Before the Hearing Panel
Appointed by the Central Otago District Council

Under	The Resource Management Act 1991
In the matter of	Private Plan Change 14 to the Central Otago District Plan

Evidence of Andrew David Carr

13 May 2020

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Introduction

1 My full name is Andrew ("Andy") David Carr.

2 I am a Chartered Professional Engineer and an International Professional Engineer (New Zealand section of the register). I am also a Chartered Member of Engineering New Zealand (formerly the Institution of Professional Engineers New Zealand), and an Associate Member of the New Zealand Planning Institute.

3 I hold a Masters degree in Transport Engineering and Operations and also a Masters degree in Business Administration.

4 I served on the national committee of the Resource Management Law Association between 2013-14 and 2015-17, and I am a past Chair of the Canterbury branch of the organisation.

5 I have more than 30 years' experience in traffic engineering, over which time I have been responsible for investigating and evaluating the traffic and transportation impacts of a wide range of land use developments, both in New Zealand and the United Kingdom.

6 I am presently a director of Carriageway Consulting Ltd, a specialist traffic engineering and transport planning consultancy which I founded five years ago. My role primarily involves undertaking and reviewing traffic analyses for both resource consent applications and proposed plan changes for a variety of different development types, for both local authorities and private organisations. I am also a Hearings Commissioner and have acted in that role for Greater Wellington Regional Council, Ashburton District Council, Waimakariri District Council and Christchurch City Council.

7 Prior to forming Carriageway Consulting Ltd I was employed by traffic engineering consultancies where I had senior roles in developing the business, undertaking technical work and supervising project teams primarily within the South Island.

8 I have been involved in a number of proposals which have involved assessing the traffic generation and effects of residential developments and plan changes that facilitate residential development. A few examples include Stonebrook (460 sections in Rolleston), Prestons (over 1,000 sections in Christchurch plus ancillary development) and Awatea (Christchurch, 139 residences). Within Queenstown Lakes district, I have assessed the effects arising from Plan Changes 4 (North Three Parks, 600 residences), 41 (Shotover Country, 770 residences plus commercial development), and 45 (Northlake, 1,600 residences plus ancillary development).

9 Within Central Otago I provided advice for Plan Changes 12 (Wooing Tree, 210 residences plus ancillary development) and 13 (River Terrace, 690 residential lots plus 150 retirement village units). I also provided advice for the redevelopment of the Cromwell Top Ten Holiday Park for 180 residences (RC170378). Previously I also provided transportation advice for the Perriam Cover subdivision towards the north of Cromwell.

10 I have also provided advice for numerous other residential plan changes and resource consents within the South Island.

11 As a result of my experience, I consider that I am fully familiar with traffic-related issues associated with residential plan changes.

Code of Conduct for Expert Witnesses

12 While this is not a hearing before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2014 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Evidence

13 In this matter, I have been asked by the plan change requestor, NZ Cherry Corp Limited, to consider the submissions made on its plan change request to rezone land on the western side of State Highway 6. From a transportation perspective, the critical element of this is the ability to construct up to 160 rural lifestyle properties. I have also been asked to comment on and respond to the Council Officers' reports.

14 I have been involved with this project since mid 2018. At this time, I assessed the expected traffic effects arising from the proposal which specific consideration of the northernmost State Highway 6 / Ripponvale Road intersection. Subsequently, I responded to a Request for Further Information from the Council, part of which requested an assessment of the southwestern State Highway 6 / Ripponvale Road intersection. For each of these I carried out peak hour traffic surveys to determine current traffic flows.

15 I adopt my Transportation Assessment and Response to the Request for Further Information reports as the primary part of my evidence, and accordingly, have not replicated much of the detail within this evidence, other by way of an overview and matters relevant to submissions and the Officer Reports. I have however provided a brief summary of the key findings, including updating information as relevant.

Executive Summary

16 I have carried out three assessments of the effects arising from the land development sought to be enabled by the plan change request, the initial Transportation Assessment, the response to the Request for Further Information, and an assessment produced in response to the submission made by NZTA. Each of these show a consistent outcome of the traffic generated by the proposal being accommodated without significant efficiency or safety issues arising, even when assessing onerous scenarios.

17 There is a high degree of agreement between myself and the Council Officers, with Mr Facey also concluding that the roading efficiency or road safety effects of approving the plan change request will be no more than minor (and Mr Whitney accepting Mr Facey's advice). However there are three differences, which relate to the widening of Ripponvale Road, provision of a shared footpath/cyclepath on Ripponvale Road and provision of a shared footpath/cyclepath on State Highway 6 over a distance of around 400m plus a formal crossing point of the highway.

18 With regard to the first two issues, I consider that these matters can be addressed at the time of subdivision of the site, whereas Mr Facey and Mr Whitney prefer to include for this within the plan change provisions. In respect of works within the highway corridor, this matter is not wholly within the proponents' or Council's control.

19 I have reviewed the submissions made on the plan change request. However I do not consider that the plan change provisions need to be modified from a transportation perspective.

20 I therefore remain of the view expressed within my earlier Transportation Assessment, that there are no transportation reasons why the plan change request could not be recommended for approval.

Summary and Update of Previous Transportation Analyses

21 At the outset I note that there have been three assessments of the effects arising from the land development sought to be enabled by the plan change request. These are the initial Transportation Assessment included as Appendix J to the plan change request (dated 23 May 2019), the assessments included within my response to the Request for Further Information (dated 23 July 2019), and a more recent assessment which was produced in response to the submission made by NZTA (dated 23 March 2020).

22 The most up-to-date assessment of the effects on the safety and efficiency of the roading network is included within the response to NZTA, which is included as

Annexure A to this evidence. To date, I have not received any response to this letter from NZTA.

23 To avoid confusion, I have not repeated in detail any information that has subsequently been superseded by a later document. However I have provided an overview and noted the conclusions of the earlier analyses, since they show a consistent outcome of the traffic generated by the proposal being accommodated without significant efficiency or safety issues arising.

24 Within the Transportation Assessment, I assessed the traffic generation of 160 rural residential dwellings. I use the term 'rural residential' throughout my assessments because, from a traffic perspective, the land use sought to be enabled by the plan change request includes a residential use on each of the allotments in a rural context, that is described in the evidence of others.

25 My assessment involved surveying the locations where traffic would meet the highway (the northern State Highway 6 / Ripponvale Road intersection), calculating the traffic generation and assessing the performance of the intersection under the increased traffic loadings.

26 As part of responding to the Request for Further Information, surveys were also carried out at the southwestern State Highway 6 / Ripponvale Road intersection, the traffic generated by the rural residential dwellings was added, and the performance of the intersection under the increased traffic loadings was assessed.

27 In both cases, I added additional traffic onto the highway to reflect ambient traffic growth. At the time this was 7.2% per annum (expressed as a percentage of 2017 traffic volumes) and so my analyses allowed for a 72% increase in the observed volumes, to account for ten years of growth. I also added a further 30% to take into account that traffic flows on the highway are greater during summer months than in winter. Even under this scenario, my assessment showed that the intersections would be able to accommodate the increased traffic without adverse effects on queues or delays.

