

30. Taking into account the additional evidence and input from Council staff, I am satisfied that the proposed amendments to the plan change provisions (including the agreed amendments from the Henmar Trust submission) provide an appropriate and efficient set of plan rules provisions and that these will give effect to the objectives of the District Plan, the higher order planning instrument, and the sustainable management purpose of the Resource Management Act 1991.

7 Conclusions

31. There can be little doubt that Plan Change 11 provides the opportunity for the release and development of a new industrial precinct at Hautapu which will have significant benefits. These benefits include;

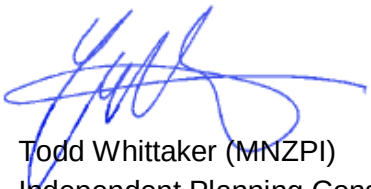
- A purpose designed and selected site for the relocation of the APL manufacturing and logistics operation,
- Additional industrial land supply which can be integrated with transportation and infrastructure networks and supply,
- Provision of a Campus Hub which will provide complementary and locational appropriate non-industrial activities,
- Economic benefits for the Cambridge and Waipa community, and
- Resetting of the C10 Growth Cell as part of the industrial land supply and higher order planning framework.

32. A number of planning and technical matters have arisen through the private plan change process and BIL has been very proactive in resolving these matters to enable a settled set of plan change provisions and planning process which can be adopted and approved by Council.

33. Part of this process will be the next level of design work through the master planning process and developer agreement which will assess the provision of transportation and infrastructure links and servicing for the Bardowie Precinct and the balance of the C10 Growth Cell.

34. It is important to recognise the earlier issues surrounding the industrial land allocation and the matters raised in submissions from the Future Proof partners. BIL has provided additional analysis of the alternative land release policies and I support the view that the plan change is consistent with the provisions of the Regional Policy Statement. This assessment includes the decision of Waipa District Council to reinstate the C10 Growth Cell. Future Proof and the Waikato Regional Council have also provided statements with general support for the plan change and no longer raise issues of industrial land allocations and alignment to the RPS.

35. I support Plan Change 11 and recommend that this be approved by the Hearings Panel in accordance with the final amendments outlined in this statement.



Todd Whittaker (MNZPI)
Independent Planning Consultant
22 November 2018

Waipa District Council
Private Plan Change 11

Planning Evidence
Appendix 1

Meeting Agreement on Submission Points - BIL/Henmar Trust

HEARING MEETING

20 November 2018 – 9am

Wayne Allan, Todd Whittaker, Richard Bax, Bryan Hudson, Matt Smith, Mark Chrisp, Abbie Fowler, Louise Bourke, Mary Bourke

Issue / Topic	Agreement
Infrastructure - Roading	• Put in a roundabout with a collector road in black dotted line (same as eastern connection) to the boundary of the Henmar Trust property to the north. • Roading and services to be included in the text – text on Structure Plan and the text of the Structure Plan. • Waipa District Council prefer the Henmar Trust land (within the C10 Growth Cell) is serviced from the BIL land, not directly off Victoria Road – subject to a Master Plan. • Take "possible" out from text on the SP • Legend needs to be updated "Roading and service connections to the north (to the property boundary of the part of Pt Allotment 190 Hautapu Parish within the C10 Growth Cell) and the east to connect with the balance of the C10 Growth Cell shall be identified and vested as roads at the time of the first subdivision of Node 3 in accordance with any C10 Growth Cell Master Plan and/or Structure Plan relating to the balance of the C10 Growth Cell that has been approved by the Waipa District Council"
Infrastructure - Stormwater	• Henmar Trust does not want to be adversely affected by the PC11 development. • Hydraulic neutrality will be achieved. • Requirement for regional consent, which will control any downstream effects. • Waipa District Council has peer reviewed BIL proposal and is comfortable with the approach.
Infrastructure - Electricity and Telecommunication Lines	• All new powerlines to be underground - and existing lines will be underground at the time of development in the respective Node (the lines that BIL has access to). • Telecommunication lines to be treated in the same manner.

Issue / Topic	Agreement
Permitted Activity Rule – Stormwater Ponds and / or facilities	• No change
Permitted Activity Rule - Water Treatment Facilities	• Delete reference to water treatment facilities from the PA rule.
Permitted Activity Rule - Spray Irrigation	• Insert into the Rule "until 31 March 2024"
Permitted Activity Rule - Farming Activities	• No change
Innovation and Advance Technology Activities	• No change
Air Discharge	• No change
Building setbacks and landscaping	• Issue is confined to the common boundary of the Henmar Trust / BIL property • Agreed - 5 metre setback which to be landscaped.
Height	• Issue is confined to the common boundary of the Henmar Trust / BIL property • No change
Noise	• No change

Issue / Topic	Agreement
Design Guidelines	• Reflectivity – 4.11 – remove the word "significant". • No change to 2.16 or 5.3. • 4.5 - delete "(particularly in Node 3)". • 4.21 – Add "Solar panels shall be integrated into the design of the building and not deviate more than 15 degrees from the angle of the roofline on which they are located." • 5.3 - Insert "screening shall not include building materials" • 7.10 – Delete "and small-scale wind generation."

M. Chrisp Snr BIL.

M. Smith Jnr BIL

Mary Louise Bourke (Trustee Henmar Trust.)

Louise Bourke, Henmar Trust

Wayne Allan; Waipa District Council

Waipa District Council
Private Plan Change 11

Planning Evidence
Appendix 2

Opus Transportation Review

12 November 2018

WSP Opus
Hamilton Office
Opus House, Princes Street
Private Bag 3057, Waikato Mail Centre, Hamilton 3240
New Zealand

+64 7 838 9344
www.wsp-opus.co.nz

Bryan Hudson
Roading Corridor Manager
Waipa District Council
Private Bag 2402
Te Awamutu 3840

Ref: 2/32841/00

Plan Change 11 North Access Concept: Review of Proposal

Dear Bryan,

1 Study Scope

The study we have completed, the results of which are described in this letter, is intended to review the concept proposals for the access arrangements at the intersection of Victoria Road and Hautapu Road proposed by Bardowie Investments Limited (BIL), as part of the proposed changes to Waipa District Council's District Plan, to allow industrial development of the area to the east of Victoria Road / Laurent Road. The works at the intersection form part of an overall proposal to provide staged access to the development area, with the provision of a dedicated intersection with right turn lane facilities to serve the Stage 1 development area, which is sited between the current proposed roundabout and the SH1 Waikato Expressway intersection to the south.. This access for Stage 1 has been accepted in principle by the Council and lies outside the scope of our review as described in this letter.

