Before Independent Commissioners Appointed by the Canterbury Regional Council and Selwyn District Council

In the matter of	The Resource Management Act 1991
And	
In the matter of	Applications by **Fulton Hogan Limited** for all resource consents necessary to establish, operate, maintain and close an aggregate quarry (**Roydon Quarry**) between Curraghs, Dawsons, Maddisons and Jones Road, Templeton

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REBUTTAL EVIDENCE OF ANDREW ALAN METHERELL ON BEHALF OF FULTON HOGAN LIMITED

TRANSPORT

DATED: 21 OCTOBER 2019

Counsel Acting: David Caldwell
Email: david.caldwell@bridgesidechambers.co.nz
Telephone: 64 21 221 4113
P O Box 3180
Christchurch 8013

Introduction

1. My Name is Andrew Alan Metherell. I produced a brief of evidence dated 23 September 2019 ("evidence in chief"), providing an assessment of the transportation effects of the proposed Roydon Quarry.

2. I have reviewed the submitter evidence received on transportation matters and now provide rebuttal evidence to matters raised in the following briefs of evidence:

3. NZ Transport Agency

    (a) Ian Clark (Transport Planning) dated 14 October 2019;

    (b) David Scarlet (Road Safety) dated 14 October 2019; and

    (c) Richard Shaw (Planning) dated 14 October 2019.

4. Christchurch City Council

    (a) Tim Wright (Transport Planning), dated 14 October 2019; and

    (b) Susan Ruston (Planning) dated 14 October 2019.

5. Canterbury District Health Board

    (a) Dr Stephen Chiles (Acoustics) dated 14 October 2019

6. Templeton Residents Association

    (a) Jolene Eagar

7. Martin Flanagan

8. Brackenridge Services Ltd

    (a) Jane Cartwright, dated 14 October 2019

9. NZ Motor Caravan Association Inc

    (a) Richard John Jackett, dated 14 October 2019

10. Yaldhurst Rural Residents Association

    (a) Sara Harnett Kikstra, dated 10 October 2019

Evidence of Ian Clark

11. Positive Features of the Site

(a) I agree with the assessment of Mr Clark at paragraph 6.2 to 6.5 that highlights positive transport features of the site for use as a quarry:

(i) Being close to the intended market;

(ii) Utilising part of the highway network that will be significantly bypassed due to CSM2, and with a major intersection improvement at SH1; and

(iii) Includes an upgrade to the Dawsons Road / Jones Road intersection which currently has a poor crash record.

12. Queue back frequency from Railway to SH1

(a) In discussing the probability of queue back from the railway to SH1, when a train results in a closure of the level crossing, Mr Clark references[1] a sensitivity test that was requested by NZTA during its ongoing model review following preparation of my evidence. The sensitivity test related to the modelled representation of Dawsons Road, and how "attractive" it will be after NZTA complete its roundabout at SH1.

(b) In my opinion the modelling methods adopted to inform my evidence in chief appropriately reflect how the transport network will change in use and function, following the installation of the SH1 roundabout at Dawsons Road, and how current impediments to its use will change. I consider less weight should be placed on the sensitivity test results provided to NZTA, even though they show a reduced volume using Dawsons Road and a consequential substantial reduction in queuing at the railway without and with the quarry. The traffic volume and queue back from the railway that I have presented is a conservative forecast and such queuing could be less.

(c) In providing Mr Clark with the sensitivity results in the form of Table 2 of my evidence in chief I included a correction to that table (which is transparently identified, and included in Table 3-1 of Mr Clark's evidence). This correction is shown in Table 1 below. The correction results in lesser queue back for both the "do-minimum" and "with-quarry" scenarios. The queue back is still identified to occur on

[1] Mr Clark, paragraph 5.7.

occasion both without and with the quarry, and the level of change in probability is similar to that originally reported.

Peak Period	Scenario	Estimated Probability of Occurrence of Queue Length Greater than 50m	
		Evidence-in-chief (Table 2)	Corrected Assessment
AM	Do Min	43%	30%
	Median Quarry Day	41%	34%
	Max Quarry Day	59%	49%
IP	Do Min	8%	4%
	Median Quarry Day	29%	17%
	Max Quarry Day	43%	36%
PM	Do Min	14%	9%
	Median Quarry Day	32%	21%
	Max Quarry Day	25%	17%

Table 1: Corrected Queue Probability Analysis – Dawsons Road South Approach to Railway during Level Crossing Closure

(d) At Paragraph 5.9.3, Mr Clark notes an unusual pattern in the PM peak level crossing queue back results, where the maximum quarry day has lower probability of queue back than the median quarry day. This was explained in communications with Mr Clark as part of his firm's peer review of the model. In the 'maximum day' quarry scenario there are a few more individual instances of queues forming in the PM peak across the set of simulated transport model runs. Most of the additional queue instances fall in the 40-50m queue length bracket, and as such the percentage which are greater than 50m decreases compared to the median day scenario. The mildly higher volume of quarry traffic and more occurrences of queues/delays may have resulted in less background traffic routeing via the Dawsons Rd link and so there is a reduced number of longer-length queues forming (longer length queues being a combination of both Quarry and other traffic).

