

**BEFORE THE INDEPENDENT HEARING PANEL APPOINTED BY THE  
QUEENSTOWN LAKES DISTRICT COUNCIL**

**UNDER** the Resource Management Act 1991 (RMA)  
**IN THE MATTER** of the Te Pūtahi Ladies Mile Plan Variation in accordance  
with section 80B and 80C, and Part 5 of Schedule 1 of the  
Resource Management Act 1991.

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**STATEMENT OF REBUTTAL EVIDENCE OF COLIN ROBERT SHIELDS  
10 November 2023**

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## Introduction

- 1 My full name is Colin Robert Shields. I am a Senior Principal Transport Planner at Tonkin & Taylor Limited (**T+T**). Prior to joining T+T, I was a Senior Engineer with Candor 3 Limited (**C3**).
- 2 I prepared a statement of evidence in chief (**EIC**) on behalf of Queenstown Lakes District Council (**QLDC** or **Council**) dated 29 September 2023 on the submissions and further submissions to the Te Pūtahi Ladies Mile Plan Variation (**TPLM Variation**). My EIC considered the findings of the Transport Strategy and additional transport assessment work, the transport related TPLM Variation provisions and responded to relevant submissions.
- 3 I have the qualifications and experience as set out at paragraphs 6 and 7 of my EIC dated 29 September 2023.
- 4 I repeat the confirmation given in my EIC that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023, and that my evidence has been prepared in compliance with that Code.

## Scope of rebuttal evidence

- 5 In preparing this rebuttal statement, I have read and considered the evidence filed on behalf of submitters as that evidence relates to my evidence. I also attended the expert conferencing session on 30 October 2023 for traffic experts and have also read and considered the Joint Witness Statement (**JWS**) dated 30 October 2023 produced at that expert conferencing session which I rely upon to address the submitters' evidence.
- 6 In this evidence I respond to the:
  - (a) Statement of Evidence of Dave Smith on behalf of Waka Kotahi (104) dated 20 October 2023.
  - (b) Statement of Evidence of Jason Bartlett on behalf of Glenpanel Development Ltd (73) dated 20 October 2023.
  - (c) Joint Statement of Evidence of Don McKenzie and Jason Bartlett on behalf of the Anna Hutchinson Family Trust (107) dated 20 October 2023.

- (d) Statement of Evidence of Leo Hills on behalf of the Winter Miles Airstream Ltd (94) dated 20 October 2023.
  - (e) Statement of Evidence of Andy Carr on behalf of the Ladies Mile Pet Lodge (78) dated 20 October 2023.
  - (f) Statement of Evidence of John Parlane on behalf of the Ladies Mile Property Syndicate (77) dated 20 October 2023.
  - (g) Statement of Evidence of Stuart Victor (89) (lay evidence) dated 20 October 2023.
  - (h) Statement of evidence of Rob Burnell on behalf of the Lake Hayes Estate and Shotover Country Community Association (79) dated 27 October 2023.
  - (i) The experts' JWS on transport, dated 30 October 2023.
- 7 The fact that this rebuttal statement does not respond to every matter raised in the evidence of submitter witnesses within my area of expertise should not be taken as acceptance of the matters raised. Rather, I rely on my EIC, and this rebuttal statement to set out my opinion on what I consider to be the key transport matters for this hearing.

**Statement of Evidence of Dave Smith on behalf of Waka Kotahi (104)**

- 8 I provide a response to the evidence of Mr Smith under the following headings:
- (a) Overall findings from assessment of existing and future conditions;
  - (b) Review of suggested recommendations to TPLM Variation provisions;
  - (c) Tomtom travel time survey data;
  - (d) Shotover Bridge Capacity;
  - (e) Mode Share; and
  - (f) Impacts west of the Shotover Bridge.

**Overall findings from assessment of existing and future conditions**

- 9 As recorded on page 1 of Attachment A of the JWS, all experts agreed with the analysis and findings reported in Mr Smith's and in my EIC, regarding the existing transport conditions and the future year transport

conditions within the TPLM Variation area. In terms of the impacts of the TPLM Variation, all the experts agreed that the focus for TPLM Variation is on ensuring that transport conditions do not get worse, in that any reduction in the level of Service (**LOS**) from the current level would not be acceptable.

### **Review of suggested recommendations to TPLM Variation provisions**

- 10 The recommended amendments to the TPLM Variation provisions or other development controls summarised at paragraph 13.2 a to l of Mr Smith's evidence were used as discussions points at conferencing. The JWS records that all experts generally agreed that the recommended amendments would be beneficial, however not all experts agreed that these matters should be included as conditions.<sup>1</sup> I address these in more detail in the paragraphs below.

#### *SH6/Stalker Road and SH6/Howards Drive intersection upgrades*

- 11 Paragraph 13.2a and 13.2b of Mr Smith's evidence recommends an upgrade to the SH6/Stalker Road and SH6/Howards Drive intersections which manage conflicting demands across the intersection approaches to achieve efficient operation as far as practicable. As recorded at page 3 of Attachment A of the JWS, all experts, including myself, are agreed that signalisation of these intersections would contribute to overall TPLM Variation transport outcomes.
- 12 Paragraphs 10.13 and 12.6 of Mr Smith's evidence recommended that Sidra modelling should be undertaken of a traffic signal form of intersection at SH6/Stalker Road and SH6/Howards Drive with the TPLM Variation.
- 13 The recommended Sidra modelling of signalised intersections has been carried out and is reported in Section 4.1 to 4.3 of Technical Memo #2 attached as **Appendix A** to my rebuttal evidence. It should be noted that the LOS calculated by the Sidra software is generated from average traffic delay per movement. As a result, for traffic signal intersections (such as at the SH6 intersections with Stalker Road and Howards Drive), a LOS of E or F can be related to relatively complicated intersection layouts (with multiple conflicting turning movements), which then

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<sup>1</sup> Traffic JWS, page 2.

requires a number of traffic signal phases to operate, which can result in a relatively high signal cycle time. Therefore, the residual delay is linked more to the complex phasing of the signals rather than a degree of delay related to congestion. For this reason, I have reviewed the results in terms of the predicted queues and resultant queue lengths.

- 14 For the SH6/Stalker Road intersection, as detailed in section 4.2.2 of Appendix A, in the AM peak when compared to the situation at 2053 with a roundabout (results presented in paragraph 54 of my EIC), the traffic signal layout provides improved capacity as well as providing controlled at grade pedestrian and cycle crossing facilities. Furthermore, the traffic signal layout performs better than the existing roundabout without any TPLM Variation development traffic (results presented in paragraph 54 of my EIC). As detailed in section 4.2.3 of Appendix A, in the PM peak when compared to the situation at 2053 with a roundabout (results presented in paragraph 54 of my EIC), the traffic signal layout provides comparable capacity on the SH6 east, Stalker Road and TPLM Variation access approaches. Although queue lengths on the SH6 west approach will be longer with the signals compared to the roundabout, these will not cause any blocking back onto the Shotover Bridge and overall I consider that the traffic signals provide sufficient capacity at the 2053 assessment year with the TPLM Variation, as well as providing safe crossing points for walking and cycling to and from the TPLM Variation area, Lake Hayes Estate/Shotover Country and SH6 bus stops.
- 15 For the SH6/Howards Drive intersection, as detailed in section 4.3.2 of Appendix A, in the AM peak when compared to the situation at 2053 with a roundabout (results presented in paragraph 54 of my EIC), the traffic signal layout provides improved capacity as well as providing controlled at grade pedestrian and cycle crossing facilities. Furthermore, the traffic signal layout performs better than the existing roundabout without any TPLM Variation development traffic (results presented in paragraph 54 of my EIC). As detailed in section 4.3.3 of Appendix A, in the PM peak when compared to the situation at 2053 with a roundabout (results presented in paragraph 54 of my EIC), although queue lengths will be longer with the traffic signals compared to the roundabout, these will not cause any blocking back issues and overall I consider that the traffic signals provide sufficient capacity at the 2053 assessment year with the TPLM Variation as well as providing safe crossing points for walking and

cycling to and from the TPLM Variation area, Lake Hayes Estate/ Shotover Country and SH6 bus stops.