28 I also reviewed the crash records on Ripponvale Road and on the affected section of the highway. Based on the review, I concluded that the development facilitated by the plan change would not give rise to adverse road safety effects.

29 Common to these analyses is a factoring of the traffic flows to reflect ambient traffic growth, and a review of the road safety records.

30 During March 2020, I participated in discussions with NZTA regarding their submission to the plan change request. As part of this, I took the opportunity to fully update my earlier analyses. For this I identified that the annual traffic growth rate

on the highway had increased to 10.3%, and therefore factored the existing traffic by 103% rather than 72% as in the previous assessment.

31 I highlight that while short-term growth rates of this scale occur relatively frequently, it is unusual for them to be sustained for any significant period of time. Consequently I consider that my assessments adopt a 'worst case' scenario for traffic growth. Even with this however, my updated analyses showed that the two State Highway 6 / Ripponvale Road intersection continued to have sufficient capacity to absorb the increased traffic.

32 I also reviewed the reported crashes on the same section of road/highway, and carried out a calculation of the expected change in crash numbers based on the NZTA's crash prediction equations. This showed that both intersections would operate satisfactorily under the increased traffic loadings.

33 My most recent review (the letter addressing NZTA concerns) is attached to my evidence as Annexure A.

Response to Council Officer Reports

34 I have read the report of Mr David Whitney, consultant planner to Central Otago District Council, who relies on a traffic engineering report produced by Antoni Facey of consultants Avanzar.

35 Overall, Mr Facey considers that the roading efficiency or road safety effects of approving the plan change request will be no more than minor, but recommends that a number of provisions are made. I agree with his overall conclusion, and discuss each of the additional provisions below.

36 Mr Facey sets out that the racecourse is recommended for upgrading in the future and this may result in more and busier race days, and potentially improvements to the adjacent roading and intersections. I concur that these matters are not presently confirmed, and as such, I do not consider that they can be taken into account within the transportation analysis. It is also not clear whether the upgrade of the racecourse (and additional activity from it) would also be dependent on successfully obtaining resource consent.

37 While agreeing that the traffic generation calculation is appropriate, Mr Facey highlights that some residents of the plan change area might also be employed on the western side of the highway. He considers that this effect would be small, but would result in a reduction in traffic volumes passing through the highway intersections. I agree with this view, and highlight it again indicates the robustness of the assessments of the intersections where no such reduction was allowed for.

38 Mr Facey goes on to say that when the plan change area is fully developed, the expected traffic flows are "*well within*" the capacity of the existing Ripponvale Road. He considers that the volumes will be well within the capacity of the highway, and that Ord Road is unlikely to be used as a route by generated traffic. He also notes that there is "*considerable capacity*" remaining at the two State Highway 6 / Ripponvale Road intersections even with the proposed development-related traffioc plus a high traffic growth rate applied. I concur.

39 He (rightly) notes that the plan change will utilise some of the available capacity at the two State Highway 6 / Ripponvale Road intersections that may have been needed for other developments. He then goes on to suggest that as a result, there should be a contribution made to the future upgrading of the intersections. This is problematic in my view, in part because there is considerable capacity remaining even under an onerous assessment scenario (as identified by Mr Facey) and partly because there is no indication of any scheme layout for an upgrading and so no meaningful costs could be calculated. In my experience it is common for a development to make a cost contribution to an intersection upgrading where the development creates capacity issues, but extremely rare when ample spare capacity is shown to remain even when allowing for rigorous assessment.

40 Mr Facey discusses that it is appropriate to consider the design of the roading network within the plan change area at the time of subdivision, and I agree. However he then goes on to say that as part of the plan change provisions, there should be a requirement to upgrade the eastern part of Ripponvale Road (between the plan change area and the northeastern intersection with State Highway 6). As I noted within my previous analysis (Transportation Assessment section 7.4 and RFI Response section 15), I have no issues with Ripponvale Road being upgraded but the matter is one of timing. I remain of the view that this can be considered when subdivision consents are sought. As I noted previously, the flat land topography in this location means that there will be no difficulties in widening the carriageway at that time if that is required.

41 Similarly, Mr Facey sets out that a footpath should be constructed on the northern part of Ripponvale Road. I set out above that pedestrian volumes will be low due to the distance that they would walk. As such, if a footpath was to be considered to be required, then this is again a matter for when subdivision consents are sought in my view.

42 With regard to the crossing of the highway, Mr Facey highlights that there would be merit in providing a crossing point for pedestrians and cyclists but that this should be combined with a crossing point adjacent to the Ripponburn Lifestyle Retirement Village which in his view is already likely to be generating a demand for cyclists and pedestrians to cross the highway. This would require the construction of a footpath between Ripponvale Road and the retirement village (a length of

around 400m) plus the provision of the crossing point itself. In his view, it should not be the sole responsibility of the plan change proponents to fund the footpath on the state highway nor the crossing point due to the likely use by other users (unrelated to development/activities within the plan change area).

43 As I noted above, pedestrian volumes associated with the plan change area are likely to be low and cyclists are already crossing the highway without crashes being reported. However, if some form of formal crossing point is to be provided, then I concur that the funding of this also should be borne by other parties who are also likely to use the crossing. In essence, these works are within third party land (the highway) over which the plan change proponents have no control.

44 Finally, Mr Facey considers that the roading network within the plan change area should connect to the paper road extension of McFelin Road, with a legal corridor of 15m width (meaning that it could be formed for motorised vehicles if desired in future), but providing a walking and cycling track in the short term. I noted above that the plan change provisions do not preclude this, and that I agree with Mr Facey that the internal roading network of the plan change area can be considered when it is subdivided. As noted elsewhere in my evidence, public pedestrian connection to McFelin Road is already provided for by the plan change provisions.

45 Mr Whitney highlights that no response has yet been provided to the peer review carried out by Mr Metherell of Stantec (dated 9 August 2019). I confirm that no response has been produced but in large part this is because few issues were raised by Stantec and it was expected that the Officers' Reports would raise any outstanding issues or confirm that sufficient information was already available to make a determination as to the effects. I consider that this is indeed the case.

46 In Mr Whitney's view, there should be explicit provision for a shared walking and cycling route on the northern side of Ripponvale Road. I note that Mr Facey identifies that cyclists are able to share the traffic lanes. Mr Whitney also seeks provision of a Rule that requires a shared walking and cycling route on the western side of the highway as far as the retirement village and a formal crossing point of the highway. He clarifies that this is not specified as being an underpass. As noted above I am unclear how this could be progressed in this manner if the plan change proponents only fund part of the works, and the works are on third party land.

47 Ultimately however, Mr Whitney adopts Mr Facey's conclusions that the traffic and transportation effects will be no more than minor, subject to

(a) Widening of Ripponvale Road between the plan change access road and the northeastern intersection with the highway. While I do not disagree with the need for a widening, I consider that this can be addressed when subdivision consents are sought rather than having specific mention of this within the plan change provisions.

(b) Provision of a shared footpath/cyclepath on Ripponvale Road between the plan change access road and the northeastern intersection with the highway. I do not consider that significant volumes of pedestrians will be present, but irrespective, I consider that this is a matter that can be addressed when subdivision consents are sought rather than having specific mention of this within the plan change provisions.