(e) I agree with the summary that the frequency of queue back from a rail level crossing closure to the State Highway will be low[2], both without and with the quarry.

[2] Ian Clark, para 6.5.

13. Queue Back Safety Effect

(a) I disagree with Mr Clark's assessment of the consequences[3] of occasional queuing at the Main South Road / Dawsons Road roundabout. Mr Clark has termed the queuing "unexpected" with the consequence being "quite significant". In my evidence I set out that the roundabout - with or without the quarry - will operate with a level of queuing on all approaches, such that drivers will approach with an expectation of stopping ahead or queueing. I also describe how a roundabout is inherently a slower-speed, safe-system traffic-control device. By its nature of slowing traffic, and based on my review of crashes at roundabouts elsewhere in the greater Christchurch area, where queuing occurs I consider they will not lead to "significant" safety concerns.

14. Queue Back Mitigation

(a) Mr Clark then sets out (also at paragraph 6.5) a recommendation that mitigation to address this issue is explored with KiwiRail. As set out in the ITA those measures were canvassed and included in the Level Crossing Safety Impact Assessment[4] (**LCSIA**). In my discussions with the KiwiRail engineer approving the LCSIA, there was endorsement by KiwiRail of the LCSIA recommendation for monitoring and mitigation involving a vehicle activated queue warning system.[5] Concerns were raised by KiwiRail around the practicality of a train activated queue warning system, following issues they have had at other sites, in addition to the design resource required by KiwiRail to implement the solution. I consider a queue activated solution is more appropriate in this case as the queue back will not occur at every closure, and with the distance between the crossing and roundabout an appropriate warning detection can be achieved.

15. Responsibility for Mitigation

(a) At paragraph 6.5, Mr Clark has suggested that it will be the Applicant's responsibility to establish the mitigation measures. Given my assessment of low frequency of queue back and low risk of safety concerns, I prefer an approach that monitors traffic conditions, and

[3] Ian Clark, para 6.5.
[4] Appended to RFI response.
[5] The Traffic Control Devices Manual, Part 9 Level Crossings, Section 4.4.11 advises "active advance warning signs should be activated by queue detection rather than on-rail detection systems".

implements a vehicle queue warning system if it is demonstrated to be required.

(b) My analysis shows an increased probability of queue back to the roundabout with the Quarry, although there will be occasions queue back to the roundabout will occur without the Quarry. On that basis the Quarry isn't generating such a change that it solely generates the need for monitoring and consideration of mitigation.

(c) Because this is not solely a Quarry issue, I consider it would be appropriate for NZTA to monitor queues and the effects arising from them after construction of the roundabout and prior to the Quarry opening. Fulton Hogan could then monitor the effect of Quarry traffic on the queues and consequences. This could then inform the extent to which there is shared responsibility for any mitigation required as a result of the Quarry opening, such as implementation of an early queue warning system if warranted.

Evidence of David Scarlet

16. At paragraph 5.3 Mr Scarlet states that the design of the roundabout took into account the adjacent level crossing.

17. Whilst I do not dispute that the railway crossing would have been taken into account, I have not identified any publicly available documentation that indicates the railway level crossing closures have been of any concern for NZTA from a safety perspective. It was not mentioned as a safety concern in the safety audit assessments carried out for the CSM2 scheme at the NOR stage. It appears the concern has only been raised once the quarry Application has been made, even though the analysis indicates there is a likelihood of queue back occurring without the Quarry.

18. At paragraph 6.2 Mr Scarlet notes that two long truck and trailers could use up the available queue space. This is an overly simplistic approach and does not assess the likely occurrence of that situation. The microsimulation analysis has addressed this more thoroughly by accounting for the proportion of long vehicles generated by the quarry, the variability in arrival patterns of those long vehicles and other traffic, the variability in train lengths and time of arrivals, and the changes in traffic patterns over time. It is on that basis that the queue probability statistics associated with the level crossing closure have been generated.

19. Whilst I agree with Mr Scarlett at paragraph 6.3 that there is an increased risk of the queue length exceeding the stacking space available, I do not consider an opinion on the level of effect the Quarry can be formed without acknowledging the level of queue back risk that exists without the Quarry. As I set out in my evidence[6] it is my opinion that the change in queueing associated with railway closures would have no more than a minor effect on the safety of the roundabout, and any change in safety performance will be difficult to deduce.

20. At paragraph 7.2 and 7.3 Mr Scarlett notes that vehicles could be stopped in the circulating lanes of the roundabout, or increased queuing on the highway with a risk of collisions. There is no supporting assessment of the frequency or severity of such collisions. However, I addressed this in my evidence in chief at paragraphs 123 to 133. The intersection will be a high volume intersection where vehicles need to approach with the expectation of stopping at any time. Queues will regularly be generated at all times regardless of the quarry or railway level crossing queue back. The simulation analysis indicates railway crossing queue lengths would not lead to long tailbacks on the state highway, and any queue generated by the railway crossing is of a short duration. Based on the assessment of crash types, I would anticipate that any collisions which do occur within the circulating carriageway of a roundabout are likely to be of low severity.