Two intersection configuration options have been provided by the developer; these are intended to create an intersection configuration to serve SH1B Victoria Road (southern link to Expressway), Hannon Road, Hautapu Road, SH1B Victoria Road (north), and the proposed northern access road to the development (BIL Road).

The drawings provided by the developer do not include details of road widths or geometry; apart from notes describing:

- A single roundabout with a 38 m diameter central island and 2 m central apron surrounding the central island for Option 1.
- Twin roundabouts with 36 m and 24 m diameter central islands and 2 m central aprons for Option 2.

For all other dimensions we have assumed or scaled these from the drawings. Our examination of the SIDRA models and of current design standards indicate that a circulatory width for the roundabouts of 7.0 m has been used. The modelled SIDRA speed appears to be 50 km/h (not the 70 / 60 km/h quoted). All approach islands to the roundabouts have a central median of 2.20 m with 0.30 m edge separation on either side.

2 Option 1 - 5 Leg Roundabout

This option creates a simple five leg roundabout to link all roads except Laurent Road.

2.1 Issue 1: At Grade Roundabout Compromises Rail Corridor

If constructed at grade, the roundabout would compromise the protected rail corridor to Cambridge that has been requested by KiwiRail. The design would require two railway level crossing systems, which in turn would require signalisation of the crossing points. The current proposal requires consultation with KiwiRail on the effects to the rail corridor; without confirmation of their acceptance of the proposals we consider that Waipa District Council should not approve the design. **The railway level crossings are a critical issue.**

A potential option would be to signalise the entire roundabout. This would still require consent from KiwiRail but would ensure full control of all traffic movements is available. The alternative would be to construct the roundabout at a higher grade than the railway line to allow the roundabout to be constructed without compromising the rail corridor. This would require considerable earthworks at the roundabout site and on all approach routes; there is insufficient information with the current design to confirm that this could be achieved without compromising key points of constraint, or the intersections with side roads and accesses for adjacent premises.

2.2 Issue 2: Intersection Visibility

The developer's drawings indicate that the visibility requirements on the Hautapu Road entry to the roundabout cross the boundary line of the rail corridor. This places the land required for visibility outside the road corridor, which is on land that cannot presently be controlled by the Waipa District Council. **This is a critical safety issue.**

2.3 Issue 3: Roundabout Crossfall Design Geometry

The Austroads design methodology for a roundabout recommends a cross fall from the central island to the external edge of a roundabout. This geometry conflicts with the requirements for the creation of a level crossing, which is dictated by the levels of the railway line. In the absence of design levels to check the level of conflict, there is no certainty that the roundabout design can comply with current standards and provide suitable levels for the railway line. The proposed design will introduce adverse changes in camber or cross fall that may create safety issues on the circulatory carriageway of the roundabout. **This is a critical design issue.**

3 Option 2 - Twin Separated Roundabouts (Dumbbell or Dogbone arrangement)

This option looks at the creation of two roundabouts; one on each side of the rail corridor, with an interlinking route between the two. The design utilises the existing gap between the two areas of rail corridor to facilitate a connection between the two roundabouts, and in doing so reduces the potential for conflict with the aspirations of KiwiRail to maintain the rail corridor for future connections between Hamilton and Cambridge. The two roundabouts have different diameters from each other; each of which is smaller than the 38 m diameter of the Option 1 roundabout. The central island diameter of a roundabout relates to the geometry of the approach routes and the number of legs that can practicably be connected to each roundabout.

3.1 Issue 4: Roundabout Sizes

While there may be justification for reducing the sizes of the roundabouts to minimise land take and construction costs, we consider it to be good practice to construct both roundabouts at similar sizes so that drivers are not surprised by differences in geometry while using the intersections.

3.2 Issue 5: Interlink Length and Stacking Distances

The interlink length is quoted by the designers as being approximately 60 m; this value is used in SIDRA. While the difference is not significant, when scaled from the drawings the actual interlink length is approximately 56 m. We have made reference to this in our comments on the SIDRA report. If queue length issues arise as a result of deficiencies with stacking lengths this may be resolved by changing the current two-lane design to a four-lane design with central median separation. The additional lanes would allow for dedicated exit lanes from the roundabouts, which would increase efficiency and double the available stacking capacity between the roundabouts.

With regard to our Issue 3 comments regarding the roundabout crossfall geometry, because the level crossing for Option 2 is proposed on the interlink between the two roundabouts this means the vertical alignment of the railway can be better accommodated. Without design levels being provided this cannot be readily verified, however, we consider there should be sufficient length on the interlink to enable a suitable transition of levels to be achieved.

4 Shared Issues - Option 1 and Option 2

4.1 Issue 6: Access for Laurent Road

A number of properties currently exist with direct access onto Laurent Road, however, neither of the proposals appear to address the need for access to Laurent Road. Therefore, neither proposal could be developed without agreement from the affected land owners regarding the means of access for those properties onto the public road network.

Laurent Road access did not form part of the Stage 1 intersection detail provided by the developer.

4.2 Issue 7: Fence Line Adjacent to Shoof

Both proposals show a fence line adjacent to the Shoof International property. This appears to be intended to protect an access route for Shoof International onto Laurent Road. Our assumption is supported by the presence of a vehicle tracking curve to the southern section of the drawings showing the vehicle tracks for the Option 1 five leg roundabout, which indicates that some form of consideration has been given to vehicle tracking from Laurent Road into the southern sector of the development (Stage 1). If this is correct, then the following issues need to be addressed.