- 16 Furthermore, in my opinion, traffic signals at both the SH6/Stalker Road and SH6/Howards Drive intersections will provide the following additional benefits:
- (a) Allow bus signal priority to provide travel savings and reliability improvements for buses.
  - (b) Enable improved network control of the road network, by allocating priority in a more equitable manner by providing appropriate priority to be given to particular movements by time of day, day of the week, and to suit seasonal conditions. Signal control could be applied via SCATS (Sydney Coordinated Adaptive Traffic System) which is managed and monitored by WTOC (Wellington Traffic Operation Centre). This network control is automated via traffic sensors at each intersection (to enable the intersection controller to apportion signal green time according to the traffic/pedestrian demands on each turning movement/crossing point) but allows user intervention during incidents or other periods of unexpected demand patterns, so that special signal plans can be activated to optimise the network operation. No such intervention is possible with the existing roundabout at SH6/Stalker Road or the proposed NZUP roundabout at SH6/Howards Drive.
  - (c) Traffic signal control will provide safety benefits by ensuring all traffic (and pedestrian movements) are provided with a guaranteed level of green time, reducing driver frustration and avoiding acceptance of unsafe gaps in conflicting traffic movements.
- 17 Both of these intersection improvements will increase the attractiveness of walking and cycling across SH6 for both TPLM Variation residents/visitors and for existing Shotover Country and Lake Hayes Estate residents to access the community and commercial facilities within the TPLM Variation area, north of SH6. The improvements will also benefit those using the wider Queenstown/Frankton active travel networks.
- 18 Furthermore, both of these intersection improvements will increase the attractiveness of public transport to users and will enable higher bus frequencies to be provided across the Otago Regional Council (**ORC**)

route network. This in turn will provide transport choice and enable a higher public transport mode share to be realised.

- 19 Based on the above assessment work, I consider that the traffic signal layout at SH6/Stalker Road and SH6/Howards Drive intersections provides an improved capacity solution as well as providing safe all round pedestrian and cycle crossing facilities and therefore I would agree with the suggested change in wording of the planning provisions as recommended in paragraph 13.2a and 13.2b of Mr Smith's evidence.
- 20 I also note that in paragraph 12.2 of Mr Smith's evidence, he states that the SH6/Howards Drive roundabout included in the Queenstown NZUP package should be built as a signalised intersection. During previous discussions, Waka Kotahi had requested analysis of the NZUP SH6/Howards Drive roundabout to see what the 'life' of this roundabout would be and whether it was worth constructing initially as a roundabout and then convert to a traffic signal intersection at a later stage; or whether it should be constructed as a traffic signal intersection from the outset. As detailed in Section 5.1 of Appendix A, for the existing situation *without* the TPLM Variation, the Howards Drive approach and SH6 east approaches in the AM peak would operate with long queue lengths of up to 75 vehicles. In the 2053 scenario *with* the TPLM Variation it would operate with longer queue lengths of up to 132 vehicles. As detailed in section 5.2 of Appendix A, a sensitivity test was carried out, scaling back the TPLM Variation trip generation to the equivalent of 500 dwellings. This still indicates long queue lengths of up to 120 vehicles in the AM peak on the SH6 east approach.
- 21 I would therefore agree with Mr Smith that the SH6/Howards Drive roundabout included in the Queenstown NZUP package should be built as a signalised intersection.

*Corresponding treatments to urbanise the SH6 corridor in keeping with a 60 kph environment*

- 22 Paragraph 13.2c of Mr Smith's evidence requests the planning provisions address the issue of corresponding treatments to urbanise the SH6 corridor in keeping with a 60 km/h environment. As recorded on page 3 of Attachment A of the JWS, all experts are agreed that from a transport perspective, a lower speed environment accompanied by a reduction and / or removal of the setbacks would be a better outcome.

However, all experts acknowledged that there are broader considerations at play here (for example, in determining matters such as setbacks).

- 23 If necessary, I consider that urbanisation and creation of 'side friction' can be achieved on this section of circa 1.6km urban section of SH6 by other means than moving the setbacks including, provision of the traffic signal intersections, kerb and channel, street lighting, active mode links alongside SH6 and by locating commercial and community facility buildings adjacent to SH6. Accordingly, I do not consider that any amendment needs to be made to the notified TPLM Variation provisions to address this issue.

*Retaining or enhancing objectives 49.2.5 and 49.2.6, and any planning mechanisms, which support the early establishment of non-residential activity within TPLM*

- 24 As recorded in page 4 of Attachment A to the JWS, I consider that this issue raised in Paragraph 13.2d of Mr Smith's evidence, is addressed in paragraph 11.150 and 11.158 of the s42A report and so no amendments need to be made to the notified TPLM Variation provisions to address this matter.

*Delivery of the following NZUP components should be completed prior to any development: i SH6 Howards Drive intersection upgrade ;ii SH6 westbound bus lanes along Ladies Mile; and iii SH6 westbound and eastbound bus lanes along SH6 to between the Shotover Bridge and SH6 / 6A with associated intersection improvements*

- 25 I agree with Mr Smith's paragraph 13.2e regarding completion of the SH6 NZUP works i) and ii) prior to any development since these are directly related to the TPLM Variation providing a means of access into the TPLM Variation area and bus lanes to improve public transport journey times and reliability along SH6 Ladies Mile. As noted in paragraph 45 below, the traffic experts all agreed that 'prior to development' would be defined as upon first occupation. I note that the Planning JWS defines 'prior to development' as issue of a Code Compliance Certificate, which I would agree with as being an appropriate trigger.
- 26 I do not agree with iii) since this is remote from, and not directly related to, the TPLM Variation. As recorded in page 4 of Attachment A to the JWS, I consider that since the works in iii) are committed, then allowing



growth to occur at TPLM will add impetus for Waka Kotahi to implement these projects. Accordingly, I do not consider that any amendment needs to be made to the notified TPLM Variation provisions to address this issue.

*Install northbound bus priority on Stalker Road and any additional bus priority to provide for continuous unimpeded as far as possible throughout local roads in Shotover Country and Lake Hayes Estate*

27 As recorded at page 5 of Attachment A of the JWS, the issue raised in Paragraph 13.2f of Mr Smith's evidence regarding inclusion of a bus lane on Stalker Road is included in the QLDC minor improvements programme. The image provided at the end of Attachment A to the JWS identifies the indicative extent of the bus lane. Accordingly, I consider that an amendment needs to be made to the notified TPLM Variation provisions to address this issue.

*Regular traffic monitoring be undertaken to measure the success of the various initiatives aimed at reducing reliance on private vehicle travel; and implementation of effective and ongoing travel planning including regular monitoring be integrated into the Transport Interventions Plan*

28 I consider the issues raised in Paragraphs 13.2g and h of Mr Smith's evidence regarding monitoring are addressed in paragraphs 22c and 34h of my EIC relating to Travel Behaviour Change and Travel Demand Management Measures that would be delivered by QLDC and is also described in paragraphs 14 to 18 of Mr Pickard's EIC dated 29 September 2023. Therefore, I do not consider that any further amendments need to be made to the TPLM Variation provisions to address this matter.

*A requirement for the preparation of an Integrated Transportation Assessment for resource consent applications on the TPLM Plan variation site be included in the planning provisions.*

29 As recorded on page 5 of Attachment A of the JWS, the issue raised in Paragraph 13.2i of Mr Smith's evidence regarding inclusion of provision for Integrated Transport Assessments to be carried out for Resource Consents, is addressed within Chapter 29 of the existing District Plan. Therefore, I do not consider that any further amendments need to be made to the TPLM Variation provisions to address this matter.