21. I consider the change in potential rear end collisions with such an infrequent queue back would be very small. Rear end crashes at roundabouts are also recognised as being the lowest severity type of crash compared to all other crash types.[7]

22. At paragraph 8.1, Mr Scarlett supports a possible mitigation measure such as electronic signs to warn drivers to not enter the roundabout when the level crossing is closed to traffic. Such a measure was installed at a roundabout on SH1 at Spring Creek near Blenheim, where the railway was immediately adjacent to the roundabout at Spring Creek. I understand[8] vehicles stop and are requested to pull to the side on the approach to the roundabout. In my discussions with KiwiRail when they were considering the LCSIA, I understand they were at that time considering removing such signs as they were overly complex for the potential issue that existed, and can lead to other

[6] Evidence in Chief, para 122-133.
[7] NZTA High Risk Intersection Guide July 2013, Table A3-11.
[8] During my visit to that site the signs were not activated.

issues. This is why I support a more conventional vehicle activated queue warning system if mitigation is required.

Evidence of Richard Shaw

23. At paragraph 6.4 Mr Shaw notes that the modelling shows an increased probability of queuing into the SH1 intersection when a train results in a level crossing closure at Dawsons Road. I reiterate the point that the modelling also forecasts queue back to the roundabout without the quarry, and that it does not cause it,[9] it just leads to a potential increase in frequency.

24. At paragraph 6.5 Mr Shaw states, and I agree, that vehicles will slow significantly as they approach and pass through the roundabout. Mr Shaw notes that "it will not be uncommon for queuing[10] to occur". That is also the case without the quarry. When considered against the background of normal queuing that is forecast to occur at the roundabout, which is almost all the time, the cumulative effect is negligible.

The modelled outputs show typical queues[11] as follows on each of the approaches:

Scenario	Approach	AM	IP	PM
Do Minimum - Without Quarry	Dawsons	37	8	29
	SH1 (east)	11	10	21
	Waterholes	39	12	20
	SH1 (west)	35	9	13
With Development (median day)	Dawsons	40	10	29
	SH1 (east)	11	14	22
	Waterholes	44	14	21
	SH1 (west)	39	10	14
With Development (max day)	Dawsons	45	12	29
	SH1 (east)	14	13	23
	Waterholes	44	16	22
	SH1 (west)	41	11	15

Table 2: SH1/ Dawsons Road Roundabout: 2028 Queue Lengths (metres)

25. At paragraph 6.5 Mr Shaw also discusses the 80km/h speed environment on SH1. Approach speed is a key input to the design of a roundabout. On my review of the design of the roundabout[12], it has taken account of the wider 80km/h approach speed through features such as longer central islands,

[9] As inferred by Mr Shaw at para 6.2 and 6.3
[10] In relation to the railway crossing.
[11] For the roundabout statistics, the maximum queue is recorded every 2 minutes, and the statistic reported is the average of these maximums over the modelled period. That is the standard measure of queuing from a simulation model.
[12] Evidence in Chief, para 127.

entry curvature designed for the speed reduction desired, and overall roundabout diameter size. These contribute to drivers slowing to a speed where stopping at short notice to give way to other vehicles is achievable. It is a speed that where, on any occasion that a vehicle collision did occur, it will be of low severity (usually non-injury), thus supporting the safe system approach.

26. At paragraph 6.6 Mr Shaw comments that the Agency is likely to have considered an alternative formation arrangement for the intersection. I understand that the rationale for the intersection type was largely to provide a safe system intersection to support access to and across the highway,[13] changes in the speed environment, and U-turns for local access. In my opinion, the intersection form will still achieve these objectives with the operation of the quarry. As I have set out in my evidence, intersections of this type carry overall low safety risk for the volume of traffic being carried.

27. Dawsons Road and Waterholes Road were classified as arterial roads at the time of the CSM2 NOR,[14] and still carry that classification. Increases in movement along Dawsons Road could have been contemplated as transport patterns change. As I set out earlier, one of the contributing factors to the issue now being raised is that the SH1 roundabout has been made bigger between scheme and detailed design, further reducing the separation to the railway. In my opinion, NZTA must have contemplated the increased potential for at least some infrequent queue back.

28. At paragraph 7.1 and 7.2, Mr Shaw provides an assessment of effects. There is no supporting assessment in the evidence of NZTA that Mr Shaw relies on relating to the change in safety risk between the situation without the quarry, and the situation with the quarry. I have set out in my evidence[15] my assessment of the change in risk based on the modelling outcomes and crash risk.

29. At paragraph 8.4 Mr Shaw notes the potential to have a *significant adverse effect on the safe operation of the state highway network*. It is not clear how Mr Shaw has deduced a significant adverse effect will arise, which appears to be a higher level of effect than assessed by Mr Scarlet.[16]

[13] Technical Report 1, NZTA CSM2 & MSRFL Design Philosophy Statement, Nov 2012.
[14] The classification changed in SDC Plan Change 12 made operative 29 April 2013, the NOR Decision was 8 November 2013.
[15] Evidence in Chief, para 104-107, 122-133.
[16] Paragraph 9.2.

