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Dear Andrew

Burnham Quarry: Peer Review of Transportation Assessment

Further to our various emails and discussions, we understand that a resource consent application has been lodged for a quarry located towards the north of Burnham. The application has included an Transportation Assessment Report (**TAR**) produced by Stantec Limited (dated August 2023), and we carried out an initial review of this in November 2023, identify further information that we considered needed to be provided. We attended a Teams online meeting at which Stantec sought some clarification on the matters raised, and they subsequently provided the additional information.

This letter sets out a review of the transportation-related matters included within the application documents relating to the proposal, including both the initial and the supplementary information.

Our report is structured in the same order as the TAR. For conciseness we have typically focused on areas of disagreement and only briefly commented on areas of agreement. Our comments regarding the additional information provided are embedded within our commentary on the main TAR.

We visited the site during November 2023.

Conditions of Consent

At the outset, we note that the AEE sets out (section 6.3) that *"suggested conditions of consent have not been provided as part of this application. It is considered more appropriate that suggested conditions be provided to the Councils following receipt of any submissions arising from the public notification of the application"*.

This leads to a situation where the TAR is based on a series of assumptions regarding traffic movements where there is presently no corresponding condition of consent to assure this outcome. For the purposes of this peer review, we have progressed in good faith that all relevant matters will be appropriately and robustly controlled by conditions of consent.

TAR Section 1: Introduction

In this part of the ITA it is stated that that the maximum daily heavy vehicle traffic generation at the gate is proposed to be set at 750 heavy vehicle movements per day with an expected typical heavy traffic generation of approximately 300vpd on an average operating day. We clarified that the 'vehicle movement' is a one-way movement, meaning that 750 heavy vehicle movements per day equates to 375 heavy vehicles travelling into the site and the same number departing.



TAR Section 2: Site Context

This section of the report sets out a description of the site location, roading hierarchy and surrounding land uses. There are three designations present in the immediate area (a military camp, school and prison) and it is also noted that there are meat processing sites, equestrian facilities, a quarry, and a winery in the area.

A scheduled bus route in the area is correctly identified and described, as well as two school bus services.

TAR Section 3: Existing Transport Environment

We concur with the description of the roading network presented. We agree that there is a potential 'see through' effect at the Aylesbury Road / Wards Road intersection, and that larger vehicles would have difficulty making some turns.

Otherwise, this section of the report is a factual description of the prevailing roading environment, and we make no further comment.

TAR Section 4: Existing Travel Patterns

The data sources used for the traffic flows and crash analysis are widely used and commonly accepted. The reduction in traffic due to travel restrictions arising from Covid-19 are often seen on the state highway network.

The peak traffic flows occurring on Fridays is an interesting outcome of the analysis, and in our view we agree that this could be attributable, at least in some part, to the role of State Highway 1 in carrying vehicles associated with weekend tourism / recreational travel. This would also be supported by the peak in traffic flows reported on Sunday afternoons.

For clarity, the counter used for the analysis of traffic on the highway is located approximately 2.6km south of the Aylesbury Road intersection. There will be some variation in this for the section of highway to the north of Aylesbury Road, but we consider that the characteristics of the highway will be the same on either side of the intersection.

The source of the traffic flows on the district roads is not set out, but the volumes reported are broadly aligned with those that are publicly-accessible and we have no reason to doubt their accuracy.

We also highlight that Stantec describes how the queue at the railway level crossing is substantial, extending beyond the level crossing and the Godley Road intersection "*during the afternoon peak period*", although the duration of this is not set out. The report also (implicitly) notes that there are no train movements at this time, with the last train being 3:20pm and the afternoon peak hour starting at 4:15pm.

Unusually, a full day or pedestrian and cyclist movements has been reported. We clarified the day that the surveys were undertaken and were advised that this was a weekday. No data was collected by Stantec over a weekend, when it is possible that there will be an increased amount of recreational cycling taking place. However Stantec advised that cycling 'heat maps' did not show that the roads around the site were particularly well-used by cyclists at weekends when compared to other, recognised routes. However walking/running heat maps did suggest Aylesbury Road was used by these road users at weekends.

Stantec concludes that no further assessment of walking/cycling is required due to:

- Aylesbury Road is an arterial road where through traffic and higher traffic volumes are expected
- Aylesbury Road does not form part of an identified cycle or walking network;
- The heat maps do not suggest that Aylesbury Road is an important recreational route;
- Weekday counts show low levels of pedestrian and cycle activity, and
- The quarry activity will generally generate lower levels of traffic on a weekend.