**Tomtom travel time survey data**

- 30 Paragraphs 6.3 to 6.9 of Mr Smith's evidence presents journey time and delay information from his analysis of Tomtom data. As detailed in section 2 of Appendix A of my rebuttal evidence, I have reviewed this data and compared it to the data I have used in my evidence and this indicates that the data is broadly similar to the data I have used. Accordingly, I consider that the data that I used to understand the current performance of the local transport network is robust.

**Shotover Bridge Capacity**

- 31 Paragraphs 7.1 to 7.2 of Mr Smith's evidence presents findings from a calculation of the theoretical capacity of the bridge. As detailed in section 3 of Appendix A of my rebuttal evidence, notwithstanding that the Waka Kotahi submission (104) states the bridge capacity to be 1700 vehicles lane/hour, I have reviewed this calculation and confirm that it has been calculated in accordance with section A3.11 of the Waka Kotahi Economic Evaluation Manual.

**Mode Share**

32. Paragraph 11.1 c) of Mr Smith's evidence states that my transport assessment relies on a shift from private vehicles to public transport of 20% to 21%.
33. I do not consider this accurately describes my broader assessment as it relates to mode share / mode shift. Accordingly, I clarify below the difference between what the updated transport model predicts in relation to a shift from private vehicles to public transport and what the TPLM Variation overall transport strategy mode share targets are.
34. The updated transport model is based on a predicted AM and PM peak bus mode share of between 21% and 22%. I understand this is what Mr Smith's evidence is referring to. However, I consider that this is not representative of the expected non-private vehicle mode share I have included in the TPLM Variation overall transport strategy.
35. As detailed in paragraph 32 of my EIC, a mode share target of up to 50% of trips by non-private vehicle modes of transport was derived for the TPLM Variation. This target takes into account trips that remain internal to the site, trips that are made by walking and cycling, trips that are made by car share/ car-pooling and trips that are made by bus.

36. As detailed in paragraph 53 (a) of my EIC, the updated transport model does not assess the impact of active modes (walking and cycling), nor can it model travel behaviour change or Transport Demand Management measures. As such, I consider the updated transport model will underestimate the impact of the proposed TPLM Variation interventions. I am of the opinion that the updated transport model is showing a worst case/conservative assessment and I consider, for the reasons detailed in the Transport Strategy and my EIC, that it will actually be a much lower car mode share than the model predicts.
37. As detailed in paragraph 53(d) of my EIC, the consultants operating the updated transport models note that the modelling suite is a fixed demand matrix, so there is no (or little) account of any temporal effects such as peak spreading and trip suppression; or any behavioural effects such as trip chaining due to congestion. Therefore, again I consider that the overall vehicle demand indicated in the model is worst case/conservative in the peak periods.
38. Notwithstanding this, the model indicates that even with this higher car mode share, that there will be limited capacity issues on the adjacent road network with the TPLM Variation.

### **Impacts west of the Shotover Bridge**

39. Paragraphs 10.13 and 10.14 of Mr Smith's evidence requested an additional assessment to demonstrate the impacts of the TPLM Variation "*on delays and queueing in the PM peak at SH6/Hawthorne Drive and other key SH6 intersections that may be impacted on the west side of the Shotover Bridge*". Having requested available information from Waka Kotahi to carry out this assessment, I have used the information provided in the Statement of Evidence of Matthew Gatenby dated 2 June 2023 for QLDC/Waka Kotahi for the Notice of Requirement for SH6, 6A and Frankton Bus Hub improvements.
40. I have reviewed paragraph 10.2 of Mr Gatenby's evidence which indicated that the proposed Notice of Requirement improvements would result in a 20% increase in capacity at the SH6/Hawthorne Drive intersection from 3,800 vehicles per hour (**VPH**) to 4,500 vph. Paragraph 6.2.1 of Appendix A of my EIC indicates a PM peak two way increase in vehicles on Shotover Bridge with the TPLM Variation of 88 vph. Assuming all of these 88 vehicles travel through the

SH6/Hawthorne Drive intersection, then the additional vehicle trips from the TPLM Variation would represent only 2% of the overall stated capacity of the SH6/Hawthorne Drive improvement. I consider that this would result in a negligible worsening in capacity at this intersection.

**Statement of Evidence of Jason Bartlett on behalf of Glenpanel Development Ltd (73)**

41. Paragraphs 14 to 17 of Mr Bartlett's evidence raises concerns about the position of Collector Road A. I understand the position of Collector Road A means Glenpanel Development Limited land is entirely dependent on development of land on either side being developed first to enable access to this key road. As recorded on pages 8 and 9 of Attachment A of the JWS, the rationale for the location of Collector Road A is provided in paragraphs 77 to 83 of the EIC of Stuart Dun. I defer to the rationale presented in Mr Dun's evidence. I also consider from a transport perspective that the location of Collector Road A is beneficial as it is more central, providing more convenient access.
42. Paragraphs 10 to 12 of Mr Bartlett's evidence refer to an approved consent from August 2020 (RM200443) to change the use of the Glenpanel Homestead from residential to commercial use which establishes a direct access intersection from SH6. In paragraphs 16 and 29, Mr Bartlett states that this access "*is suitable and acceptable*" for up to 180 residential units. I understand this is based on his subsequent transport assessments undertaken to support Glenpanel Development Limited Flints Park fast track consent application for a comprehensive residential development with a mixed use local centre component that was lodged in July 2022.
43. Based on subsequent information received from Mr Bartlett, I understand that Waka Kotahi responded to the fast track application stating they had a number of concerns regarding the potential impact of the proposed development. Waka Kotahi also indicated that if the Expert Consenting Panel were of a mind to grant consent then a number of proposed conditions would need to be modified and new conditions included. I note the Waka Kotahi comments included a proposed condition limiting the number of units to 180 that could use the consented (RM200443) new SH6 access until the east west collector road is in place. I also note that Waka Kotahi requested a condition requiring construction of an underpass under SH6. Paragraphs 25 and

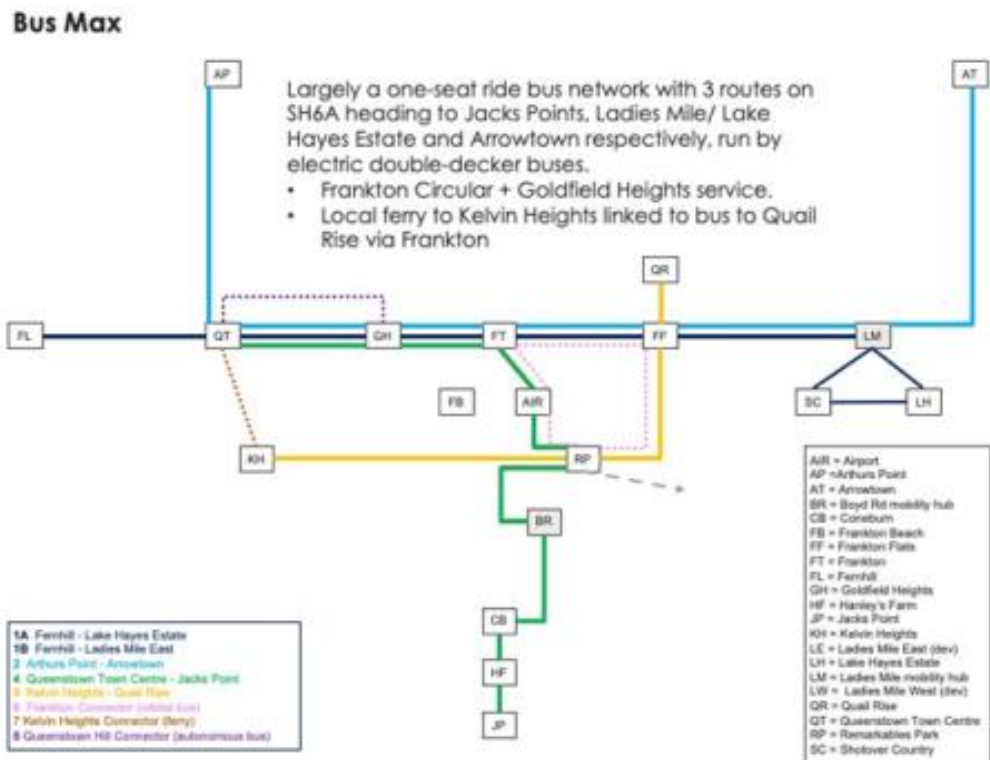
29 of Mr Bartlett's evidence refers to consultation with ORC identifying that required bus stops for the proposal of 180 residential units could be provided within the site. Based on subsequent information received from Mr Bartlett, I note that the ORC response to the fast track application makes no reference to an agreed approach for bus services to access the site.