30. At paragraph 9.4 Mr Shaw recommends the Applicant investigates the feasibility of a Variable Message Sign on three approaches to the roundabout. As I discussed earlier, we have previously been advised by KiwiRail (through the LCSIA process) against such a treatment because of the additional complexity it creates. In my assessment, a simpler form of warning treatment would be most appropriate, if any is required, to mitigate any potential effects of the development. A larger scale mitigation as suggested by Mr Shaw would, in my opinion, be of the kind NZTA might implement in recognition that the modelling indicates queue back and the type of risk they are concerned with occurs with or without the quarry.

31. Lastly, whilst the evidence of Mr Shaw (and Mr Scarlet) is confined to the direct impact on SH1, at no point do either of them acknowledge the positive benefits of the proposal to overall crash risk in the immediate vicinity of the highway. Some of those benefits relate directly to how queues discharge from the railway level crossing which can influence the duration a queue will be formed on Dawsons Road. The Applicant's proposed improvements at Jones Road / Dawsons Road will address many of the safety concerns that would remain after the NZTA funded interim improvements are carried out at the intersection. In my opinion those improvements will significantly reduce crash risk[17] at a known serious crash site, which is on the classified arterial road network. Given the existing and sustained poor safety record, I consider this a significant benefit and am surprised it has not been given much consideration by NZTA witnesses.

Evidence of Tim Wright

32. At paragraph 3.2 Mr Wright supports the modelling approach taken in my evidence, being more detailed for assessment of the issues raised through submissions. I agree and given the changes in traffic patterns now forecast by the traffic models, I consider it is appropriate to place emphasis on results from that model. However, throughout his evidence Mr Wright then reverts back to the superseded analysis and modelling methods.

33. At paragraph 5.7 to 5.9 Mr Wright discusses his observations[18] at the Pound Road quarry. As described in the ITA, I have undertaken an analysis of the Pound Road traffic patterns to inform the hourly pattern of movement at the Roydon Quarry based on the traffic generation constraints that will be

[17] Evidence in Chief, para 106.
[18] It is not clear whether the observation was all vehicles, or heavy vehicles only.

imposed through the conditions of consent. In that respect it was not intended to assess a maximum observed at Pound Road.

34. The conditions of consent will limit the volume of traffic that can be generated by the quarry on any one day, as well as over a longer period. Together with the potential for some low level of activity beyond the normal operating hours observed at the Pound Road quarry, I consider the assessed traffic generation at an hourly level is representative of what could be expected if the consent is approved subject to the traffic generation conditions proposed.

35. At paragraph 5.12 Mr Wright notes that the modelling methodology is realistic, but requires accurate modelling. The model extent has specifically been developed to retain the overall forecast of traffic within the cordoned area, such that there is no wider area reassignment (such as between Rolleston and Christchurch). Local level route choice is determined by the network configuration and traffic conditions and this is standard practice with a calibrated transport model.

36. At paragraph 5.14 Mr Wright queries whether the model has been peer reviewed. The model was initially developed to respond to NZTA's concerns and the model and model development report was provided to NZTA staff/consultants for peer review. I understand Mr Clark's firm (Flow Transportation Specialists) has peer reviewed the model and documentation. Based on correspondence with them and the subsequent receipt of Mr Clark's evidence, I understand they are comfortable with the model for the purpose it is being used. Based on the correspondence provided, I understand that they have reviewed the approach to model coding, parameters and settings used, development of base year traffic demands, the base year calibration and validation achieved, and the method used to develop future forecasts in the "Do-minimum" and "with-development" scenarios.

37. One area of particular discussion relates to a change in the model parameter for driver perception of the future transport network, and the impact of that is documented in the evidence of Mr Clark.

38. In addition, Fulton Hogan engaged Mr Tim Kelly to undertake a review of my work and evidence in chief in order to satisfy Fulton Hogan and its advisors the issue of safety was being appropriately addressed. When Mr Kelly was engaged, NZTA had not engaged Mr Clark. As such, Mr Kelly fulfilled the

role of a reviewer at that time. His review was at a higher level, and I understand he supports the modelling methods adopted.[19]

39. At paragraph 6.3 Mr Wright comments that the movement from the quarry access to the south could be sensitive to changes in traffic. The delay modelled in the ITA primarily relates to a very conservative assessment of truck driver gap acceptance, with different gap acceptance applied for different sizes of trucks. At very low volumes of turning volumes, where the proportion of larger trucks to smaller trucks can vary with just a change in 1 vehicle, modelled results can be skewed by the type of truck input. In practice, the very low volumes of right turning traffic trucks will arrive at the stop line independently of other trucks, such that there would not be a relationship between the volume arriving and the delay observed. Any change in delay due to increasing right-turn-out traffic would barely be perceptible.