1 Access issues onto Laurent Road - see Issue 1 above.
2 Radius of corner is insufficient for use by large vehicles. This appears to be a 6 to 8 m internal radius as scaled from the available plan. No vehicle tracking information has been provided to confirm that the corner is sufficient to accommodate delivery vehicles to the premises, but our review indicates that an alteration to the verge area in front of the current Shoof sign will be required.

It appears that it would be preferable for Shoof International to have a direct access onto the BIL Road as part of Stage 2 of the development.

4.3 Issue 8: Access to Premises on Hannon Road

Access to existing premises on Hannon Road between 213 Hannon Road and 235 Hannon Road does not appear to have been addressed. We consider that additional details need to be provided to allow us to confirm the layout of the intersection to connect this truncated section of Hannon Road to the intersections proposed for both proposals. The position of the connections to these premises do not appear to have been modelled in the information provided by the developer; additionally, there is no evidence that the traffic volumes have been considered.

A potential solution would be to provide a dedicated right turn lane on the leg from the roundabout to Hannon Road, however, this would require detailed examination as its position would have a direct effect on the geometric design of the roundabout, and on its size in either option.

Similarly, if an access is created at the existing intersection of Hautapu Road and Hannon Road, its proximity to the roundabout will need to be considered as the provision of dedicated turning or merge lanes for the intersection will also have a direct effect on the geometry of the approach to the roundabout from Hautapu Road, and on the roundabout geometry itself.

4.4 Issue 9: Roundabout Approach Speeds

The designer states in the design parameters that "entry and exit curves [are included] to promote lower circulation speeds and lower risk to pedestrians and cyclists at crossing points".

There is no evidence that this philosophy has been included in the design; all approaches and exits appear to be designed with unmodified approaches. In addition, the information in the SIDRA modelling provided by the developer has an assumed design speed of 50 km/h (this is discussed elsewhere in this letter). We recommend that the developer is asked to provide a revised impact assessment with a more appropriate design speed used.

The provision of realignments to reduce vehicle speeds on approach to roundabouts is an accepted practice but requires additional lengths of alignment on approach to allow for suitable construction of the feature. This is not shown on the drawings of the proposals. We consider that if this were to be included then the lengths of the approaches would generate a design that is unlikely to be able to be accommodated within the site constraints.

4.5 Issue 10: Circulatory Speed Sight Criterion

The sight line criterion for the roundabout quoted on the drawings is 60 km/h for approaches, and 40 km/h for circulating vehicles. While these values are below the intended posted speed limit, the approach speeds adopted by the designer are reasonable, however the circulating visibility is below that used for design speed and for the SIDRA calculation. The SIDRA model should be re-examined using the speed adopted for the geometric design. We consider that this is unlikely to have any major effect on the circulatory visibility provided no obstructions to forward visibility are introduced in the roundabout island; notwithstanding that, the design speed amendment may introduce changes in the locations of the pedestrian/cyclist crossing points as vehicles exit the roundabout.

4.6 Issue 11: Vehicle Swept Path Design Speed

Using the draft design provided as a background, we have reproduced the drawings to scale and confirmed the swept paths for all vehicle manoeuvres for both options. These are reproduced as an appendix to this letter. Using a base design speed of 5 km/h to 15 km/h for the design vehicle, the swept path can be accommodated within the roundabout designs with minor modifications to such things as island width and corner radii. When a higher vehicle speed is used the dynamic forces on the vehicle will cause it to have wider swept paths, and these paths cannot be accommodated within the design. It should be recognised that heavy vehicles will not be able

to travel around the current design roundabouts at the design speeds noted. This does not affect the developer's SIDRA model as this assumes that the speed around the roundabout(s) is reduced from the design speed by the need to slow or stop on the approaches.

5 SIDRA Analysis

We have reviewed the SIDRA analysis provided by Gray Matter and, based on the information provided, it appears that there are a number of issues with the modelling. These are detailed in Appendix 2, but are summarised as:

- We have been unable to verify that the traffic volumes modelled are accurate, and that the network model from which these volumes were obtained was the most appropriate for this purpose. We understand that traffic volumes from an AECOM network model were used by Gray Matter and that this network model is different from the one used to inform the creation of the District Plan. We also understand that the traffic model developed by AECOM has discrepancies with known traffic volumes obtained from the NZTA national data.
- The approach distances on some approaches are set to be up to 200 m shorter than the 500 m default. The reason for this is unclear.
- Approach Data – Extra bunching. A value of 50% has been set, where the SIDRA user guide advises a value of 35%. If the SIDRA values are used this will have the effect of reducing issues with level of service.
- Roundabout Data -Number of Circulatory Lanes and sizes - WSP Opus note that there are a number roundabout layouts analysed in SIDRA. The number of circulating lanes for the dual lane roundabout options is set to be 1 on all approaches. This is likely to be an input error as the roundabout cannot operate safely and efficiently in this format.
- The SIDRA model does not detail any effects from the use of the new access to the industrial estate created in Stage 1 of the development. If this were included in the model it may have the effect of improving the deficient levels of service.

The result from the current SIDRA models provided by Gray Matter shows that none of the single lane roundabout models/options, either for the single five leg roundabout or for the twin separated roundabouts, have an acceptable level of service once the industrial development sites to the east and west are fully developed. **This is a critical issue.**

The current dual lane models have a better performance. The 95% queue distance on the worst movement of the 5-leg PM peak dual lane model is on the "BIL" approach, the queue distance (309.8 m) is longer than the approach distance (100 m). This would indicate stacking within the industrial estate. **This is a critical issue.**

While this is not an issue for traffic on the current routes, it may lead to traffic from the industrial estate using the alternate access to the area proposed in the Stage 1 development until that access is closed as part of the later stages of the site development.