(c) Provision of a shared footpath/cyclepath on State Highway 6 over a distance of around 400m plus a formal crossing point of the highway (with Mr Facey noting that this should only be partly funded by the plan change proponents). If such infrastructure is provided then in my view it should not be part of the plan change provisions but rather would be through third-party discussions between the plan change proponents, the Council and NZTA.

(d) In my view there are relatively few differences between myself and the Council Officers. We agree on the 'effects' of the plan change, and the matter is largely one of whether provision is made within the plan change or through conditions on the subdivision consent. I note though that in respect of a crossing on the highway, the matter is not wholly within the proponents' or Council's control.

Response to Submissions

48 I have read the submissions received by the Council on the plan change request and have identified those which relate specifically to traffic and transportation matters. I respond below to the specific points raised. To avoid repetition, the issues are grouped together where the same matter has been identified by different submitters, and for clarity, they are not addressed in any specific order.

49 One submission was made by NZTA. I understand that the policy issues the Agency raised are addressed in the planning evidence of Mr Giddens and I have therefore focussed my assessment on the technical transportation issues. The remaining technical matters are included below, but for clarity, a specific assessment of issues which they have raised during subsequent discussions is included as Annexure A.

Submitter concern: The proposal will result in adverse traffic / road safety effects

50 My initial analyses considered the road safety and efficiency effects of the plan change, and these were updated as a result of recent discussions with NZTA. Based on these, I consider that the traffic generated by the development associated with the plan change can be accommodated on the adjacent transportation networks.

Submitter concern: The proposal will increase traffic flows through both of the State Highway 6 / Ripponvale Road intersections, which should be improved

51 My initial analyses considered the road safety and efficiency effects of the plan change at the two intersections, and these were updated as a result of recent discussions with NZTA. Based on these, I consider that the traffic generated by the development associated with the plan change can be accommodated by these two intersections without the need for any improvement measures.

Submitter concern: The speed limit on the highway should be reduced around the northern State Highway 6 / Ripponvale Road intersection to improve safety

52 It is not within the scope of a plan change to lower a speed limit, as this requires a different statutory process. My analyses are all based on the existing speed limits, but if these were to be reduced at some point in future (as NZTA has verbally indicated to me is under consideration), there would be no adverse transportation effects that would arise.

Submitter concern: Ripponvale Road should be improved to accommodate the expected traffic flows

53 Within my response to the Request for Further Information, I considered the current formation of Ripponvale Road together with the traffic generated by the plan change proposal. In this I concluded that the current road formation is narrower than anticipated under the Council's Code of Practice for Subdivision for the existing traffic flows on the road. As such, even without any development, the road does not meet the Code of Practice, and would need to be widened if the Code of Practice is to be met.

54 However, even if the road was increased in width such that the formation met the Code of Practice for the existing traffic flows, development of the plan change area would justify further widening because of the increased traffic volumes expected.

55 Taking into account that the widening is relatively minor, in the Request for Further Information I set out that I did not consider that there was a requirement for a specific rule in the plan change provisions that required widening, but that widening was best considered at the time of subdivision. I remain of this view.

Submitter concern: No assessment has been made of the effects when an event is held at the Cromwell Racecourse

56 Cromwell Racecourse lies to the immediate southwest of the northern State Highway 6 / Ripponvale Road intersection. I understand that the facility hosts three horse racing events per year, and is also used for a number of community events. Access is provided via Ord Road, on the southern side of the racecourse.

57 Since access is provided on the southern side, whereas Ripponvale Road lies to the north and west, the traffic interactions between development in the plan change area and events at the racecourse will be limited. In this regard, I expect that the bulk of vehicles will use the State Highway 6 / Ord Road intersection, rather than Ripponvale Road.

58 In my experience, community and sporting events do not typically generate traffic in the weekday morning and evening peak hours, but at weekends or on public holidays. In those latter times, the traffic generation of rural residential activity is low.

59 Finally, the number of events at the racecourse is low, meaning that it does not generate significant traffic flows on a frequent basis.

60 Consequently I do not consider that it is necessary to evaluate a scenario with an event taking place at the racecourse, due to these being infrequent, traffic flows typically not occurring at the same times as those associated with development in the plan change area, and the use of different parts of the roading network.

Submitter concern: No assessment has been made of extra traffic during fruit seasons / holiday periods on Ripponvale Road

61 My analysis takes into account much higher traffic flows than presently seen on the roading network, and queues and delays at the intersections with the highway remain acceptable even under this scenario.

Submitter concern: No assessment has been provided of the effects on groups of cyclists using Ripponvale Road

62 In my experience, groups of cyclists are usually present during weekends, whereas the greatest traffic generation of rural residential activity takes place in the weekday morning and evening peak hours. Consequently, the two do not usually coincide, and thus the potential for a newly-generated vehicle on the network to encounter a group of cyclists.

63 The NZTA cyclist road code[1] sets out that when riding in groups, there must never be more than two cyclists cycling next to one another, and that when the road is narrow or vehicles cannot pass, everyone should cycle in single file. The road code also sets out that it is illegal for three or more cyclists to ride next to one another. Given this, and the available width of Ripponvale Road, I do not consider that in the event that a cycling group and a vehicle meet, there is any reason to anticipate that adverse safety effects would arise. I also note that Ripponvale Road is one of

[1] https://www.nzta.govt.nz/resources/roadcode/cyclist-code/about-cycling/cyclist-responsibilities#groups

many rural roads within the district, and the Council's Code of Practice does not require any specific provision for groups of cyclists in rural areas.

64 As such I do not consider that the plan change provisions should include specific provision for groups of cyclists.

Submitter concern: A walking/cycling route should be provided along Ripponvale Road (east of the plan change area)

65 Given the low traffic volumes, and that Ripponvale Road is not a designated walking/cycling route, in my view there is very limited potential for these road users to encounter one another. There is no record of adverse road safety issues arising from any conflict between these road users, and the Council's Engineering Standards do not indicate that footpaths or provision for cyclists is required on rural roads.

66 I therefore do not consider that such a route is required to be specified within the plan change provisions.

Submitter concern: The location of the site does not promote walking and cycling to/from Cromwell

67 From a technical transportation perspective, it is generally accepted that a pedestrian will typically walk for a maximum of around 1km, with a cyclist travelling for a typical maximum of 3km. In the Request for Further Information, Council noted that the site was within 3km of the town centre meaning that cycling could be a viable mode of transport. However according to the Ministry of Transport Household Travel Survey, cycling accounts for only around 5% of all travel within Otago, meaning that cycling accounts for only a small amount of overall trips.

68 That being the case, I agree that the number of walking and cycling walking trips between Cromwell town centre and the plan change area will be limited. The distance is beyond that which most pedestrians will walk, and while the distance is viable for cycling, the low proportion of people that cycle will limit numbers. However the distance of the site from the town centre is an outcome of the rural lifestyle zoning – to promote walking and cycling would require reduced travel distances, but in turn reduced distances would then mean that the site was more urban than rural.