40. At Paragraph 7.6, Mr Wright notes that the "without development" model in the ITA did not exceed the available space throughout the day. Importantly, the analysis method allowed traffic to discharge from the queue without being impeded by any downstream effects. As I have set out in my evidence, one of the issues that impacts the queue discharge in the "Do-minimum" scenario is the downstream stop line on Dawsons Road at the Jones Road intersection. It has been determined that the modelling in the ITA for the "without quarry" scenario was unable to represent the downstream effect of a pulse of exiting traffic after a level crossing closure. With the quarry, the separation to the new Dawsons Road / Jones Road roundabout affords greater discharge capacity. In that respect, the detailed micro-simulation assessment undertaken for evidence is able to better address the change in queueing and effect.

41. The project model assessment in Section 7 of Annexure B of my evidence is based on variable train lengths, as will occur in reality. The simulation allows for both long and short trains, not an "average" train length as assumed by Mr Wright (paragraph 7.8).

42. As noted above, I determined that for assessing the differences in queuing back from the railway, the nature of the discharge capacity at the end of the railway closure is important. For the "Do-minimum" scenario, the use of

[19] Mr Kelly, para 14-16.

SIDRA Intersection software[20] cannot represent that downstream constraint presented by the stop line almost immediately north of the railway. This was a consideration in carrying out the more detailed assessment in micro-simulation which provides for dynamic interactions between intersections. On that basis, any SIDRA Intersection analysis of queuing by Mr Wright comparing the quarry scenario to the "Do-minimum"[21] scenario will lead to an over-estimate of the Quarry effects. It also appears that Mr Wright has only focused on the effect under the busiest quarry day scenario, rather than a median day. As I have set out in evidence[22] that is a particularly conservative approach.

43. At paragraph 7.16 Mr Wright agrees that a queue warning system would be appropriate for mitigating the safety risk at SH1, but suggests imposition as a requirement of consent, rather than following monitoring. As I have set out elsewhere,[23] I prefer a monitoring approach.

44. Mr Wright also comments on the potential of a railway detected queue warning system. The modelling suggests queuing will build up over the period of the level crossing closure, rather than in seconds. Even at the maximum day with an average of approximately one truck per minute towards the quarry, after allowance for differing vehicle sizes, the low frequency of the queue back, the many hours of the week when there will be no or negligible levels of railway queueing, I consider it more appropriate to implement a queue-based detection system.

45. I envisage suitable detection points could be set back from the railway, and the warning signal say approximately 120m[24] before the roundabout. That allows for the warning to only be activated on those occasions there is a higher likelihood of queuing, and in a position where it will be most effective. More sophisticated methods such as multiple detection points could also be contemplated so that the time since the start of the queue could be accounted for if deemed necessary.

46. At paragraph 8.2 Mr Wright asserts that the proposal has significant potential effects when discussing proximity of the railway line and Jones Road with its short stacking distance. In my opinion, there is not a potential effect as the proposal will avoid such an outcome by implementing an intersection solution

[20] A commonly used intersection analysis software, intended for use with standard isolated intersections.
[21] Mr Wright, para 7.14.
[22] Evidence in chief, para 66-67.
[23] Evidence in chief, para 136, 151, 170.
[24] NZTA Traffic Control Devices Manual, Part 1 General Requirements, Table 7.1.

that transforms the Jones Road / Dawsons Road intersection location to address the existing crash risk.

47. At paragraph 8.3 Mr Wright says the changes in intersection configuration "should provide safety benefits". Within my evidence[25] I calculated that the proposed transformational changes could reduce the injury crashes from a forecast rate of approximately 0.96 injury crashes per year to between 0.07 and 0.09 crashes per year, after the inclusion of the quarry traffic. Recognising the high prevalence of serious injury crashes that have occurred, I consider this a significant safety benefit to all road users and addresses a problem intersection that does not appear to be a focus of the road controlling authorities.

48. At paragraph 8.5 Mr Wright indicates a preference for Option 2[26] and sets out some rationale for that. I consider both options address the mitigation requirements of the proposed quarry traffic generation, both provide safety benefits to the community, and both support the effective functioning of the transport network. I understood that the Selwyn District Council have indicated a slight preference for Option 1[27] from a transport perspective, being a typical roundabout similar to what is being constructed at Jones Road / Weedons Ross Road (albeit with more separation to the railway than is proposed at that intersection). The LCSIA approved by KiwiRail also identified a slight preference for Option 1 on a railway safety basis. Whilst the road hierarchy supports Option 2, the relative existing use of Jones Road and Dawsons Road indicates merits in Option 1. I support both options so a condition of consent could, in my view, appropriately allow for implementation of either one.

49. At paragraph 9.2 Mr Wright comments on queue back on Dawsons Road from the SH1 roundabout. I agree that queuing from SH1 did not present as any concern in the ITA analysis.

50. At paragraph 9.3 Mr Wright provides a screenshot of a maximum queue measured over numerous model runs. As noted by Mr Wright, it was not intended to represent anything other than how a queue is measured.