At the moment the only intersection configuration that operates with an acceptable level is the double roundabout dual lane option – a combination of 4-leg (level of service (LOS) B) and 3-leg (LOS A) dual lane roundabouts. The worst movement for both of the roundabouts is on the "interlink" approach, where the queuing distance is less than the design stacking length.

6 Summary

Of the two proposed options we consider that there are sufficient issues identified with the Option 1 - 5 Leg roundabout design to discount it as a viable option at this time.

Although issues exist with Option 2, we consider that these are minor compared with those associated with Option 1.

We believe that a variation of the Option 2 layout submitted by the developers that incorporates the dual lane approaches and dual lane circulatory routes for each roundabout modelled in the SIDRA analysis is a viable option to provide suitable access to all sites in the future. At present we consider that that the developers design drawings are not sufficiently advanced to enable this to be confirmed at this time. The existing draft drawings provided by the developer show a single lane approach and roundabout for all options, despite their SIDRA model showing that dual lane roundabouts and approaches are needed to provide an acceptable level of service in the future.

Given the early stage of design for Stage 2, and the number of variables that have been identified that would have a direct effects on the nature and size of the final design, WSP Opus cannot confirm that the single lane Option 2 layout provided would be sufficient to meet the needs for evidence for the proposed changes to Waipa District Council's District Plan to allow industrial development of the area to the east of Victoria Road / Laurent Road.

In view of this, should the Council wish to progress the development proposals, we suggest that the Council adopts a staged construction policy, where provision is made within the alteration of the District Plan to protect a road reserve corridor that has sufficient width to enable the construction of two lane roundabouts with a full dual lane approaches and departures from each roundabout. This would enable the future expansion of the road corridor to meet the predicted growth modelled in the developers SIDRA analysis.

In the short term the roundabouts could be built with single lanes on the circulatory carriageway and on the approach and departure lanes. However, both roundabouts and their approaches could then be improved in the future to provide two circulatory lanes and two-lane approaches and departures once development of the industrial sites within the area generate sufficient traffic to justify it. Should the Council decide to adopt the suggested alteration to the District Plan it is recommended that the developers design take this future widening into account, and make allowance for this to be undertaken.

We also suggest that the future development plan should also take into account the needs for pedestrian and cycle routes, and for the potential signalisation of the intersection configuration. The signalisation of the roundabouts may be required to manage increased traffic flows in the future; signalisation would also enable the creation of a level crossing on the roundabout link road to facilitate the recreation of a dedicated rail link to Cambridge.

Please contact me if you have any questions or need further information regarding the matters raised in this letter.