44. Ultimately, the fast track consent application was refused in November 2022 and therefore with reference to paragraphs 26 and 29 of Mr Bartlett's evidence, I consider that Mr Bartlett has not demonstrated that *"it is possible to provide appropriate transport infrastructure without the need to provide the variation required transport infrastructure"*
45. Paragraph 32 of Mr Bartlett's evidence, states that development must be possible ahead of the provision of SH6 works and the specific transport infrastructure requirements of the TPLM Variation provisions. As recorded in page 9 of Attachment A of the JWS, all of the experts agreed that the transport infrastructure works are required prior to first occupation of development in order that transport choices and travel behaviour to use public and active (walking and cycling) transport modes is made from the outset of occupation. If these transport choices are not available then I consider residents and visitors would most likely revert to use of private vehicles. As detailed in paragraph 25 above, I agree with issue of a Code Compliance Certificate being used as the definition of 'prior to development' trigger.

**Joint Statement of Evidence of Don McKenzie and Jason Bartlett on behalf of the Anna Hutchinson Family Trust (107)**

46. As recorded at page 6 of Attachment A of the JWS (and agreed with Mr Smith), I do not agree with the proposal to extend TPLM Variation to the 'Hutchinson land' since this land would be much further away from the proposed TPLM Variation local centre, high school and sports hub, thus reducing the attractiveness of walking or cycling to these facilities (as also addressed in paragraph 70 (a) of my EIC). As recorded in the JWS, this is further compounded by the level differences within the 'Hutchinson land' which would make walking and cycling less attractive compared to the relatively flat terrain of development within the TPLM Variation.

47. As detailed in page 6 of Attachment A of the JWS, I do not agree with the public transport proposal outlined within Mr Bartlett and Mr McKenzie’s evidence of providing a separate local bus service away from SH6 which would then interchange with express buses on SH6. This does not comply with the public transport “*bus max*” strategy of a one seat ride bus network agreed by the Way To Go (W2G) partners and set out in the Queenstown Business Case. Essentially as shown in the extract below<sup>2</sup> the bus max strategy is a bus network intended to deliver a step change in high quality, high capacity bus services, where, with a single bus journey, locations (including Ladies Mile) are connected to other key locations (such as Frankton and Queenstown Town Centre) using one bus i.e. no interchange of buses is required which is what is proposed in Mr Bartlett and Mr McKenzie’s evidence.



48. The TPLM Variation public transport strategy complies with the ‘bus max’ one seat ride network.
49. I therefore agree with Mr Smith’s conclusion (page 6 of Attachment A of the JWS) that the inclusion of the ‘Hutchinson land’ would not result in a

<sup>2</sup> Figure 5 Section 4 of Queenstown Business Case

compact urban form, which is what the TPLM Variation is intending to achieve.

50. Various paragraphs (including paragraphs 31, 45c, 49 and 53a) of Mr Bartlett and Mr McKenzie's evidence make reference to the 'Hutchinson land' providing a future transport system to potential future growth within Speargrass Flat and Dalefield areas. As detailed in Section 11, Theme E (paragraphs 11.138 – 11.147) of the s42A report, no growth is actually proposed in these areas and nor is it considered desirable and hence I do not consider it of value to provide additional transport works to these areas.

**Statement of Evidence of Leo Hills on behalf of the Winter Miles Airstream Ltd (94)**

51. At paragraphs 2.1 – 2.8 of Mr Hills evidence he comments on Rule 49.5.33 that sets out the transportation infrastructure that must be first implemented before development can occur. Mr Hills is concerned that this rule could be interpreted as requiring the completion of all of the infrastructure works listed for Sub- Areas A - G is required before any development in those sub areas can commence. As recorded in page 7 of Attachment A of the JWS, I agree with Mr Hills request for greater clarity in the wording of Rule 49.5.33. I consider that the transport infrastructure works that are required to be completed before development of any sub-area should only be those infrastructure works relevant to that particular sub-area.
52. I also agree with Mr Hills request to remove the word 'preference' from the wording in Policy 49.2.6.4b (in relation to preference for underpass for the 'Key Crossing'). Accordingly, I consider that an amendment needs to be made to the notified TPLM Variation provisions to address these issues.

**Statement of Evidence of Andy Carr on behalf of the Ladies Mile Pet Lodge (78)**

53. As recorded in page 8 of Attachment A of the JWS, all experts agree that with the provision of at grade signalised pedestrian crossings at the SH6/Howards Drive intersection (see paragraphs 11-19 above in relation to Mr Smith's evidence) that an underpass is no longer a requirement. Accordingly, I consider that an amendment needs to be made to the notified TPLM Variation provisions to address this issue.

**Statement of Evidence of John Parlane on behalf of the Ladies Mile Property Syndicate (77)**

54. Mr Parlane's evidence draws on international research on public transport use and density of residential development including research that indicates there is a diminishing return to density and that the impact of increasing density to 40 dwellings/Ha will have a greater impact on alternative modes than further increasing density from 40 to 60 dwellings/Ha. However, the research that Mr Parlane uses does indicate greater use of alternative modes with a higher density, which concurs with the evidence in my EIC. Mr Parlane also concludes in paragraph 8.7, that the minimum required density of 60 dwellings per hectare in the High Density Residential Precinct should be reduced to 40 dwelling per hectare since his "*understanding of the situation is that it might be a level of density that will not be supported by the market*".
55. As recorded in page 7 of Attachment A of the JWS and demonstrated in my EIC, I agree that there is a connection between density and the success of the mode share assumptions and, although I agree that this is finally balanced between 40 – 60 dwellings per hectare, I consider that at least 40-60 dwellings/Ha is required for effective mode shift. As detailed in my EIC, my research indicates that densities greater than 40 dwellings/Ha will increase non-car mode shares and this is also demonstrated in the research presented by Mr Parlane. Therefore, I reconfirm my support for the inclusion of precincts within the TPLM Variation where density is greater than the medium density minimum of 40 dwellings/Ha and in the range of up to 60 dwellings/Ha. Furthermore, I do not consider that justification of a lower density on the grounds of market economics is a transport justification for a lower minimum density.
56. As recorded in page 7 of Attachment A of the JWS, and on page 11 of the Urban Design JWS, there are also urban design reasons for the setting of the minimum density which are set at the population threshold level to unlock key walkable neighbourhood amenity provisions such as the requirements with regard to the provision of community facilities, parks and commercial centre viability.