Submitter concern: An underpass should be provided to allow people to cross the highway when walking or cycling to/from Cromwell

69 As I noted above, the distances involved mean that the number of walking and cycling movements between the plan change area and Cromwell will be low. Thus,

the number of people crossing the highway will be also very low. Consequently, based on likely demand, I do not consider that an underpass is justified.

70 With regard to the construction of the underpass, in addition to the structure beneath the highway, an underpass also requires suitable approach routes for its users. As a public facility, it needs to be accessible to the mobility impaired, and hence approach ramps (and resting places) are needed on both sides. These occupy land, and in this case, land on the western side of the highway is limited (although for completeness, there is a very large area of land within the legal highway corridor on the eastern side). Achieving a suitable design for the underpass will therefore be challenging.

71 Finally, underpasses are expensive pieces of infrastructure.

72 Taking these three factors together, I consider that the underpass will be lightly-used, be expensive to construct, and be difficult to accommodate within the available land. In my view, it is therefore a scale of infrastructure that is far greater than justified by the plan change request.

73 I have also reviewed the reported crashes on the state highway which involved pedestrians and cyclists. To ensure a robust assessment, I considered the whole section of highway from south of the (northernmost) State Highway 6 / Ripponvale Road intersection to just north of the State Highway 6 / State Highway 8B intersection (a 1.5km long section). I also considered the past 40 years of records. However no crashes involving these road users have been reported.

74 This conclusion must be interpreted cautiously as the current numbers of pedestrians and cyclists will be low (for the reasons I set out above). I note though that submitters say that groups of cyclists use Ripponvale Road, which suggests that cyclists are presently crossing the highway without serious incident.

75 I am aware that plan changes sometimes include ‘triggers’, whereby some form of new infrastructure or improvement scheme is required to be in place once a particular threshold of development is reached. However in my experience, these provisions are put in place in cases where infrastructure is already under pressure (that is, is demonstrably running out of capacity), and even then it is highly unusual for a no development at all to be permitted until the improvement measure is put in place. Rather, a specific amount of development is allowed before the measure needs to be funded or put in place. In this case, because the underpass would be so lightly-used, in my view it would be difficult to fairly and robustly define a suitable threshold.

76 Moreover, it is usual that the developer makes a contribution to the infrastructure in proportion to the effects that they cause (or recognising that their development brings forwards the timing of committed development), which can be through a

specific development contribution levy that is set and administered by the Council. They do not, in my experience and within the context of plan change provisions, wholly fund the measure themselves.

77 Overall, I do not consider that an underpass is a justified mitigation measure given the likely very low usage and relatively small scale of development permitted in the plan change area. It would also be difficult to include for its construction in the plan change provisions.

78 In this regard, it is of relevance that the submission of NZTA, as the road controlling authority for the highway, set out that further consideration of safe and efficient pedestrian/cycle access across the highway was required. However their further submission opposes an underpass.

79 That said, if an underpass (or some other formal crossing point of the highway) is ultimately determined to be necessary by the road controlling authorities, I consider that an appropriate approach would be for the plan change proponents to make a financial contribution towards the cost of the crossing based upon the number of titles created within the plan change area, with other parties also making a contribution. In this regard, my views are the same as those of Mr Facey, whose report to the Council confirms that the plan change proponents should not be wholly responsible for funding any crossing point.

Submitter concern: The internal roadway which terminates at the northern boundary should be a cul-de-sac rather than potentially connecting to roads further north

80 The specific concern raised appears to be that the road within the plan change area aligns with an existing unformed road ('paper road'), McFelin Road, on the northern boundary. If the road to the north was to be formed, then this could result in a greater amount of traffic passing through the plan change area than has been assessed thus far.

81 Having reviewed the locations and patterns of lots, I note that there were once paper roads that ran through the plan change area, but I understand that these have been formally stopped and are now freehold titles owned by the plan change proponents. However there is still a paper road that runs between the formed part of McFelin Road and the northern boundary of the plan change area.

82 On my reading of the plan change request, there is no provision that requires the formation of a roading linkage to the northern site boundary. Equally though, the formation of such a link is not precluded. From a transport planning perspective, good practice indicates that where possible subdivisions should allow for future connections to external land parcels, so as to promote connectivity. I also note that a paper road can be formed by a roading authority at any time, and hence the extension of McFelin Road towards the north of the plan change area could be

formed by the Council if they chose, and that this is not a matter relating to the plan change per se.

83 Overall, I do not support the prohibition of a possible future connection towards the north and rather, am of the view that the plan change should not preclude such provision.

Submitter concern: Public access should be granted to the unformed part of McFelin Road

84 As a paper road, McFelin Road has the same status as a formed road, meaning that the public has the right to use it by all lawful modes of transport.

85 Rule 4.7.2(ii)(a)(vi) requires that public pedestrian connections be provided in the general locations shown in the Circulation Plan in Schedule 19.24, and that Circulation Plan shows a connection to McFelin Road. Accordingly public access to the unformed part of McFelin Road will be provided.

86 I note that Mr Facey considers that the formation of such a link is desirable, and I concur.

Submitter concern: The proposal has not been assessed under the Regional Policy Statement or Regional Land Transport Plan

87 Section E2.0 of the AEE (and Appendix B) accompanying the plan change request addressed the Regional Policy Statement, with the Regional Transport Plan being addressed in section E4.2 of the AEE. I understand that my Transportation Assessment was used to inform the assessment against these documents.

Conclusion

88 Based on my review of the development facilitated by the plan change request, I consider that the traffic generated can be accommodated without significant efficiency or safety issues arising.

89 There is a high degree of agreement between myself and the Council Officers, with Mr Facey also concluding that the roading efficiency or road safety effects of approving the plan change request will be no more than minor (and Mr Whitney accepting Mr Facey's advice). However there are three differences:

(a) Widening of Ripponvale Road between the plan change access road and the northeastern intersection with the highway. While I do not disagree with the need for a widening, I consider that this can be addressed when subdivision consents are sought rather than having specific mention of this within the plan change provisions.

(b) Provision of a shared footpath/cyclepath on Ripponvale Road between the plan change access road and the northeastern intersection with the highway. I do not consider that significant volumes of pedestrians will be present, but irrespective, I consider that this is a matter that can be addressed when subdivision consents are sought rather than having specific mention of this within the plan change provisions.

(c) Provision of a shared footpath/cyclepath on State Highway 6 over a distance of around 400m plus a formal crossing point of the highway (with Mr Facey noting that this should only be partly funded by the plan change proponents). If such infrastructure is provided then in my view it should not be part of the plan change provisions but rather would be through third-party discussions between the plan change proponents, the Council and NZTA.

90 I have reviewed the submissions made on the plan change request. However I do not consider that the plan change provisions need to be modified from a transportation perspective.

91 I therefore remain of the view that there are no transportation reasons why the plan change request could not be recommended for approval.

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13 May 2020

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Dear Brett

Plan Change 14 (Shannon Farm): Assessment of Effects on State Highway 6

Further to the teleconference with the New Zealand Transport Agency (**NZTA**) on 19 March 2020, we have considered further the matter of the safety and efficiency effects of the requested plan change on State Highway 6.