Yours sincerely

Ed Varley
Highway Design Lead

Appendix 1 - Vehicle Swept Path Analysis

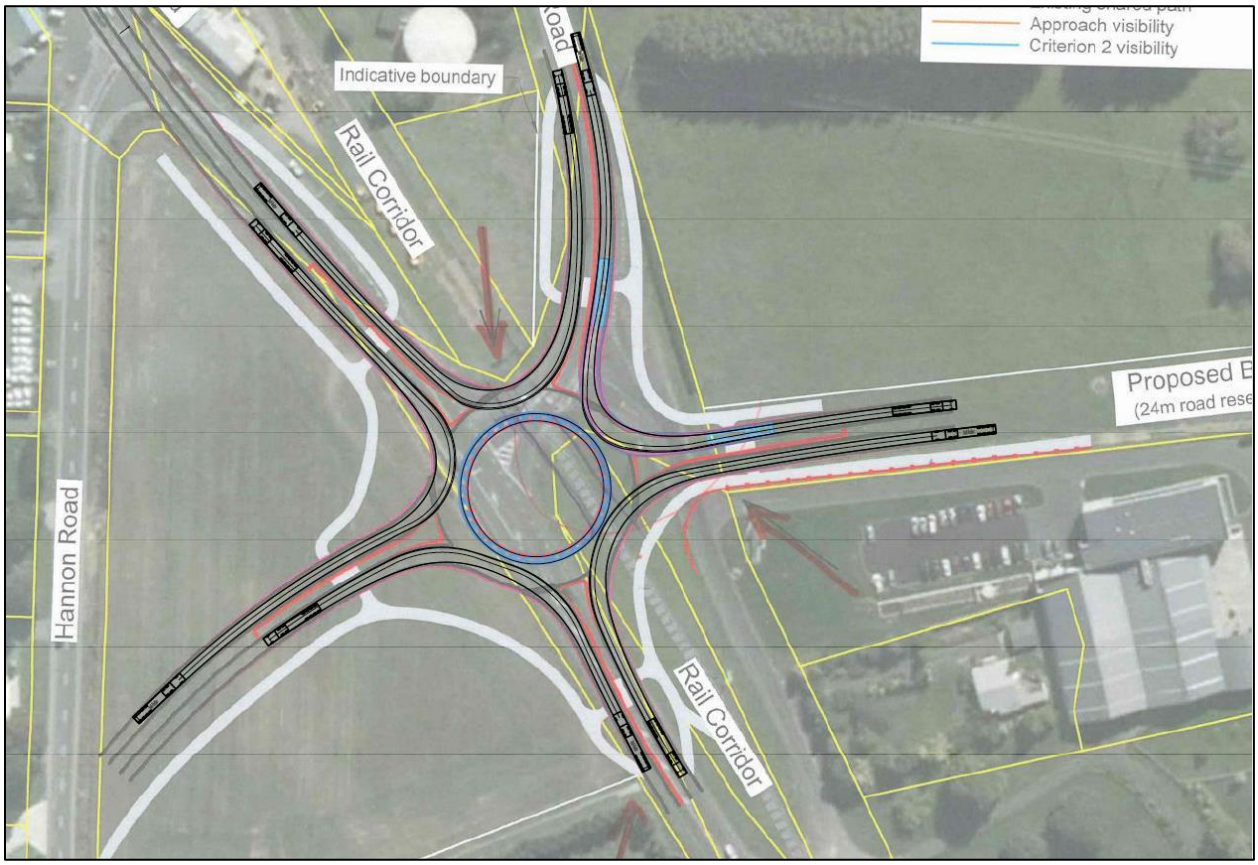


Figure 1 – Option 1 – All external circulatory movements

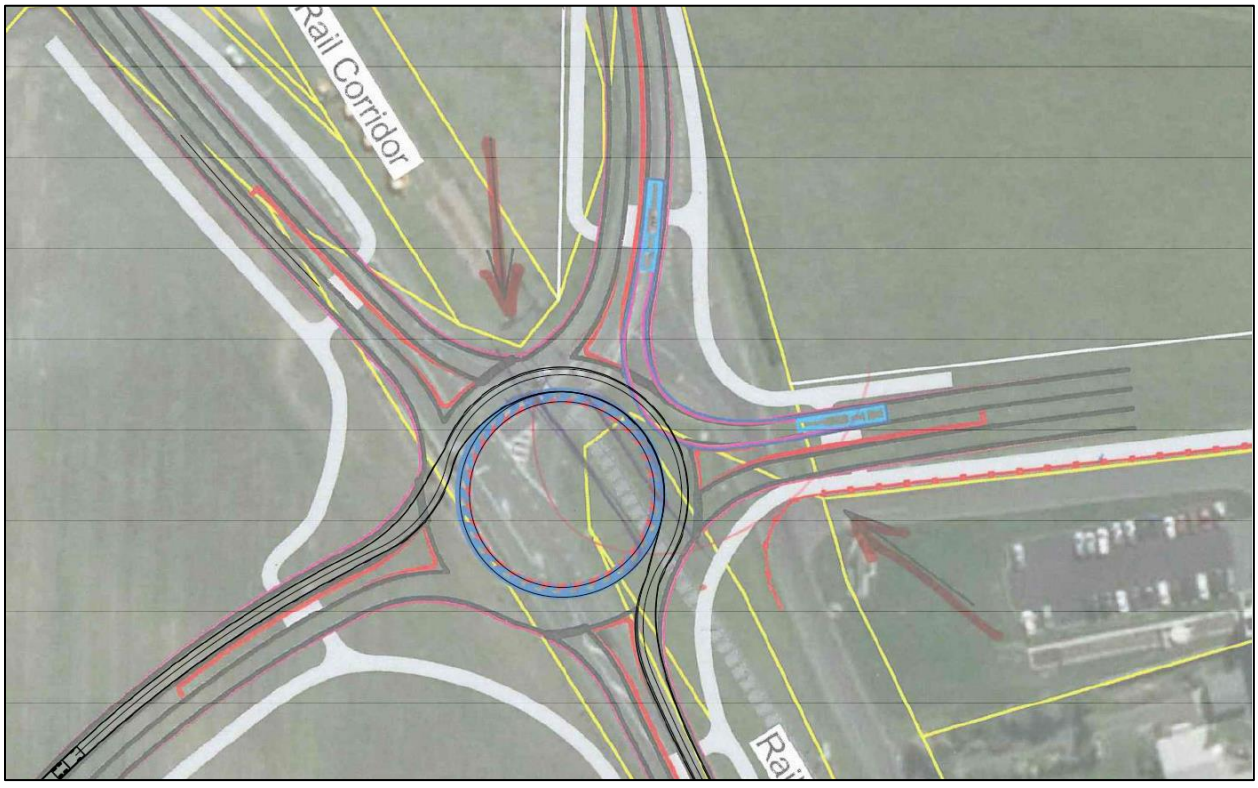


Figure 2 – Option 1 – Hannon Road to SH1B (south)