**Statement of Evidence of Stuart Victor (89)**

57. Mr Victor raises a number of concerns with my EIC and Mr Pickard's evidence which I summarise below with my response.
58. At page 2 of his evidence, Mr Victor comments that "*A new roundabout on SH6 at Howards Drive will not help improve current or future traffic flows.*" As demonstrated in my rebuttal evidence above, I consider that a traffic signal intersection will provide improved capacity at the Howards Drive intersection.
59. At page 2 of his evidence, Mr Victor comments that "*The addition of a bus lane of approximately 750 metres in length will have minimal benefits as there is one major flaw with this; that being that the local school and urban buses already get stuck with the current traffic levels within Lake Hayes and Shotover Country.*" As detailed in paragraph 27 above, a bus lane on Stalker Road is included in the QLDC maintenance programme. This will improve bus journey times and reliability since buses will be able to avoid the peak period queues on Stalker Road and therefore this will make buses a more attractive choice for residents of Shotover Country and Lake Hayes Estate.
60. At page 2 and 3 of his evidence, Mr Victor raises a number of concerns regarding my description of the existing transport conditions. As recorded in page 1 of Attachment A of the JWS, all of the transport experts agree that I have correctly described the current performance of the transport network within the vicinity of the TPLM plan variation. I therefore consider my description of existing transport conditions, as set out in paragraph 21, of my EIC is accurate.
61. At page 3 and 4 of his evidence, in relation to the "*Comprehensive Parking Management Plan*", Mr Victor states that it is unrealistic to believe residents/visitors will not want to own/rent a car. As recorded in page 1 of Attachment A of the JWS, all the transport experts agreed that mode shift away from the private car is required and hence why the TPLM Variation provisions include for restrictions on car parking as one of the interventions to achieve mode shift.
62. At page 4 of his evidence, Mr Victor comments on "*Timing of development and provision of transport interventions.*" As detailed in paragraphs 35 to 37 of my EIC and paragraph 45 above, the transport

interventions will be provided prior to development of the particular TPLM Variation sub area.

**Statement of Rob Burnell on behalf of Lake Hayes and Shotover Country Community Association (79)**

63. Mr Burnell raises a question of whether Council would “*consider getting their traffic management plan peer reviewed*”. As noted in paragraph 9 above, all experts agreed with the analysis and findings reported in Mr Smith’s and in my EIC, regarding the existing transport conditions and the future year transport conditions within the TPLM Variation area. The Traffic JWS (at page 1) also recorded that the experts agreed that the modelling used to date is acceptable and it represents the current/future situation. The experts also agreed that the modelling demonstrates the importance of achieving the mode share targets that have been assumed. Given this substantial agreement between experts on the assumptions used in the TPLM Variation Transport Strategy, I do not consider that a formal peer review is required.
64. Mr Burnell queries whether “*the basic tenor of the transport strategy is that very limited or no car parks means no congestion and means that modal shift will work*”. As clearly set out in paragraphs 18 to 62 of my EIC, the overall vision for the Transport Strategy for the TPLM Variation is to create an accessible, healthy, safe and sustainable TPLM community by reducing reliance on car use, by providing a well-connected street network to local community facilities and invest in active and public transport modes so that walking, cycling and bus use are everyone’s first travel choice. As such the transport strategy is more multi-faceted than Mr Burnell’s assertion.
65. Mr Burnell questions Mr Pickard’s evidence in relation to the transport strategy success being dependent on the wider (transport) programme being implemented. As detailed in paragraphs 34 to 37 of my EIC, the transport interventions required will need to be implemented by the TPLM Variation developers and also the Way to Go Partners as part of their ongoing network wide bus, active mode and travel behaviour change/Transport Demand Management measures.
66. Mr Burnell questions Mr Pickard’s evidence in relation to the Sylvan Street link being considered “*a critical part of the masterplan*”. Mr Pickard, in paragraph 19 of his EIC, does not state that this is a critical

part of the masterplan. Likewise neither do I as stated in Paragraph 34c of my EIC which refers to the Sylvan Street link as a potential new bus (and pedestrian/cycle) only link, subject to submission of a business case.

67. Mr Burnell is concerned by Mr Pickard's evidence in relation "*to the TPLM variation should provide a high level of transportation mode choice*". Paragraphs 18 to 62 of my EIC provide detail on how the TPLM Variation will deliver the required mode choice.
68. Mr Burnell is concerned by Mr Pickard's evidence in relation to the potential positive effects of developing correctly. As detailed in paragraph 23 of Mr Pickard's evidence this is in relation to the TPLM Variation "*providing a synergistic benefit of reducing demand on the state highway and local roads and facilitate mode shift on the south side*" (Lake Hayes Estate and Shotover Country). As demonstrated in paragraph 53 e of my EIC, the Strategic Transport Model indicates that with public transport investment by W2G partners and with the TPLM Variation, mode shift can be achieved at Lake Hayes Estate and Shotover Country and hence I agree with Mr Pickard's comment.
69. On a similar theme, regarding traffic from Lake Hayes Estate and Shotover Country, Mr Burnell acknowledges that school traffic "*causes a large part of the peak hour traffic congestion*". As demonstrated in paragraph 21 c and d of my EIC I agree with Mr Burnell given that the Transport Strategy estimated that trips to schools represent approximately 19% of the AM peak westbound traffic flow on Shotover Bridge and that during the school holidays queue lengths are much smaller on the transport network.
70. Mr Burnell asserts that "*a large portion of residents in TPLM will seek to buy or already have cars already*". As detailed in paragraphs 145 to 148 of my EIC, I addressed similar comments from a number of other Submitters.

## **Conclusion**

71. Having considered the matters raised in the evidence of submitters, I confirm the conclusions stated in my EIC.

**Colin Robert Shields**

**10 November 2023**

## **APPENDIX A**

**Draft Memo #2**

<b>To:</b>	QLDC/Waka Kotahi	<b>Job No:</b>	1091554
<b>From:</b>	Colin Shields	<b>Date:</b>	10 November 2023
<b>cc:</b>			
<b>Subject:</b>	TPLM – Review of Abley data and Sidra traffic signal assessments		

**1 Background**

1.1 A Technical Memo dated 27 September 2023 was prepared to address comments raised by Waka Kotahi. This Technical Memo was attached to the TPLM Plan Variation evidence of Mr Shields dated 29 September 2023. Following a subsequent meeting with Waka Kotahi on 12 October 2023 (and various subsequent emails), the following work has been carried out:

- Review of the Abley Tomtom data review dated 11 October 2023 (and included in Sections 6.3 to 6.9, 10.8 and Appendix A of Mr Smith’s evidence dated 20 October 2023).
- Review of the Abley Shotover River Bridges Capacity Analysis dated 14 May 2018 (and included in Sections 7 and 10.3 of Mr Smith’s evidence dated 20 October 2023).
- Sidra modelling of SH6/Stalker Road/Lower Shotover Road/TPLM access intersection and SH6/Howards Drive/TPLM access intersection to understand the performance of provision of traffic signals.
- Assessment of ‘life’ of SH6/Howards Drive NZUP roundabout capacity.

1.2 This memo #2, reports on the findings from the above work.

**2 Review of Abley Tomtom data**

2.1 The Tomtom data analysed by Abley was for the period March 2023 for the following sections of roads:

- SH6 eastbound and westbound between Lake Hayes Road and Kawarau Road (BP).
- Stalker Road northbound between Jones Avenue (Primary school) and SH6.
- Howards Drive northbound between Sylvan Street and SH6.
- Hawthorne Drive between Glenda Drive and SH6.

2.2 Travel time and queue length data is reported in Mr Shields evidence on each of these sections of road except Hawthorne Drive.

2.3 A comparison of the Tomtom data reported in Mr Smith's evidence with the corresponding data from Mr Shields Evidence is summarised Table 2.1 below:

**Table 2.1 - Comparison of delay survey data**

**AM peak delays**

	<b>March 2023 Tomtom (Abley)</b>	<b>June 2023 Bluetooth (Mr Shields Evidence)</b>	<b>June 2023 bus journey time data (Mr Shields evidence)</b>	<b>2020 queue length survey (TPLM Transport Strategy)</b>
SH6 westbound	2 to 6	5.3 to 8.9	-	<sup>1</sup> 5 (average only)
Stalker Road northbound	3.5 to 12	-	6	11 <sup>2</sup>
Howards Drive northbound	0.75 to 5	-	-	4.2 <sup>3</sup>

**PM peak**

SH6 eastbound	3 to 10	2.7 to 6.1	4	-
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2.4 Comparison of the Abley Tomtom data with the data presented in Mr Shields evidence and the TPLM Transport Strategy demonstrates that the data is broadly similar and indicates:

- Delays SH6 westbound (from Lake Hayes Road to BP intersection) in the AM peak varying between 2 to 8.9 minutes.
- Delays Stalker Road northbound in the AM peak varying between 3 to 12 minutes.
- Delays Howards Drive northbound in the AM peak varying between 0.75 to 5 minutes.