Update of Earlier Information

An evaluation of the effects on the highway was set out within our Transportation Assessment. Following a teleconference in mid-2019, we also provided a specific letter (dated 26 August 2019) to NZTA which addressed further the matter of the effects on the highway at both of the State Highway 6 / Ripponvale Road intersections. We have initially reviewed these to assess whether any additional information has subsequently become available.

Growth Rate

At the time, the most recent information for Annual Average Daily Traffic (**AADT**) was based on 2017 data, which showed a volume of 4,887 vehicles (two-way), at the closest count station (00600947). The data also showed an annual growth equivalent to 350 vehicles per day. This should mean that the 2018 AADT is in the order of 5,238 vehicles per day (two-way). We have reviewed the NZTA data and find that the recorded AADT is 5,342, meaning that the growth was greater than expected over the course of a day.

Adopting the same approach as previously used to find the growth rate over the past five years, the assessment shows an average rate of 10.3% compared to the previously calculated rate of 7.2%.

For completeness, we have also assessed the peak hour to identify whether growth is occurring in these periods also. The data shows:

- A weekday morning peak hour of 7am to 8am: 277 vehicles southbound (previously 254 vehicles), 93 vehicles northbound (previously 77 vehicles); and
- A weekday evening peak hour of 5pm to 6pm: 176 vehicles southbound (previously 171 vehicles), 317 vehicles northbound (previously 290 vehicles).

Our earlier assessment allowed for ten years of growth on the highway by adding 72% to the observed volumes. In view of the revised data, we have updated our assessment to allow for an additional 103% of traffic (that is, slightly more than double the prevailing flows). This then leads to the follow base traffic flows:

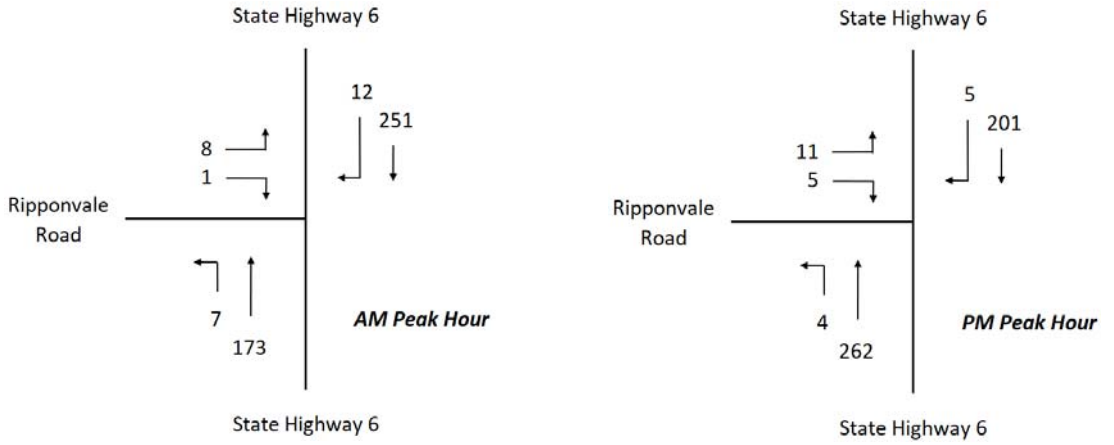

Figure 1: Observed Traffic Flows on State Highway 6 / Ripponvale Road (East) Intersection, as per Transportation Assessment

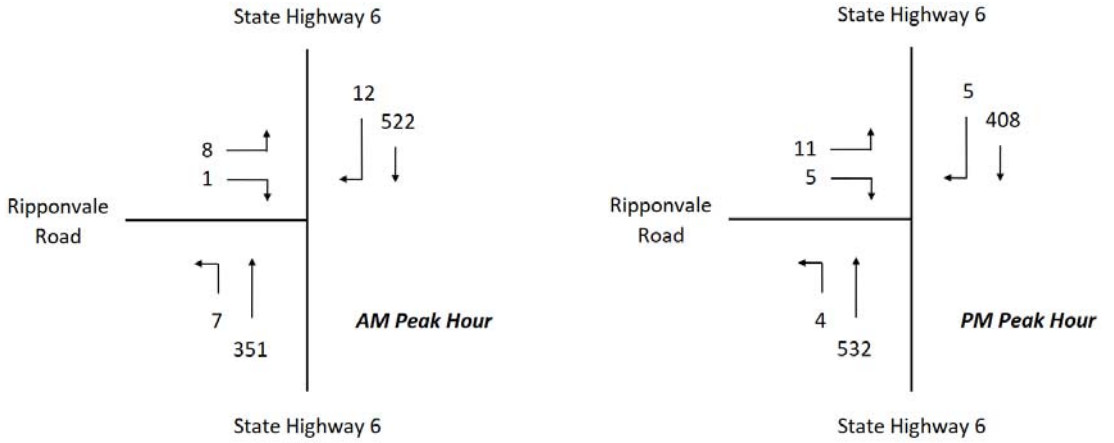

Figure 2: Factored Traffic Flows on State Highway 6 / Ripponvale Road (East) Intersection (No Plan Change)

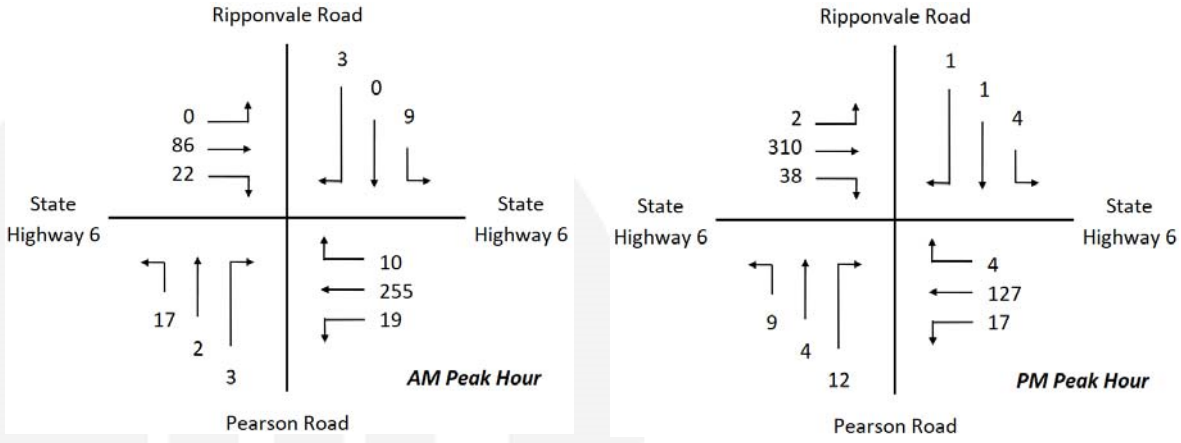

Figure 3: Observed Traffic Flows on State Highway 6 / Ripponvale Road (West) Intersection, as per Letter Dated 26 August 2019