In respect of the latter point, we note that the traffic generation limits on Saturday is the same as on a typical weekday. It is only on Sundays when the traffic volumes are limited, and practically speaking, traffic generation on Sundays will not coincide with the majority of possible walking and cycling movements. We discuss the matter of Saturday activities subsequently.

TAR Section 5: Road Safety

The report sets out the most recent data that was then available, being the period of 2018 to 2022, but since that time further information will be recorded in the database. We note though that the most common type of crash is a non-injury crash, and these are taking more than three months to be added to the database, meaning that the calendar year of 2023 is unlikely to be complete at the current time.

We expect that the applicant will take the opportunity at a future time to review and update their analysis. We have briefly reviewed 2023 and the partial record for 2024, and note that these generally show the same pattern as reported by Stantec, with no fatal or serious crashes reported in the area assessed (these types of crashes are coded into the database within one day).

With regard to the area assessed, this extends for a distance of at least one intersection beyond the site boundary. The direction of travel of generated traffic (discussed later in the TAR) shows that under the scenarios considered there remains a bias towards the state highway but that up to 11% of traffic could pass through the Aylesbury Road / Bealey Road / State Highway 73 intersections. We sought, and were provided with, additional information regarding the functioning of this location but this did not discuss prevailing crash rates, and so we have undertaken our own assessment. This shows that for the five years period covered by Stantec, there have been 8 crashes in this location, with a further 1 crash recorded subsequent to this. Four of the crashes have resulted in serious injuries and have included types of crashes which suggest that some improvement may be required to the intersection geometries or signage. By way of context, within the wider search area shown on Figure 5-2 of the TAR, only 2 resulted in serious injuries.

TAR Section 6: Planned Infrastructure Changes

We sought clarification on the measures proposed to be implemented at the Aylesbury Road level crossing and were advised that most have not been installed. Stantec is of a view that the measures are not the responsibility of the applicant to install. While this may be correct, we also note that if the measures are not in place, they will not provide any mitigation which may have been relied upon in the TAR.

One further relevant matter is the potential for the State Highway 1 / Aylesbury Road intersection to be reconstructed into a roundabout. Since the TAR was written, the 'Road to Zero' project (though which funding for the roundabout was identified) has been terminated and is to be replaced by a different strategy, yet unspecified and only due to be published late in 2024. It is therefore unclear at the present time whether the roundabout will continue to be progressed. We agree with

Stantec that if constructed, it can be expected that it will accommodate larger vehicles (ie trucks) due to Aylesbury Road being an Arterial Road.

Similarly the current government has signalled that funding of cycleways is to be reassessed, thereby meaning that there is higher uncertainty over schemes such as the Rolleston to Burnham Cycleway identified in the TAR.

We note that the schemes identified in the TAR may remain uncertain until further clarification emerges from central government regarding strategic direction and funding.

TAR Section 7: Future Population Growth

This section of the TAR sets out the likely areas of population growth in the district, which Stantec notes to be of relevance in determining the likely direction for aggregate transportation. Although this is not a common approach, we agree that it provides a suitable proxy for the direction of vehicle movements.

TAR Section 8: Proposed Quarry

This section of the TAR is a description of how the site is expected to operate. From a transportation perspective the key matter is that there is to be one point of access, via a new roadway connecting to Aylesbury Road for the movement of quarry-related traffic. There is an existing access (on Grange Road) that will be used for farm-related traffic.

TAR Section 9: Traffic Generation Patterns

As is common with quarry applications, the assessment sets out an expected typical number of vehicle movements, and a maximum number of movements (with the latter occurring infrequently). The analysis is however based on the maximum number of vehicle movements, on the basis that the more typical volumes will have a lesser effect. This approach is appropriate.

We note that the traffic distribution is based on information provided by the Applicant, with 95% of traffic expected to be to Christchurch City. This appears contradictory to Section 7.1 of the TAR where the population growth in Selwyn District is discussed, since this will comprise only 5% of the traffic generation.

The approach set out to assess how the traffic generation of the proposed quarry will vary is based on weighbridge records for other quarries, both day-to-day and hour-by-hour, and this then being applied to the proposed maximum number of vehicle movements. We consider that this approach will provide the most appropriate assessment of the expected traffic volumes, since it reduces the extent of any assumptions needed and is based on local, 'real world' patterns of vehicles.