51. The more recent modelling based on updated land use and traffic forecasts indicates the SH1 roundabout is likely to carry higher traffic volumes overall

[25] Evidence in chief Table 1.
[26] A three arm roundabout on Jones Road west and Dawsons Road, and a priority tee intersection at Jones Road (east) / Dawsons Road.
[27] A four arm roundabout at Jones Road / Dawsons Road.

in the peak periods, and movement from the north at the roundabout from the likes of Templeton will be attractive particularly in the AM peak period because it avoids turning at the sign controlled cross road of SH1 / Kirk Road, and provides access to SH1.

52. In the without and with quarry analysis (under the busiest day scenario), the queue from the roundabout is predicted to occasionally extend back to the railway in the morning peak period. In the inter peak and evening peak periods queuing will be contained within the available storage space. Changes in queueing set out in Table 2 are very small. The controls in this case include barriers at the crossing physically stopping vehicles crossing the railway when a train is approaching, and the roundabout generated queue is dynamic such that queues dissipate as vehicles enter the traffic stream at the roundabout.

53. In my opinion the effect of the quarry reduces any safety concern because with the Do-minimum, in the circumstance of any queues nearing the railway there is more complex decision making by those drivers on Jones Road, or the north side of the Jones Road / Dawsons Road intersection where they have to queue in a vulnerable position on the through road. With the proposed roundabout and change in intersection priorities, the decision making is much simpler, and there is less impetus for vehicles north of the railway to clear that area. I note that in the northbound direction, the quarry mitigation proposal also reduces the safety concern as vehicles on the downstream side can more easily exit the area of vulnerability.

54. Whilst it was not a matter that I considered required mitigation, as suggested by Mr Wright at paragraph 9.11, a possible option the road controlling authorities could consider to address the potential issue in the Do-minimum would be to ensure during construction of the CSM2 roundabout the shoulder on the southeast side of the intersection is wide enough to allow a vehicle to shift to the left of any stationary queuing vehicles.

55. I agree with the assessment by Mr Wright at 10.8 that the likelihood of quarry vehicles travelling through Templeton on Jones Road is low.

56. Mr Wright at Paragraph 11.3 discusses the design for the pedestrian / cyclist refuge. Firstly, this is not a Major Cycleway, but will form an extension to the Southern Express route which terminates at Templeton. Secondly, it appears Mr Wright has misinterpreted the plan label showing a “1.5m wide crossing” as being the depth of the crossing. By scaling from the plans, the

depth shown is 2m, which is a standard refuge width for accommodating a bicycle. This crossing is being designed and constructed by NZTA, and I would expect it is providing the refuge area to the standards required for the facility and location. Any issues with width would be addressed through the NZTA design review and audit processes. I do not consider specific mention of this is necessary in conditions as suggested by Mr Wright at 12.6, as the requirements should be the same with or without the quarry.

57. For reasons set out earlier, and in my evidence in chief, I do not support the suggestions set out by Mr Wright at Paragraph 12.6 that:

    (a) The condition of consent number 15 should be specific to Option 2 only for the roundabout. I consider a flexible approach is warranted, although I accept based on the current CCC position Option 2 may be the solution that is ultimately implemented.

    (b) The new condition relating to the imposition of the electronic warning system at any time, and at the expense of the consent holder. The analysis demonstrates that if there is a likelihood of occasional queueing, there will also be queuing likely to occur without the quarry. The requirement should follow appropriate monitoring and recommendations by a suitably qualified independent traffic engineer, taking into consideration the relative contribution of quarry and non-quarry traffic to queuing.

Evidence of Susan Ruston

58. At Paragraph 8.11 Ms Ruston advises her understanding, based on the evidence of Mr Carr, that the consequence of a collision at the SH1 / Dawsons Road intersection could include serious harm or fatality. In my evidence I have explained why I do not agree with that assessment. I have based my assessment on the design characteristics of the roundabout, a review of typical roundabout crash rates and crash types, the low frequency of rail crossing generated queue events in comparison to regular queuing at the roundabout in normal operating conditions, consideration of the specific vehicle conflicts that may be introduced to the roundabout, and review of actual crash records for roundabouts in the Christchurch area.

59. In her assessment of effects, including roundabout options, Ms Ruston has not referenced any of the safety analysis in my evidence. That analysis identifies that the improvements proposed by Fulton Hogan significantly

reduce a serious existing safety issue in the transport network. When considered in the whole, taking account of the safety of the SH1 roundabout, railway crossing, and Jones Road / Dawsons Road intersection, I consider there will be a substantial overall safety improvement with the quarry as compared to the "without quarry" scenario.

60. I have addressed the matter of queue back from the roundabout in responding to the evidence of Mr Wright. This will occur without or with the quarry in the morning peak, and the proposed mitigation measures improve the overall safety of queuing. I also disagree with the concerns regarding cycle crossing of Dawsons Road, noting that it is of a standard depth for a cycle refuge, and the complexity of the area is reduced with the quarry mitigation at Jones Road / Dawsons Road.