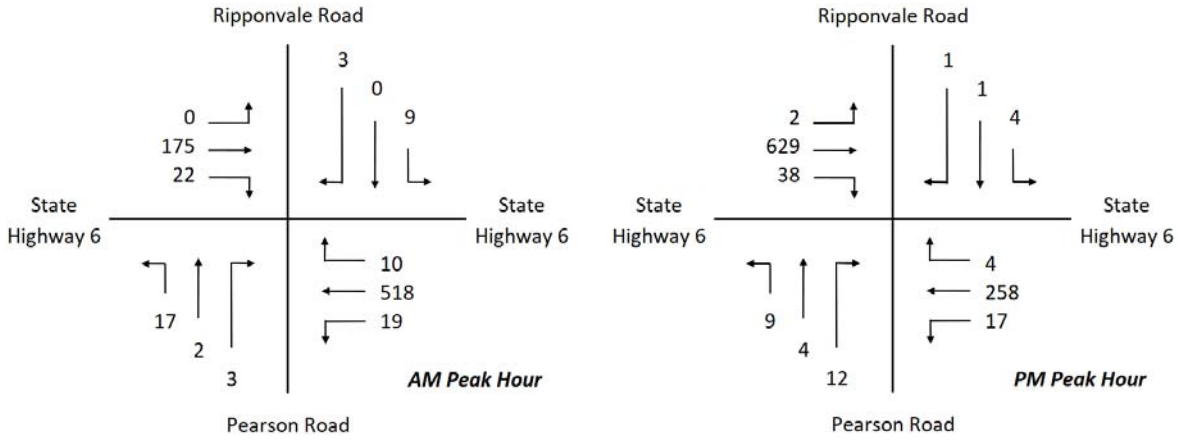

Figure 4: Factored Traffic Flows on State Highway 6 / Ripponvale Road (West) Intersection (No Plan Change)

Traffic Generation and Distribution of the Proposed Plan Change

To summarise our earlier work:

- The plan change allows for the development of up to 160 residences;
- We allowed for 1 vehicle movement per residence in the peak hours;
- In the Transportation Assessment, we allowed for all of this traffic to pass through the State Highway 6 / Ripponvale Road (east) intersection, with then:
    - 40% of traffic turning towards the north, towards Cromwell; and
    - 60% of the traffic turning south, towards Queenstown
- This distribution was queried through a Council Request for Further Information, as a result of which a second distribution was used:
    - 90% of traffic turning towards the north, towards Cromwell and all of this would use the State Highway 6 / Ripponvale Road (east) intersection; and
    - 10% of the traffic turning south, towards Queenstown, and all of this would use the State Highway 6 / Ripponvale Road (west) intersection

We have adopted a consistent approach within this updated assessment and have used the same traffic generation and tested both distributions.

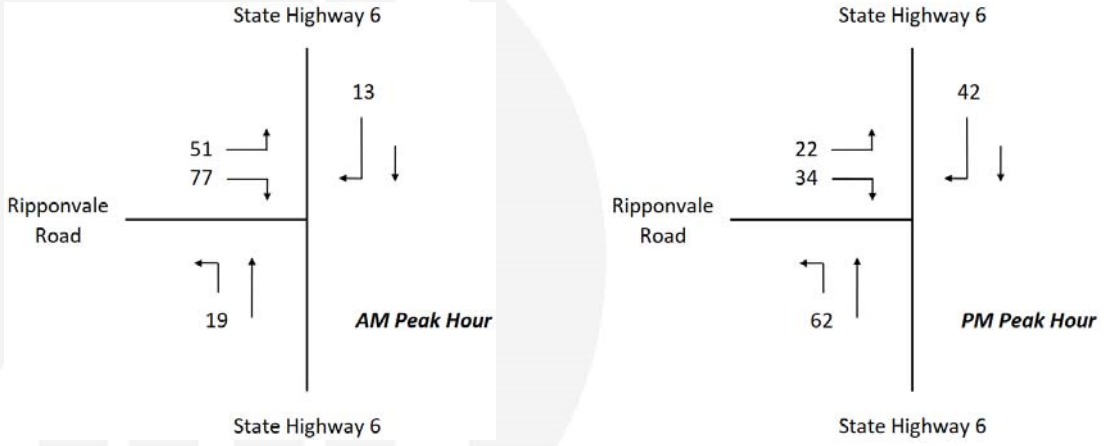

Figure 5: Traffic Distribution of Plan Change (Option 1, All Traffic via the State Highway 6 / Ripponvale Road (east) Intersection)

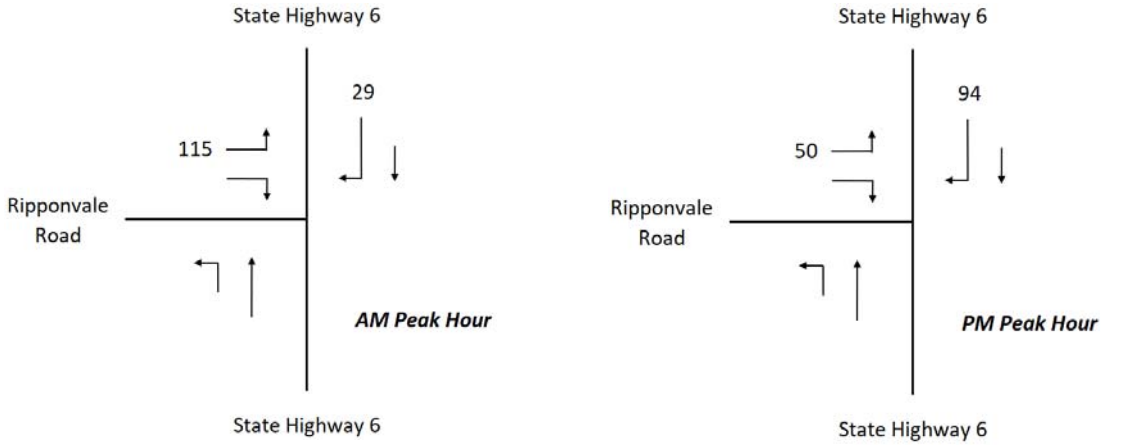

Figure 6: Traffic Distribution of Plan Change (Option 1, All Traffic via the State Highway 6 / Ripponvale Road (east) Intersection)

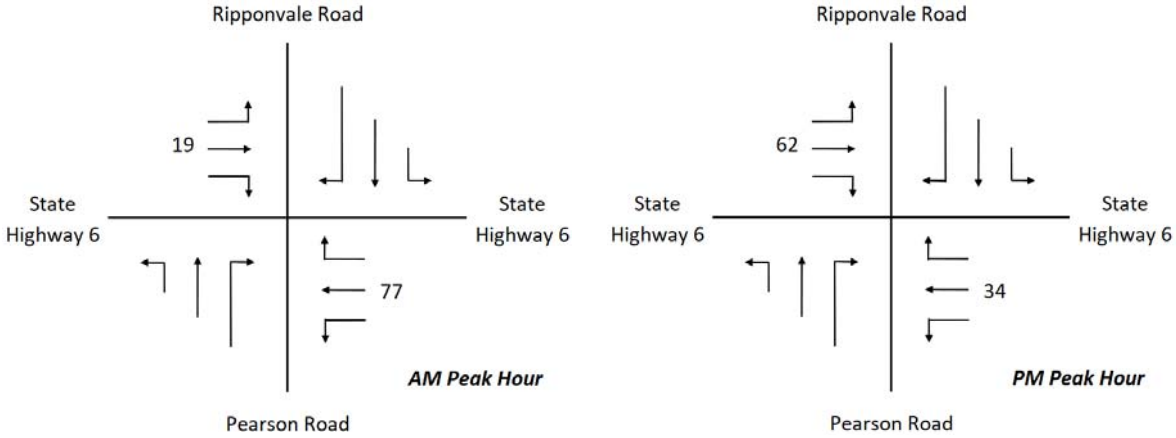

Figure 7: Traffic Distribution of Plan Change (Option 2, Split Between East and West State Highway 6 / Ripponvale Road Intersections)