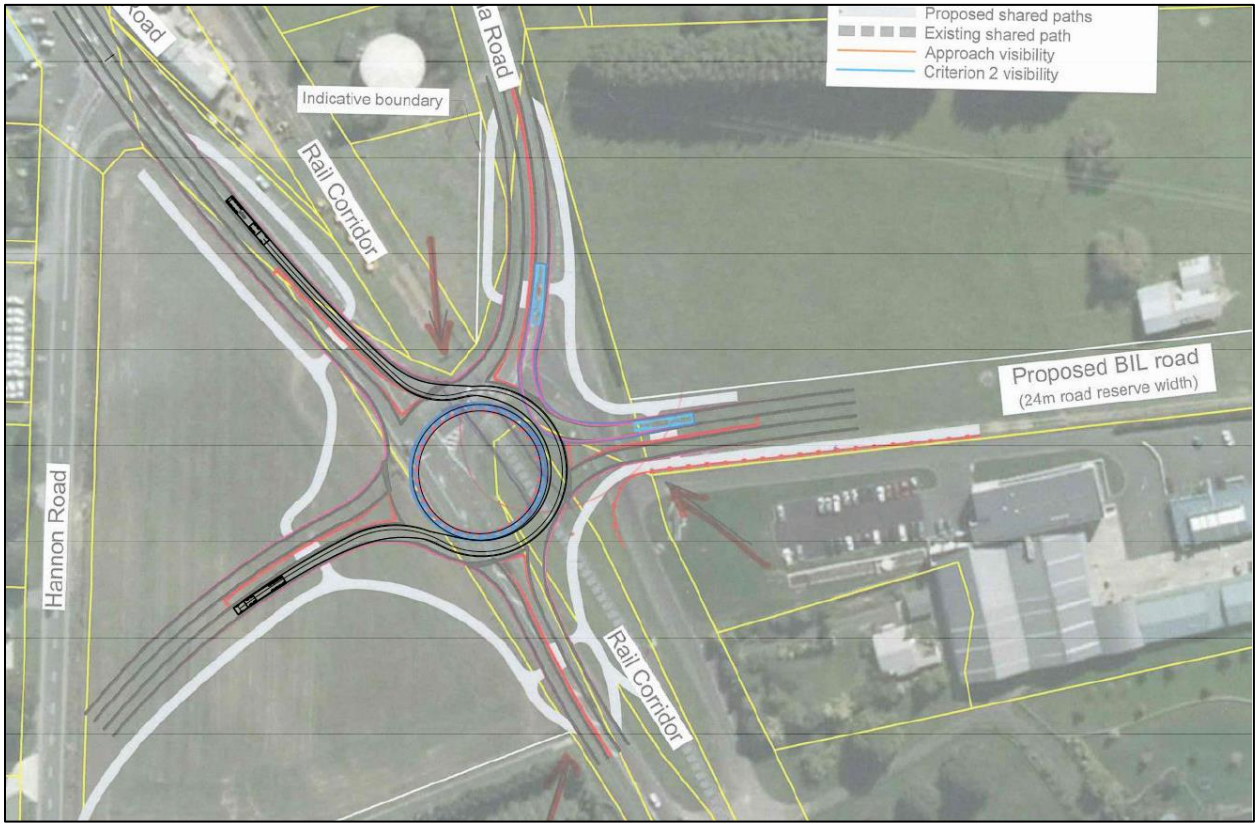


Figure 3 – Single Roundabout - Hautapu Road to Hannon Road

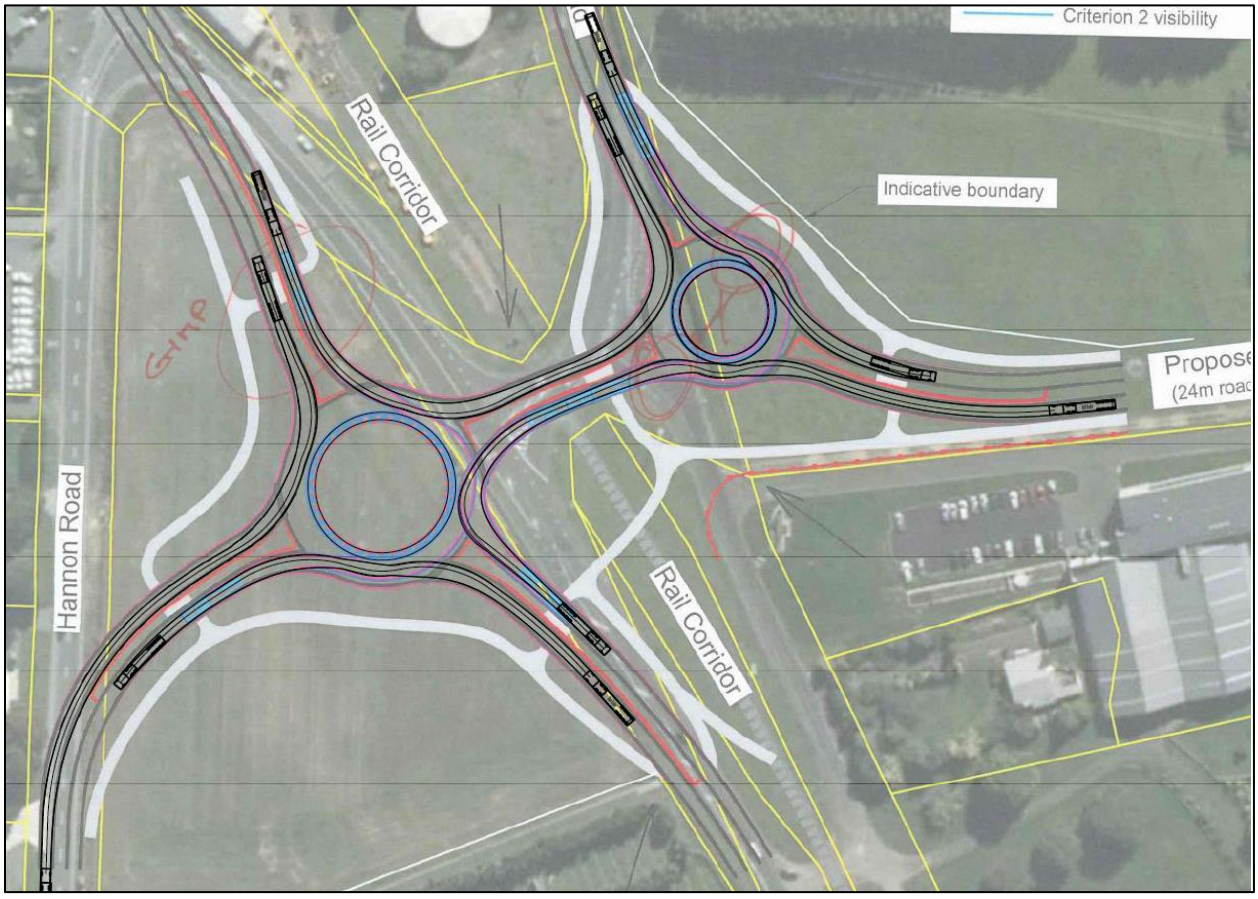


Figure 4 – Option 2 – Twin Roundabout - All external circulatory movements

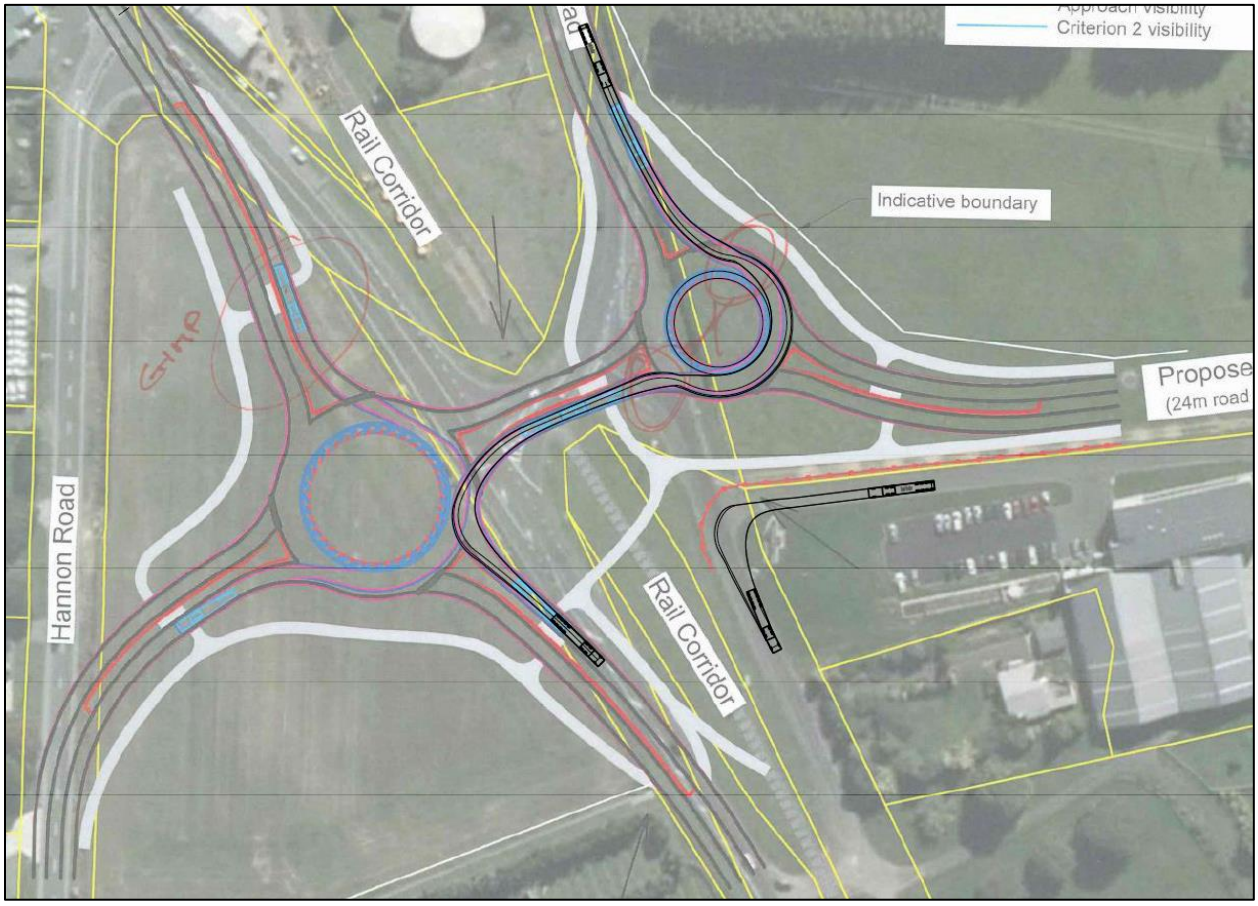


Figure 5 – Option 2 Twin Roundabout – SH1 B southbound movement

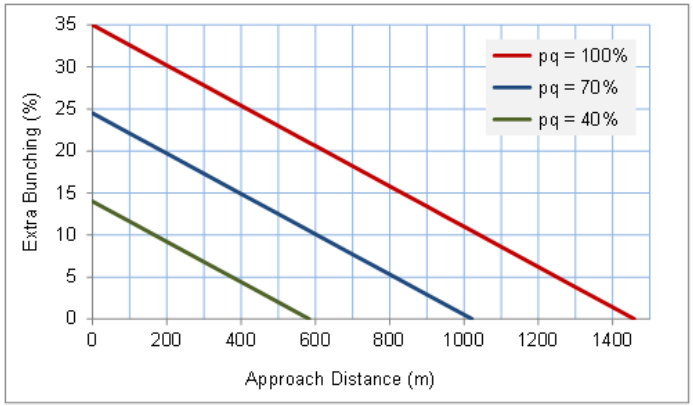
Figure 6 – Shoof Industries access turning path

Appendix 2 – SIDRA Analysis Summary

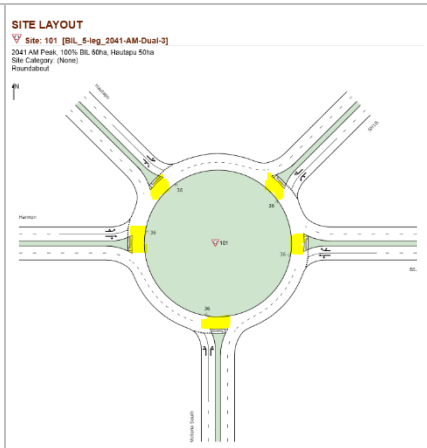
		5-LEG SINGLE RAB	4-LEG SINGLE RAB	3-LEG SINGLE RAB	5-LEG DUAL LANE RAB	4-LEG DUAL LANE RAB	3-LEG DUAL LANE RAB
Intersection	Approach Distance	The approach distances on some approaches are set to be shorter than the 500 m default. In this case the difference in approach distance should not significantly influence the results and is considered to be conservative.	For the double roundabout option, the approach and exit distance of the road linking between the two roundabouts is set to be 60 m, which is consistent with the notes in the drawings "Approx. 60m [sic] stacking length between intersections." We have measured the stacking length using the drawing provided, which is around 56 m.		The approach distances on Victoria South and Hannon are set to **310** m and **300** m respectively instead of the 500 m default. This should not significantly influence the results and is considered to be conservative.	For the double roundabout option, the approach and exit distance of the road linking the two roundabouts is set to be 60 m, which is consistent with the notes in the drawings "Approx. 60m [sic] stacking length between intersections." We have measured the stacking length using the drawing provided, which is around 56 m.	
	Approach Data – Extra bunching	The "extra bunching" is set to 50% for the south approach of all the models. We assume that this extra bunching is in relation to the traffic signals at Victoria Road Interchange for the Cambridge Section of the Waikato Expressway. The SIDRA User Guide shows that the maximum extra bunching value is around 35% (100% proportion queued and 0 approach distance). Considering the maximum extra bunching is 35% and that Victoria Road Interchange is located 700 metres away, the 50% value used is considered to be high.					