<sup>1</sup> Based on average journey time observed of 11 minutes between Lake Hayes Rd and Hawthorne Drive compared to 2023 free flow time of 6 minutes Lake Hayes Rd to Hawthorne Drive

<sup>2</sup> Based on observed average journey time of 12 minutes between Jones Ave and SH6 compared to calculated free flow time of 1 minute (700m at 40km/h)

<sup>3</sup> Based on observed average journey time of 5 minutes between Jones Ave and SH6 compared to calculated free flow time of 0.8 minute (520m at 40km/h)

- Delays SH6 westbound (from BP intersection to Lake Hayes Road) in the PM peak varying between 2.7 to 10 minutes.

2.5 It is noted that the evidence submitted on behalf of the Ladies Mile Syndicate by John Parlane indicates SH6 westbound travel times between McDowell Drive to the Frankton roundabout (which is assumed to mean Hawthorne Drive) is between 7 to 14 minutes at 0835 on 12 October 2023 and 6 minutes off peak. This would result in delays on SH6 westbound of 1 to 8 minutes. This again confirms the travel delay data used by Mr Shields and Mr Smith.

2.6 Mr Parlane also concludes that *“I have reviewed traffic patterns on SH6 and while it is reasonably loaded in the morning peak the congestion that occurs is of relatively short duration. Of course traffic congestion is a comparative matter and what might be noticeable in a small town when most people are travelling to work might be considered insignificant in a larger city. Queenstown is a growing town and while traffic delays of 1 minute or even 8 minutes might seem extreme to some, that level of delay is simply the norm for people living in busy and vibrant cities”*.

### **3 Shotover River Bridge Capacity**

3.1 Mr Shields evidence uses the capacity of the Shotover Bridge of 1,700 vehicles/hour which is the traffic capacity of the bridge stated in the Waka Kotahi submission (#104).

3.2 Section 7 of Mr Smith’s evidence uses an alternative capacity of 1590 vehicles/ hour based on an Abley Shotover River Bridges Capacity Analysis dated 14 May 2018. It is noted that this capacity has been calculated in accordance with section A3.11 of the Waka Kotahi Economic Evaluation Manual.

### **4 Sidra modelling - Traffic Signal intersections**

#### **4.1 Background**

As requested by Waka Kotahi at the meeting on 12 October 2023 and indicated in paragraph 10.14 of Mr Smith’s evidence, Sidra capacity assessments were undertaken at the SH6/Stalker Road/Lower Shotover Road/TPLM site access and SH6/Howards Drive/TPLM site access intersections.

As agreed with Waka Kotahi, in the absence of any available designs, a Sidra assessment was carried out without any design drawings and the assessments included at grade pedestrian and cycle crossings across all arms of the intersections. The assessments were carried out using the 2053 with TPLM post PT skim turning flows. At the SH6/Stalker Road intersection, the TPLM access was

assumed to be combined with the Lower Shotover Road access and at the SH6/Howards Drive intersection, the TPLM access was assumed to be the northern access.

As with the previous roundabout assessments detailed in the tech memo dated 27/9/23, the signal assessments were carried out with and without calibration in the AM peak at the SH6/Stalker Road intersection (due to the existing westbound queues on SH6 in the AM peak from the Shotover Bridge) . Since the predicted signal assessments outlined below do not show a queue blocking back to SH6/Howards Drive intersection (as is the situation with the roundabouts) the calibration was not applied to the SH6/Howards Drive intersection. The calibration was achieved by adjusting the value for “Capacity Adjustment” of affected traffic lanes to a negative value until similar queue lengths to the site observations was achieved. Since there are no queues in the PM peak then this was not required for the existing PM peak. The calibration applied is summarised in Table 4.1 below:

**Table 4.1: Capacity adjustments applied in AM peak – SH6/Stalker Road/Lower Shotover Road**

Approach	Lane	Capacity adjustments*
Stalker Road	Signal: combined left-turn and through lane	-22.5%
SH6 East	Signal: through lane and combined left-turn and through lane	-30.8% in each lane

The results from the traffic signal Sidra assessments are presented in the following sections.

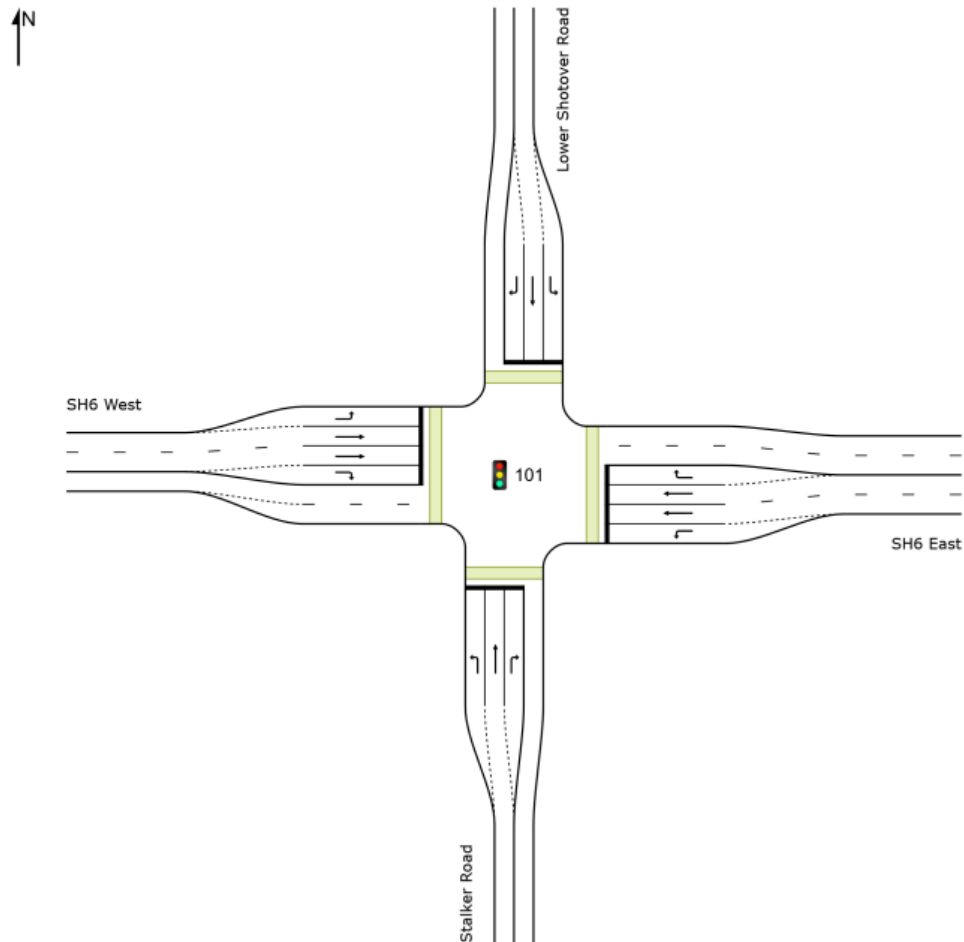
## **4.2 SH6/Stalker Road/Lower Shotover Road/TPLM traffic signal– 2053 base plus TPLM post PT skim**

### **4.2.1 Introduction**

A high level concept traffic signal form of intersection has been modelled incorporating safe controlled crossings for pedestrians and cyclists across all arms. The layout assumed in Sidra is shown below:



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



#### 4.2.2 AM peak

The results from this assessment for the AM peak are summarised in Table 4.2 below for the calibrated scenario:

Table 4.2: Sidra modelling outputs AM peak – proposed SH6/Stalker Road/Lower Shotover Road/TPLM signalised intersection (with calibration)