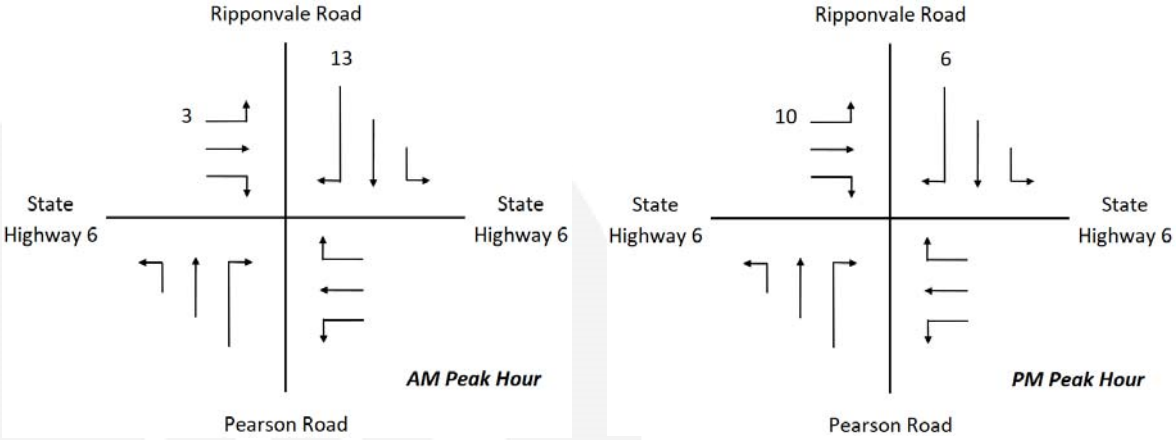

Figure 8: Traffic Distribution of Plan Change (Option 2, Split Between East and West State Highway 6 / Ripponvale Road Intersections)

Assessment of Intersections

As before, we have used the Sidra Intersection computer program to model the performance of the intersections. This has been done with and without development of the plan change area in order to allow for a comparison between the baseline (that is, without the plan change in place) and the proposed (that is, with the plan change in place and fully developed) scenarios.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6	L	8.4	0	A	8.4	0	A
State Highway 6	R	9.1	0	A	10.1	0	B
Ripponvale Road	L	10.1	0	B	12.1	0	B
	R	16.3	0	C	17.8	0	C

Table 1: Performance of State Highway 6 / Ripponvale Road (East) Intersection, Without Plan Change

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6	L	8.5	0	A	8.6	0	A
State Highway 6	R	9.1	0	A	10.3	0	B
Ripponvale Road	L	10.3	0	B	12.3	0	B
	R	19.0	1	C	20.2	1	C

Table 2: Performance of State Highway 6 / Ripponvale Road (East) Intersection, With Plan Change (Option 1 Distribution)

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6	L	8.6	0	A	8.8	0	A
State Highway 6	R	9.1	0	A	10.4	1	B
Ripponvale Road	L	10.5	1	B	12.5	0	B
	R	16.8	0	C	19.6	0	C

Table 3: Performance of State Highway 6 / Ripponvale Road (East) Intersection, With Plan Change (Option 2 Distribution)

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6	L	+0.2	-	-	+0.4	-	-
State Highway 6	R	-	-	-	+0.3	+1	-
Ripponvale Road	L	+0.4	+1	-	+0.4	-	-
	R	+2.7	+1	-	+2.5	+1	-

Table 4: 'Worst Case' Change in Performance under Either Distribution Option at State Highway 6 / Ripponvale Road (East) With and Without Plan Change

The analysis shows that without the plan change, the eastern intersection provides good levels of service and low queues and delays. This situation remains the same with the plan change area fully developed, and the greatest change due to the plan change relates to an increase of 1 queuing vehicle and an extra delay of 2.7 seconds per vehicle.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Pearson Road	L	12.3	0	B	9.5	0	A
	T	18.5	0	C	27.2	0	D
	R	19.4	0	C	28.1	0	D
State Highway 6 (east)	L	8.6	0	A	8.7	0	A
	R	8.4	0	A	11.1	0	B
Ripponvale Road	L	9.0	0	A	14.0	0	B
	T	18.2	0	C	25.8	0	D
	R	19.3	0	C	27.1	0	D
State Highway 6 (west)	L	8.6	0	A	8.5	0	A
	R	10.3	0	B	8.8	0	A

Table 5: Performance of State Highway 6 / Ripponvale Road (West) Intersection, Without Plan Change

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Pearson Road	L	13.6	0	B	9.8	0	A
	T	22.1	0	C	33.3	0	D
	R	23.0	0	C	34.3	0	D
State Highway 6 (east)	L	8.6	0	A	8.7	0	A
	R	8.5	0	A	11.8	0	B
Ripponvale Road	L	9.1	0	A	15.3	0	C
	T	21.6	0	C	31.5	0	D
	R	23.0	0	C	33.0	0	D
State Highway 6 (west)	L	8.6	0	A	8.5	0	A
	R	11.0	0	B	9.0	0	A

Table 6: Performance of State Highway 6 / Ripponvale Road (West) Intersection, With Plan Change (Option 1 Distribution)

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Pearson Road	L	12.3	0	B	9.5	0	A
	T	18.5	0	C	27.2	0	D
	R	19.4	0	C	28.1	0	D
State Highway 6 (east)	L	8.6	0	A	8.7	0	A
	R	8.4	0	A	11.1	0	B
Ripponvale Road	L	9.0	0	A	14.0	0	B
	T	18.7	0	C	26.7	0	D
	R	19.9	0	C	27.9	0	D
	L	8.6	0	A	8.5	0	A

State Highway 6 (west)	R	10.3	0	B	8.8	0	A

Table 7: Performance of State Highway 6 / Ripponvale Road (West) Intersection, With Plan Change (Option 2 Distribution)

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Pearson Road	L	+1.3	-	-	+0.3	-	-
	T	+3.6	-	-	+6.1	-	-
	R	+3.6	-	-	+6.2	-	-
State Highway 6 (east)	L	-	-	-	-	-	-
	R	+0.1	-	-	+0.7	-	-
Ripponvale Road	L	+0.1	-	-	+1.3	-	B to C
	T	+3.4	-	-	+5.7	-	-
	R	+3.7	-	-	+5.9	-	-
State Highway 6 (west)	L	-	-	-	-	-	-
	R	+0.7	-	-	+0.2	-	-

Table 8: 'Worst Case' Change in Performance under Either Distribution Option at State Highway 6 / Ripponvale Road (West) With and Without Plan Change

The analysis shows that without the plan change, the western intersection provides satisfactory levels of service and low queues and delays. This situation remains the same with the plan change area fully developed. The level of service changes for just one approach, queues remain the same, and the greatest change due to the plan change relates to an increase of under 4 seconds.