We note that the "2019 financial year" is assessed, which is clarified to mean July 2019 to June 2020. This therefore encompasses the first year of changed travel patterns due to Covid-19 (with the first lockdown being 25 March 2020 to 27 April 2020, and further travel restrictions being in place after this). The graphs presented in the TAR show the effects of this, and as such, we do not consider that references to an 'average' volume over the course of a year are reliable in absolute terms. That said, the TAR adopts an approach of applying a ratio of maximum to typical volumes (or "relative percentages" as referred to in the TAR), which minimises any effects of Covid-19 restrictions in the absolute figures. Broadly, the analysis shows that the 'average' traffic volume is 40% of the 'maximum' volume, which Stantec then calculates to show that the 'average' traffic volume at the proposed quarry will be 300 heavy vehicle movements per day.

The same approach is adopted for the hourly breakdown of heavy vehicle movements, with an assessment that the proposed quarry would result in 112 vehicle movements in the absolute busiest hour and 30 vehicle movements in the 'typical' scenario peak hour.

For clarity, the TAR necessarily sets out a summary of the calculations and we have therefore not assessed the data in detail (which we expect was undertaken through a spreadsheet). Our further assessment is based on these figures being accurate.

With regard to the distribution of the heavy vehicle movements, Stantec considers two scenarios. One of these is based on the Applicant's view that 95% of traffic will be associated with Christchurch City, which then results in the bulk of traffic travelling along Aylesbury Road to State Highway 1. We agree that under this scenario, traffic generation on other roads within Selwyn district would be imperceptible.

A second scenario allows for growth in population centres within Selwyn district only. In our view this represents a sensible sensitivity test, because it is possible that further quarries may be constructed in future which mean aggregate from the proposed quarry is only used locally. The approach used is a pro-rata of the maximum heavy vehicle numbers based on population growth areas, which we consider is appropriate.

We note that paragraph 9-1 of the TAR sets out that the movement of light vehicles is also discussed, but this is not referred to again in this section of the TAR. In fact, the balance of the report appears to focus exclusively on the movement of heavy vehicles. In our experience light vehicles form only a very small proportion of quarry-related traffic, and the volumes will be lower than the peak numbers of heavy vehicles. As such, an assessment of the volumes and effects of heavy vehicles will necessarily address any matters arising from light vehicles also. That said, it would be helpful for an assessment of the expected volumes and travel patterns of light vehicles to be provided.

TAR Section 10: Potential Transport Effects

Table 10-1 of the TAR summarises the change in traffic volumes under the two scenarios considered by Stantec. Stantec rightly notes that the range of traffic flows is high, depending on which scenario is considered. For clarity, the table shows the daily traffic flows, whereas the volumes expected on an hourly basis would potentially be of more assistance in understanding effects (especially as subsequent evaluations of intersection performance are based on assessing peak hours).

We agree that the site location on Aylesbury Road is a positive aspect of the proposal, given that this is an Arterial Road and so expected to accommodate higher traffic volumes and higher proportions of heavy vehicles, plus it connects to longer-distance routes which are also high in the roading hierarchy. We anticipate that this routing will be controlled by conditions of consent in due course.

At the site access, we agree that a complying design can be achieved in respect of the access geometry and sightlines. We requested, and received, an assessment of the need for auxiliary turning lanes at the access which showed that no auxiliary lanes were required. We agree. We also note that seal widening is proposed on both side of Aylesbury Road at the intersection which enables 'through' traffic to pass turning traffic.

Stantec suggests 'flag' lighting and additional carriageway markings, and we agree. We also suggest that advance warning signage of the presence of trucks would also be useful, but this can be addressed through conditions of consent.

In respect of the change in traffic volumes on each road, Stantec notes that the surrounding roads will continue to provide a high level of service, and we agree. In respect of the changes in performance of key intersections, Stantec has adopted 'design years' of 2030 and 2035m which we consider to be appropriate, and has applied ambient traffic growth of 2% to the current volumes of traffic on the network. This is slightly lower than the 2.4% set out in paragraph 4.1.1 of the TAR (which for clarity excludes short-term changes due to Covid-19).

The TAR notes that no adjustment has been made for the higher Friday volumes on the basis that quarry peak times do not occur on Friday afternoons. We assume that this conclusion is drawn from the extensive information on traffic volumes discussed in Section 9 of the TAR but it would be helpful for this to be confirmed.

There is no mention of how seasonality on the highway has been taken into account. Paragraph 4.1.2 of the TAR suggests higher volumes in summer than in winter, but paragraph 4.3 also sets out that the intersection turning counts were carried out in November (spring). The analysis is also based on the quarry operating at 45% capacity in 2030, which again would need to be controlled through a condition of consent.