Approach	Lane	Average delay (secs)	LoS	95 <sup>th</sup> %tile back of queue (vehicles)*
Stalker Road	Left turn	102.9	F	27
	Through lane 1	53.5	D	2
	Right-turn	51.2	D	1
SH6 East	Left turn	15.6	B	0
	Through lane 1	95.6	F	46
	Through lane 2	84.2	F	46
	Right-turn	67.9	E	3
Lower Shotover Road/ TPLM access	Left turn	44.1	D	1
	Through	52.3	D	1
	Right-turn	84.6	F	24
SH6 West	Left turn	16.6	B	4
	Through lane 1	30.7	C	18
	Through lane 2	31.6	C	21
	Right-turn	71.9	E	7
Intersection		68.2	E	46

The outputs indicate an overall LoS of E with four approaches having a LoS F. Sidra will typically indicate a LoS F for traffic signals when the average delay is in excess of 80 seconds. Overall, with the calibration factor applied, the following is noted:

- Queue lengths on SH6 East will be up to 276m long (assuming 6m vehicle queue length) which is well within the available 750m distance to the SH6/Howards Drive intersection and hence will not block back to this intersection.
- Queue lengths on SH6 west will be relatively small at up to 126m.
- Queue lengths on Stalker Road will be up to 162m, which is much lower than existing.
- Queue lengths on the TPLM access will be low at up to 144m.

Compared to the roundabout layout results in Table 7.7 of the Tech memo dated 27/9/23, the traffic signal layout provides improved capacity as well as providing controlled at grade pedestrian and

cycle crossing facilities. Furthermore, when compared to Table 7.5 of the Tech memo dated 27/9/23, the traffic signal layout performs better than the existing roundabout without TPLM.

It is therefore considered that the traffic signal option provides a much improved capacity solution as well as providing safe all round pedestrian and cycle crossing facilities.

The results from this assessment for the AM peak uncalibrated scenario are summarised in Table 4.3 below:

**Table 4.3 Sidra modelling outputs AM peak – proposed SH6/Stalker Road/Lower Shotover Road/TPLM signalised intersection (uncalibrated)**

Approach	Lane	Average delay (secs)	LoS	95 <sup>th</sup> %tile back of queue (vehicles)*
Stalker Road	Left turn	48.4	D	13
	Through lane 1	35.9	D	2
	Right-turn	36.0	D	1
SH6 East	Left turn	15.0	B	0
	Through lane 1	53.2	D	25
	Through lane 2	41.9	D	26
	Right-turn	52.1	D	2
Lower Shotover Road/TPLM access	Left turn	30.7	C	0
	Through	35.1	D	1
	Right-turn	52.1	D	16
SH6 West	Left turn	15.9	B	3
	Through lane 1	30.5	C	16
	Through lane 2	30.7	C	17
	Right-turn	60.1	E	5
Intersection		41.8	D	26

The outputs indicate an overall LoS of D with one approach having a LoS E. Overall, without the calibration factor applied, the following is noted:

- Queue lengths on SH6 East will be up to 156m long which is well within the available 750m distance to the SH6/Howards Drive intersection and hence will not block back to this intersection.
- Queue lengths on SH6 west will be relatively small at up to 126m.
- Queue lengths on Stalker Road will be up to 102m, which is much lower than existing.
- Queue lengths on the TPLM access will be low at up to 96m.

Compared to the roundabout layout results in Table 7.8 of the Tech memo dated 27/9/23, the traffic signal layout provides improved capacity as well as providing controlled at grade pedestrian and cycle crossing facilities. Furthermore, when compared to Table 7.2 of the Tech memo dated 27/9/23, the traffic signal layout performs better than the existing roundabout without TPLM.

It is therefore considered that the traffic signal option provides a much improved capacity solution as well as providing safe all round pedestrian and cycle crossing facilities.

#### **4.2.3 PM peak**

The results from this assessment for the PM peak are summarised in Table 4.4 below:

**Table 4.4: Sidra modelling outputs PM peak – proposed SH6/Stalker Road/Lower Shotover Road/TPLM signalised intersection**

Approach	Lane	Average delay (secs)	LoS	95 <sup>th</sup> %tile back of queue (vehicles)*
Stalker Road	Left turn and through	46.6	D	10
	Through	62.3	E	1
	Right-turn	68.7	E	1
SH6 East	Left turn	22.4	C	1
	Through lane 1	40.4	D	26
	Through lane 2	37.4	D	27
	Right-turn	58.1	E	1
Lower Shotover Road/TPLM access	Left turn	39.7	D	2
	Through	63.2	E	2
	Right-turn	98.9	F	17
SH6 West	Left turn	26.2	C	13
	Through lane 1	90.6	F	47
	Through lane 2	89.4	F	56
	Right-turn	115.0	F	34
Intersection		67.7	E	56

The outputs indicate an overall LoS of E with four approaches having a LoS F (noting that Sidra will typically indicate a LoS F when the average delay is in excess of 60 seconds). Overall, the following is noted:

- Queue lengths on SH6 East will be up to 162m long, which is well within the available 750m distance to the SH6/Howards Drive intersection and hence will not block back to this intersection.
- Queue lengths on SH6 west will be up to 336m which will not cause any blocking back issues on the bridge (noting the end of the bridge is 1km west of the intersection).
- Queue lengths on Stalker Road will be relatively small at up to 60m.
- Queue lengths on the TPLM access will be low at up to 102m.

Compared to the roundabout layout results in Table 7.12 of the Tech memo dated 27/9/23, the traffic signal layout provides comparable capacity on the SH6 east, Stalker Road and TPLM access approaches. Although queue lengths on the SH6 west approach will be longer with the signals compared to the roundabout, these will not cause any blocking back onto the bridge and overall the traffic signals are considered to provide sufficient capacity at the 2053 assessment year with TPLM. Furthermore, the traffic signals provide controlled at grade pedestrian and cycle crossing facilities.

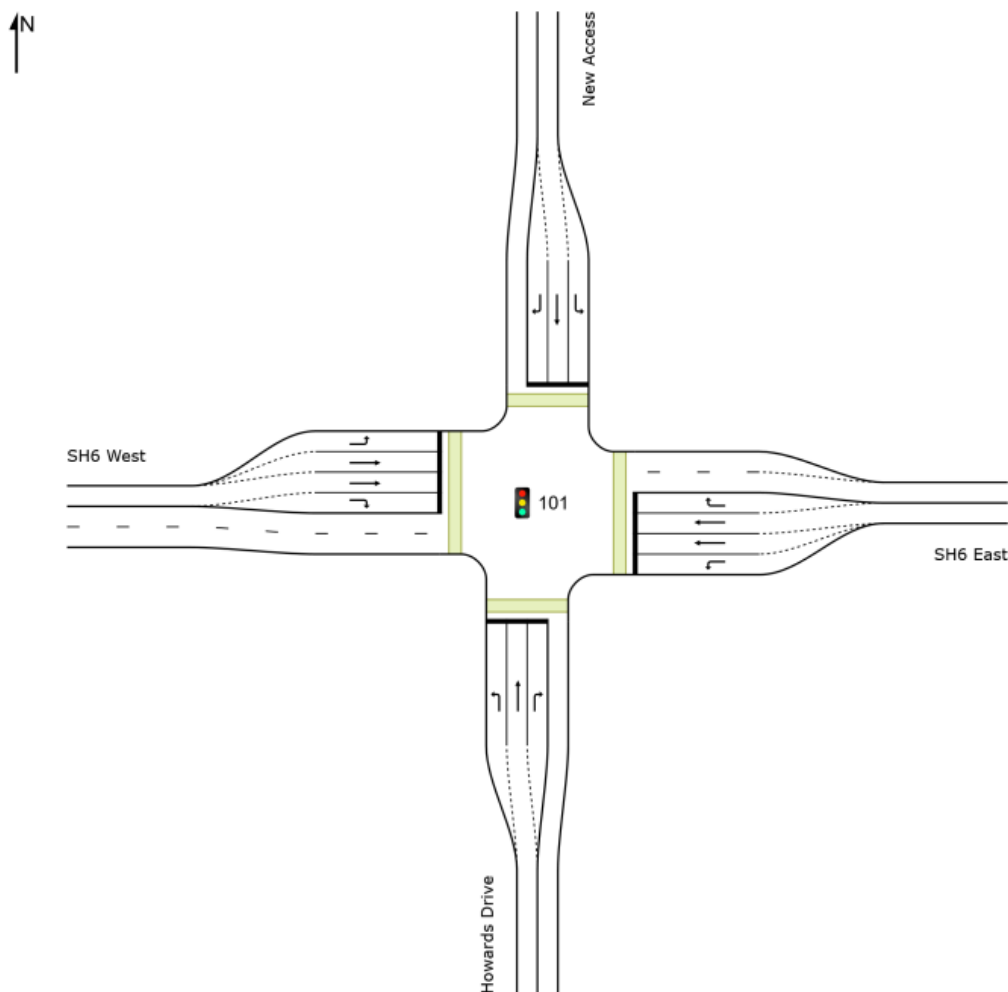
It is therefore considered that the traffic signal option provides sufficient capacity as well as providing safe all round pedestrian and cycle crossing facilities.