On the basis of our analysis (which to reiterate, allows for ten years of ambient traffic growth at a high rate of 10.3%), we do not consider that there will be any capacity-related issues which arise at either of these intersections. We also do not consider that there is any case that the intersections are required to be improved from the perspective of capacity.

Road Safety

Reported Crashes

We have previously reported the historic crashes within both the Transportation Assessment and our earlier letter to NZTA. However we have taken the opportunity to review this to ensure that the information is up-to-date and have therefore again used the NZTA Crash Analysis System to identify all crashes in the immediate vicinity. The area assessed was the section of section of State Highway 6 between the two intersections with Ripponvale Road, and including a distance of 100m to the north and west of the intersections. In view of the traffic flows on the road, we have assessed the past five years of crashes.

Between 2015 to the current date, there have been 14 crashes recorded on the highway. From south to north:

- One crash occurred around 50m south of the western Ripponvale Road intersection when a southbound driver lost control and left the highway. It did not result in any injuries;

- One crash occurred at the State Highway 6 / Ripponvale Road (west) intersection when a driver emerged from Pearson Road and was struck by a driver travelling eastbound on the highway. It did not result in any injuries;
- Three crashes occurred 150m east of the State Highway 6 / Ripponvale Road (west) intersection (at or near the driveway to 499 Kawarau Gorge Road):
    - Two crashes occurred when an eastbound driver turned right into a driveway and was struck by a westbound vehicle. One resulted in minor injuries and one did not result in any injuries;
    - One crash occurred when an eastbound driver carried out a u-turn and was struck by a following vehicle. It did not result in any injuries;
- Two crashes occurred 750m east of the State Highway 6 / Ripponvale Road (west) intersection (at or near the driveway to 436 Kawarau Gorge Road):
    - One crash occurred when a westbound driver ran into the rear of another driver that was waiting to turn into the driveway. It did not result in any injuries;
    - One crash occurred when an eastbound driver lost control of their vehicle and left the highway. It did not result in any injuries;
- One crash occurred at the State Highway 6 / Sandflat Road intersection when an eastbound driver left the highway. Driver intoxication was noted to be a factor. It did not result in any injuries;
- One crash occurred at the State Highway 6 / Silverstone Drive intersection when a northbound driver left the highway. It did not result in any injuries;
- One crash occurred at the State Highway 6 / Ord Road intersection when a southbound driver ran into the rear of another driver that was waiting to turn into the minor road. It did not result in any injuries;
- Two crashes occurred at the State Highway 6 / McNulty Road intersection:
    - One crash occurred when a truck turning right into McNulty Road 'cut the corner' and struck a vehicle waiting to turn right onto the highway. It did not result in any injuries;
    - One crash occurred when a driver turned right out of McNulty Road in front of a southbound vehicle on the highway. It did not result in any injuries.
- Two crashes occurred at the State Highway 6 / Ripponvale Road (east) intersection:
    - One crash occurred when a vehicle turned left out of Ripponvale Road and was struck by a northbound vehicle on the highway. It did not result in any injuries;
    - One crash occurred when a southbound driver struck a straying farm animal on the highway.

The crashes occurred in different locations and/or with different causal factors. We therefore remain of the view that there are no existing road safety related issues on this part of the highway network.

The matter of sight distances at the intersections is addressed within our earlier work, but in short, at the eastern intersection they are excellent and at the western intersection they are affected by overgrown vegetation within the highway reserve. If the vegetation was to be removed or cut back, then the sightlines would be appropriate.

Changes due to Increased Traffic Flows

The NZTA Crash Estimation Compendium sets out equations by which the expected number of injury crashes can be found. Using this, we have calculated the crash rates for the existing and proposed levels of traffic:

Scenario	Crash Rate	
	State Highway 6 / Ripponvale Road (east)	State Highway 6 / Ripponvale Road (west)
Existing Traffic Flows, No Plan Change	1 injury crash every 26.1 years	1 injury crash every 6.0 years
Traffic Flows in 10 Years, No Plan Change	1 injury crash every 20.7 years	1 injury crash every 4.2 years
Traffic Flows in 10 Years, with Plan Change, Distribution Option 1	1 injury crash every 7.9 years	1 injury crash every 4.0 years
Traffic Flows in 10 Years, with Plan Change, Distribution Option 2	1 injury crash every 8.2 years	1 injury crash every 3.4 years

Table 9: Expected Number of Injury Crashes

Comparing the eastern and western intersections, we note that the number of crashes forecast at the State Highway 6 / Ripponvale Road (west) intersection without the plan change under the current traffic loadings is higher than at the State Highway 6 / Ripponvale Road (east) intersection with the plan change under future traffic loadings (1 injury crash every 6.0 years compared to 1 injury crash every 7.9 years).

The State Highway 6 / Ripponvale Road (west) intersection appears to be operating satisfactorily at the moment, and we are not aware of any proposals to improve it. This being the case, we do not consider that the plan change proposal triggers the need to implement any improvement measures at the State Highway 6 / Ripponvale Road (east) intersection.

At the State Highway 6 / Ripponvale Road (west) intersection, the change in the number of crashes in future with and without the plan change in place is small. The difference between the two scenarios (that is, with and without the plan change traffic) equates to one additional injury crash every 18 years. We do not consider that this is sufficient to justify any improvement measures at the intersection.

Summary

On the basis of our assessment we consider that:

- Traffic growth on State Highway 6 has been greater than has been used to date within the analysis presented;
- Even allowing for the higher traffic growth and a revised assessment at ten years into the future, the changes in queues, delays and levels of service at the State Highway 6 / Ripponvale Road (east) and State Highway 6 / Ripponvale Road (west) intersections arising from full development of the plan change area are low. Both intersections continue to offer an appropriate level of service under this scenario;
- An assessment of the safety records on the highway and at the the State Highway 6 / Ripponvale Road (east) and State Highway 6 / Ripponvale Road (west) intersections has not identified any common locations or factors that suggest an existing safety issue on the highway;
- Using the crash prediction equations, the number of crashes forecast at the State Highway 6 / Ripponvale Road (west) intersection without the plan change under the current traffic loadings is higher than at the State Highway 6 / Ripponvale Road (east) intersection with the plan change under future traffic loadings. We therefore do consider that the plan change proposal triggers the need to implement any improvement measures at the State Highway 6 / Ripponvale Road (east) intersection.

- The change in the number of crashes at the State Highway 6 / Ripponvale Road (west) intersection with and without the plan change in place is small and equates to one additional injury crash every 18 years. We do not consider that this is sufficient to justify any improvement measures at the intersection.

I trust that this is of assistance, but please do not hesitate to contact me if you require anything further or clarification of any issues.

Kind regards
Carriageway Consulting Limited

Andy Carr
Traffic Engineer | Director

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