Table 5.2.1 - A rough guide for specifying Extra Bunching when the Input option is selected:

Distance to upstream signals (m)	< 100	100-200	200-400	400-600	600-800	> 800
(ft)	< 350	350-700	700-1300	1300-2000	2000-2600	> 2600
Extra bunching (%)	25	20	15	10	5	0



		5-LEG SINGLE	4-LEG SINGLE	3-LEG SINGLE	4-LEG DUAL	5-LEG DUAL	3-LEG DUAL
Movement Definitions	Origin-Destination Movements	U turn movements have not been included in any of the SIDRA models. Considering the location of the roundabout and adjacent infrastructure, the exclusion of U-turns is considered to be appropriate.					
Lane Geometry	All	Default parameters have been adopted for all lane geometry data. WSP Opus have not checked the lane widths against the concept drawings. The SIDRA output is sensitive to lane width, so it is important that the lane widths are updated in the detailed design drawings.			No drawings have been provided for the dual lane roundabout options. We noticed that SIDRA been modelled with two lane entries and two lane exits on all legs of the roundabout. Considering the volumes on some legs two lane entry and two lane exits on all legs is unlikely.		

Lane Movement	All	Default parameters are adopted for all lane movement data which is considered appropriate			
Roundabouts	Roundabout Data -Number of Circulatory Lanes	All the single lane roundabouts have one circulating lane.			 WSP Opus note that the number of circulating lane for dual land RAB options also set up to be 1 in front of all approaches. This is likely to be an input error as the RAB cannot operate safely and efficiently.
	Roundabout Data -Circulating Width	7 m	7 m	8 m	Similarly, the circulation width for the dual lane options and the single lane options are the same. Default circulating width is 8 m and 10 m for a single lane roundabout and dual lane roundabout respectively. Increasing the circulating width is likely to improve overall level of service (LOS) in the roundabout.
	Roundabout Data -Island Diameter	The island diameters of the 3-leg and 4-leg roundabouts modelled in SIDRA are consistent with the drawings provided, the 3-leg roundabout option with 24 m diameter, 4-leg roundabout option with 36 m diameter. The island diameter of the 5-leg option is different between the drawing provided and the SIDRA Input. The drawing shows an island diameter of 38 m,, however SIDRA has been modelled with 36 m. Increasing the island diameter is likely to improve LOS.			

		5-LEG SINGLE	4-LEG SINGLE	3-LEG SINGLE	5-LEG DUAL	4-LEG DUAL	3-LEG DUAL
Volume	Vehicle Volumes - General	The report outlines the base network traffic (Gray Matter adopted from the Traffic Impact Assessment (AECOM, 2011)), traffic generation and traffic distribution. However, we consider that the ITA should clearly define the correlation between the base network traffic and the traffic volume used in the traffic models so that the volumes described in the ITA can be readily compared with the					

		volumes described in the modelling. It would be useful if Gray Matter can provide a summary table or a description of the assessment that they under took to determine the traffic volume used in the SIDRA models from the traffic evidence they provided.
	Volume Factors – Peak Flow Factor	All the SIDRA models have been modelled with 100% peak flow factor. The default peak flow factor in SIDRA models is 95%. Modelling with 95% peak flow factor (3101 all vehicles) shows that there is a slightly longer delay time compare to the result with 100% peak flow factor (3150 all vehicles) - on the 5-leg PM peak single lane model We understand that the traffic model for future development prediction has been based upon one developed by AECOM with a future year of 2041.
Gap Acceptance	All	Default parameters are adopted for all the gap acceptance data
Vehicle Movement Data	Path Data - Approach and Exit Cruise Speed	The approach and exit cruise speeds have been set to 50 km/h for all the roundabout models on all legs. However, the drawings indicate that the posted speed limit for the double roundabout and 5-leg roundabout options is 60 km/h. Clarification required from Gray Matter regarding the proposed speed for the development. Modelling with 60 km/h speed limit shows that there is a slight difference in the movement summary, the LOS at Victoria South changes from LOS A to LOS B when there is a change in the speed from 50 km/h to 60 km/h, the overall LOS of the intersection stay at LOS F - on the 5-leg PM Stage 3 single lane model

Level of Service Summary

The results from the current SIDRA models provided by Gray Matter show that none of the single lane models/options have an acceptable level of service and 95% queue distance. **This is a critical Issue**

The current dual lane models have a better performance. However, the 95% queue distance on the worst movement of the 5-leg PM peak Stage 3 dual lane model is on the "BIL" approach, the queue distance (309.8 m) is longer than the approach distance (100 m). **This is a critical Issue**

The only option operating at an acceptable level at the moment is the double roundabout dual lane option – a combination of 4-leg (LOS B) and 3-leg (LOS A) dual lane roundabouts. The worst movement of both of the roundabouts is on the "link" approach, the queuing distance is less than the design stacking length. However, as mentioned above, there are a few matters that need to be addressed within the SIDRA models, for example, the number of circulating lanes and approach lanes. We anticipate that the results may change after the adjustments.

		5-LEG SINGLE STAGE 3 PM	4-LEG SINGLE STAGE 4 PM	3-LEG SINGLE STAGE 4 PM	5-LEG DUAL STAGE 3 PM	4-LEG DUAL STAGE 3 PM	3-LEG DUAL STAGE 3 PM
Movement Performance	LOS	LOS F (critical loss of service)	LOS F (critical loss of service)	LOS F (critical loss of service)	LOF C	LOS B	LOS A
	Average Delay (seconds)	188.2	490.3	299.5	32.5	10.8	6.0
	Degree of Saturation	1.627	1.812	1.758	0.984	0.575	0.457
	95% Queue distance (m) - Worst movement	1699.2 (BIL) 100 m approach distance	3208.9 (link) 60 m approach distance	2884.2 (link) 60 m approach distance	309.8 (BIL) Unacceptable with 100 m approach distance	43.8 (link) Acceptable as less than 60 m	29.1 (link) Acceptable as less than 60 m