**4.3 SH6/Howards Drive/ TPLM traffic signal– 2053 base plus TPLM post PT skim**

**4.3.1 Introduction**

A high level concept traffic signal form of intersection has been modelled incorporating safe controlled crossings for pedestrians and cyclists across all arms. The layout assumed in Sidra is shown below:

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



**4.3.2 AM peak**

The results from this assessment for the AM peak are summarised in Table 4.5 below:

**Table 4.5: Sidra modelling outputs AM peak – proposed SH6/Howards Drive/TPLM access signalised intersection**

Approach	Lane	Average delay (secs)	LoS	95 <sup>th</sup> %tile back of queue (vehicles)*
Howards Drive	Left turn and through	25.1	C	6
	Through	28.9	C	4
	Right-turn	37.6	D	5
SH6 East	Left turn	17.3	B	2
	Through lane 1	25.3	C	11
	Through lane 2	25.3	C	11
	Right-turn	40.0	D	1
TPLM Access	Left turn	24.6	C	2
	Through	27.8	C	2
	Right-turn	42.8	D	8
SH6 West	Left turn	18.1	B	4
	Through lane 1	23.2	C	3
	Through lane 2	33.7	C	16
	Right-turn	42.0	D	3
Intersection		28.9	C	16

The outputs indicate an overall LoS C, with 4 approaches having a LoS of D. Overall, the following is noted:

- Queue lengths on SH6 East will be relatively small at up to 66m long, which is much lower than existing.
- Queue lengths on SH6 west will be relatively small at up to 96m, which is well within the available 750m distance to the SH6/Stalker Road intersection and hence will not block back to this intersection.
- Queue lengths on Howards Drive will be small at up to 36m, which is much lower than existing.
- Queue lengths on the TPLM access will be low at up to 48m.

Compared to the roundabout layout results in Table 7.9 of the Tech memo dated 27/9/23, the traffic signal layout provides improved capacity as well as providing controlled at grade pedestrian and cycle crossing facilities. Furthermore, when compared to Table 7.6 of the Tech memo dated 27/9/23, the traffic signal layout performs better than the existing roundabout without TPLM.

It is therefore considered that the traffic signal option provides a much improved capacity solution as well as providing safe all round pedestrian and cycle crossing facilities.

#### 4.3.3 PM peak

The results from this assessment for the PM peak are summarised in Table 4.6 below:

**Table 4.6 Sidra modelling outputs PM peak – proposed SH6/Howards Drive/TPLM access signalised intersection**

Approach	Lane	Average delay (secs)	LoS	95 <sup>th</sup> %tile back of queue (vehicles)*
Howards Drive	Left turn and through	35.3	D	4.4
	Through	47	D	5.7
	Right-turn	56.3	E	5.9
SH6 East	Left turn	19.5	B	4.5
	Through lane 1	27.3	C	13
	Through lane 2	27.3	C	13
	Right-turn	55.6	E	6.5
TPLM Access	Left turn	34.1	C	1.9
	Through	48	D	7.6
	Right-turn	72.7	E	14.1
SH6 West	Left turn	19.6	B	5.7
	Through lane 1	60.6	E	36.5
	Through lane 2	26.8	C	7
	Right-turn	82.3	F	15.3
Intersection		45.1	D	36.5

The outputs indicate an overall LoS of D with one approach having a LoS F and 4 approaches having a LoS of E. Overall, the following is noted:



- Queue lengths on SH6 East will be relatively small at up to 78m long.
- Queue lengths on SH6 west will be up to 219m, which is well within the available 750m distance to the SH6/Stalker Road intersection and hence will not block back to this intersection.
- Queue lengths on Howards Drive will be small at up to 35m.
- Queue lengths on the TPLM access will be relatively low at up to 84m.

Compared to the roundabout layout results in Table 7.13 of the Tech memo dated 27/9/23, although queue lengths will be longer with the signals compared to the roundabout, these will not cause any blocking back issues and overall the traffic signals are considered to provide sufficient capacity at the 2053 assessment year with TPLM. Furthermore the traffic signals provide controlled at grade pedestrian and cycle crossing facilities.

It is therefore considered that the traffic signal option provides sufficient capacity as well as providing safe all round pedestrian and cycle crossing facilities.

## **5 Estimation of 'life' of SH6/Howards Drive NZUP roundabout**

### **5.1 Background**

Waka Kotahi requested an assessment of the estimated life of the NZUP roundabout proposal at SH6/Howards Drive. As indicated in Table 7.6 of the Tech memo dated 27/9/23, for the existing situation without TPLM, the Howards Drive approach and SH6 east approaches in the AM peak would operate at a LoS of F and with queue lengths of up to 75 vehicles. As demonstrated in Table 7.9 of the Tech memo dated 27/9/23, for the 2053 plus TPLM situation, the Howards Drive approach and SH6 east approaches in the AM peak would operate at a LoS of F and with queue lengths of up to 132 vehicles on SH6 east.

As demonstrated in Table 7.13 of the Tech memo dated 27/9/23 at the 2053 scenario with TPLM in the PM peak the NZUP roundabout would be operating well within capacity.

Therefore, without TPLM, the NZUP roundabout does not have sufficient capacity in the AM peak. With TPLM, the queues and delays increase on the SH6 east approach. A further assessment was carried out assuming 500 units at TPLM as compared to the 2,400 units assumed in the 2053 modelling. A simple pro rata of trips in the Sidra model to/from TPLM was therefore carried out based on 21% of total trips for the 500 unit scenario (i.e. 500/2400).

### **5.2 Sidra results for assumed 500 units at TPLM**

The results from this assessment for the AM peak for 500 units (21% of the TPLM trips) are summarised in Table 5.1 below:

**Table 5.1: Sidra modelling outputs AM peak – proposed SH6/Howards Drive/TPLM access roundabout 21% traffic volume reduction from TPLM (Calibrated)**

Approach	Lane	Average delay (secs)	LoS	95 <sup>th</sup> %tile back of queue (vehicles)*
Howards Drive	Left-turn lane	137.4	F	19
	Through and right-turn lane	5.7	A	1
SH6 East	Through and left-turn lane	106.2	F	20
	Through and right-turn lane^	524.7	F	120
TPLM Access	All directions	6.5	A	2
SH6 West	Through and left-turn lane	9.0	A	4
	Right-turn lane	15.4	B	1
Intersection		143.2	F	120

The results indicate only a marginal reduction in queue lengths on the SH6 East approach with reduced level of development at TPLM.

Overall, the Sidra assessments demonstrate that the proposed NZUP roundabout proposal at SH6/Howards Drive does not have sufficient capacity in the AM peak and that TPLM only marginally increases delays and queues, regardless of whether there is full or partial TPLM development.