61. I am surprised that the Head of Parks for Christchurch City Council has, in the letter to QTP appended to the evidence,[28] so readily discounted a transport improvement option that is a standard treatment to mitigate serious and potentially fatal injuries that occur within the existing transport network, and is supported by other transport authorities. In preparing their development plan for their adjoining land, I would have anticipated they would want to ensure all options for improving the transport network safety are enabled, noting sports parks can also be high trip generators and would likely add to traffic using the intersection.

Statement by KiwiRail

62. KiwiRail has provided a letter to the Hearings Panel (dated 16 October 2019). It states that the proposed new roundabout options were supported in the LCSIA approval.

63. The LCSIA - in discussing treatment options for potential queue back - recommended a vehicle activated queue warning system. As I discussed earlier, concerns were raised by KiwiRail around potential mitigation involving a rail activated warning system. In my opinion queue warning signs activated by detection loops located back from the railway crossing vehicle limit line would be appropriate.

64. I note that some of the LCSIA recommendations would apply regardless of the quarry, given the "change in use" associated with the NZTA roundabout. As highlighted in the letter, *"Safe road network operations at or near level*

[28] Ms Ruston, Annexure 3.

crossings are a shared issue". My assessment has identified matters that NZTA and/or the road controlling authorities should be considering at this point in time as part of the CSM2 design and construction, such as mitigating queue back risk which is modelled to exist regardless. This is a shared issue and would lessen the need for a private company to monitor and potentially rectify issues created by the infrastructure design of the transport network owners/operators.

Evidence of Dr Stephen Chiles

65. Strategic Location

(a) Dr Chiles at paragraph 24 states that a positive feature of this site compared to some other quarries is the proximity to State Highway 1 (SH1), allowing trucks to quickly access a core section of the existing road network. Whilst the statement is in the context of noise effects, I agree[29] that the location is supportive of effective use of the road hierarchy, and also contributes to achieving safe and efficient movement.

66. Suggested Restrictions on Use of the Road Network

(a) At paragraph 16, on the basis of addressing noise effects, Mr Chiles makes the following recommendations:

(i) all trucks should be required to access the quarry via SH1 at Dawsons Road at all times; and

(ii) the road between SH1 and the site should be upgraded to minimise noise.

(b) As set out in my evidence, the change in traffic volumes on local roads due to quarry traffic (except for movement to and from SH1 via Jones Road and Dawsons Road) is small compared to existing use of the local roads by heavy vehicles. I do not agree with Dr Chiles[30] that the predicted use of local roads by quarry trucks will lead to a notable change in truck patterns. This was addressed in the ITA at section 15 and 16.

(c) Whilst the primary route for quarry traffic will be Jones Road and Dawsons Road to SH1, the low level use of the existing roads

[29] Evidence in chief, paragraph 165.
[30] Dr Chiles, paragraph 26.

contributes to overall efficient use of the transport network infrastructure. From a road safety and efficiency perspective I do not consider it necessary to require all traffic to use the primary route to SH1. I understand that is also the position of the Council reporting officer Mr Carr.[31]

67. Noise from Road Defects

(a) Local roads are subject to Council asset management planning processes,[32] with contracted maintenance monitoring and implementation programmes. Defect repairs are made over time in accordance with priorities.

(b) In that respect, whilst the overall road formation on surrounding local roads is unlikely to be upgraded in the near term, unless otherwise programmed for widening, I consider it appropriate for assessment purposes to anticipate the defects observed by Mr Chiles[33] to be addressed as part of maintenance programmes. On the local road network surrounding the site, the current construction of CSM2 will be contributing to some deferral of maintenance until the completion of that project. I consider it reasonable to anticipate a return to typical maintained conditions for the rural local road network.

68. Impact of Route Restrictions

(a) At paragraph 28 Mr Chiles considers a route limitation should be imposed for noise related reasons. This would lead to an increase in overall vehicle travel. In most cases, such as for movement to and from Rolleston and West Melton this is not material, as the SH1 route is similar in distance and time. The requirement would, however, not be logical for areas being serviced within the rural areas north of, and including Jones Road bound by Weedons Ross Road and Hasketts Road. Use of rural local roads for local access is intended by the rural road hierarchy.

(b) Mr Carr has also noted[34] that roads in the vicinity have been identified as recommended for being reclassified as Collector Roads through the District Plan Review, with Dawsons Road retaining its existing Arterial

[31] S42A report, Report by Mr Carr, para 81.
[32] Set out in the Selwyn District Council Transportation Activity Management Plan.
[33] Chiles, para 27.
[34] Mr Carr, para 17.

Road function. This is to represent their existing[35] and future function for connecting areas in the rural road network, and are determined without consideration of the quarry. The limitation suggested by Dr Chiles would be inconsistent with the existing rural road use in the area.

(c) CDHB have not provided an assessment of the transport effects of the recommendation to further limit movement on parts of the transport network. However, I note the concerns raised by Mr Carr, NZTA and CCC about the impact on vehicle queuing in the vicinity of the railway. A further shift in movements onto that route will lead to a small increase in the probability of queuing when the railway barriers are closed.

69. Monitoring

(a) Mr Chiles[36] has recommended automatic number plate matching as a method for constant verification of transport routes. I understand some technologies exist, however, in my opinion the monitoring approach would be complex and require several automatic number plate recognition cameras, filtering out a high volume of non-quarry traffic. Given the assessments undertaken, I consider it is more appropriate for a site such as this any monitoring required utilises conventional methods. I prefer the approach to monitoring set out in my evidence,[37] and as suggested by Mr Carr.

70. Design of Road Improvements

(a) At paragraph 31 Mr Chiles recommends further controls on the use of the access route to SH1. I consider the road access improvements would lead to a largely slow speed environment, due to the proximity of the access to the proposed roundabout at Dawsons Road / Jones Road. The alignment of Jones Road also supports progressive slowing down by all vehicles with an entry curve prior to the roundabout. The intersection and access changes will also require much of the rural road surface used by access to the quarry to be resurfaced. I would expect these will be to a standard typical of a rural area to address pavement performance requirements, and road safety.

[35] As shown in Figure A-2 of my evidence in chief, these roads carry an ONRC collector road (or for part of Jones Road an arterial) status for their existing function.
[36] Dr Chiles, para 29.
[37] Evidence in chief, para 160.

Evidence of Jolene Eager

71. Ms Eagar at paragraph 77a recommends that there should be a *"complete prohibition on use of local roads by quarry trucks (i.e. all quarry trucks to utilise SH1 via Jones Road between the proposed quarry access and Dawsons Road)."*

72. The quarry is in a rural environment, accessed by a rural road, which already carries volumes typical of a Collector Road. The assessments undertaken show that the change in heavy vehicle traffic volumes on local roads (aside for the section with access to Dawsons Road) is low, as logically they only service lower demand areas. From a transportation effects perspective, I have not established the need for such a restriction. Instead, I support the provisions already included in the Transport Routing Management Plan, and conditions of consent proposed by the Applicant.

Evidence of Martin Flanagan

73. Mr Flanagan at page 2 queries the road classifications. I confirm that Dawsons Road is an arterial road in the Selwyn District Plan and Christchurch City District Plan, and also noted the existing ONRC classification of Secondary Collector Road.

74. The ONRC reflects existing function as at 2013, which includes for some heavy vehicle movement. The District Plan classification represents a combination of existing and intended use of the road. In this case, the classification clearly relates to future use as an orbital route linking from SH73 through to SH1, and on to Shands Road near Prebbleton. I understand the Arterial classification reflects the changes in the road network occurring associated with CSM2, which with the roundabout at SH1 will undoubtedly change traffic patterns to some extent.

75. From a transport perspective, I consider that Dawsons Road can accommodate the small number of heavy vehicle movements forecast, and its use by increasing vehicles has been long anticipated through its District Plan classification.

76. Mr Flanagan raises concerns with the effectiveness of a Transport Management and Routing Plan. From both the original ITA assessment, and my more recent detailed microsimulation analysis, I consider the Plan will support what are, in my opinion, logical routes for trucks anyway. The Plan is founded on implementation of straight forward route restrictions. I

understand Fulton Hogan is aware of the need to ensure compliance. As I set out in my evidence, I consider the transport network can safely and efficiently accommodate some additional heavy vehicle movement. Any infrequent non-compliance (which would lead to responses from Fulton Hogan) would have negligible transport effects at the time, given the level of background traffic volume on Jones Road.

Evidence of Jane Cartwright

77. At paragraph 25 Ms Cartwright raises concerns with heavy vehicle movements along Maddisons Road and Kirk Road. The transport modelling has not identified the use of those roads as being logical routes for day to day travel. The 16 August 2019 RFI response by Stantec addressed a scenario by the Selwyn District Council that additional traffic utilises Maddisons Road (for access to the northwest). It was assessed that even under some short duration use for local movement, the change in volume would likely fall within the existing day to day variation of the road.

Evidence of Richard Jackett

78. At paragraph 88 Mr Jackett raises a concern about a "significant increase in truck traffic along Curraghs Road". From my assessments of transport routes, I have anticipated the use of Curraghs Road would be occasional,[38] as it does not form a primary route to higher demand locations for the use of aggregate.

Evidence of Sara Harnett Kikstra

79. At paragraph 16, Ms Kikstra queries the traffic generation and assessments. The 1,200 heavy vehicles are the total (and maximum) of all vehicles that enter or exit the quarry, and as such includes night time vehicles.

80. At paragraph 17, Ms Kikstra queries the use of a transport management plan. In this case, I consider the critical route matters are addressed by the traffic conditions, and the assessments have shown that the forecast additional traffic on local roads associated with third party operators can be safely and efficiently accommodated. The Transport Route Management Plan is a further measure, and in my opinion will be effective[39] in this case in further reducing the likelihood of trucks taking a route through the district road network in Templeton.

[38] ITA Section 16.1, Response to RFI 16 August 2019 "Trip Distribution".
[39] Evidence in chief, para 138-141.

Conclusion

81. I have considered and responded to the matters raised in submitter evidence. As set out by my rebuttal evidence, the conclusions in my evidence-in-chief remain unchanged.

Andrew Metherell

21 October 2019