The TAR goes on to say that the "*full peak hour*" traffic generation has been applied to the morning peak period with 50% of this being applied to the evening peak hour. This approach is a little puzzling, as Stantec has already made it clear that they have ample data to be more specific about the proportions of traffic occurring in each hourly period (as shown on their Figure 9-2). Based on that graph, we agree that the use of 100% and 50% of the peak traffic generation in the morning and evening peak hours will represent a conservative assessment.

The most critical location appears to be the State Highway 1 / Aylesbury Road intersection, where the site observations showed queuing in the evening peak hour and the modelling shows that poor performance (Level of Service F) is expected irrespective of the quarry. We agree that "*the ability of the intersection to accommodate additional traffic is compromised by its generally poor performance, and higher numbers of heavy vehicles in the long queue would create some additional instability of intersection performance with the quarry*". With this in mind, Stantec suggests that a small amount of traffic could be accommodated with a focus on truck movements outside peak hours and a proposed average traffic volume of 1 additional heavy vehicle movement every 20 minutes.

The approach of limiting the traffic generation of a development (or limited the extent of development as a proxy for limiting traffic generation) is a common approach where infrastructure is approaching or has exceeded theoretical capacity, and where a forthcoming improvement scheme is expected. We therefore agree with the general approach suggested. We highlight though that if there is uncertainty regarding the change in intersection form from a priority intersection to a roundabout, this 'interim' measure may be in place for some considerable time.

If the roundabout is put in place, we would expect to see a substantial reduction in queues and delays, and this is forecast by the modelling presented. We note that Stantec highlights that there are indications that the roundabout is approaching capacity beyond the 2035-year design horizon, but that as this is more than ten years into the future, it is not a matter that should be considered by the application. In our view, forecasting traffic flows more than ten years into the future is extremely difficult without a more complex transportation model being used, because patterns/volumes are affected by longer-term changes in population and land use distribution, and wider changes to society. Further, the Stantec assessment adopts the traffic generation of the busiest day, and we expect that the number of these will be limited through conditions of consent. Consequently we support the approach used by Stantec in this instance.

Stantec also assesses the queues and delays at the site access using the greatest traffic flows anticipated, as well as other intersections in the study area, and identifies that these will operate efficiently,. Based on the traffic flows set out in the TAR, we would not anticipate that substantial queuing or delays would arise.

We requested, and were provided with, an assessment of the Aylesbury Road / Bealey Road / State Highway 73 intersections albeit this was at a high level and without detailed modelling being carried out. Stantec opines that the low traffic flows means that the effects of additional traffic on the performance of the intersection will be negligible in view of the low volumes expected. Stantec cites 33 vehicle movements per day but this is the average day and the 'peak day' equates to 83 movements. However we concur that this represents a very low frequency of vehicle movements and efficiency is unlikely to be significantly adversely affected.

In respect of road safety, Stantec identifies possible changes at the Aylesbury Road / Two Chain Road intersection and we expect that these will be formalised through a condition of consent if required (based on the routing of vehicles, which would also be controlled through a condition of consent). Similarly, potential changes at the Aylesbury Road / Wards Road intersection are set out, with a proposal for these to be either implemented or managed/monitored through a Traffic Management Plan.

In both cases, the measures indicated are able to take place wholly within the road corridor and without the need for third party land. We therefore support the principles indicated by Stantec, but further assessment will be required in due course and prior to any improvements (or other mitigation measures) being set out in conditions of consent.

We requested a similar safety assessment of the Aylesbury Road / Bealey Road / State Highway 73 intersections, with Stantec commenting that adverse road safety effects were unlikely. We note though that this response did not initially review the prevailing road safety record, which we noted above to be higher than might be expected and with a greater proportion of serious injuries. Notwithstanding the response then, we consider that further evaluation of safety-related effects in this location is justified.

For cyclists, Stantec notes that the low volumes observed suggest that trucks and cyclists are able to share the road, and that Aylesbury Road does not form part of an identified cycling route. We noted previously that Stantec also set out that traffic volumes generated by the quarry would be lower at weekends, when cyclists are potentially more likely to be present. While this is the case on Sundays, it does not appear that there are more controls on the quarry on Saturday when recreational cyclists may be present. The data presented in Section 9 of the TAR does not specifically address Saturday traffic to support this assertion, although it would appear that sufficient information is available for this to be done. In the absence of this, we consider that the potential safety-related risk to cyclists on Saturdays on Aylesbury Road has not been fully identified and evaluated.

Further from the site, trucks will be more dispersed and we consider that this creates additional mitigation for interaction with cyclists. We also agree that the existing cycling route on the southern part of Aylesbury Road will ensure suitable separation between trucks and cyclists.

Stantec also considers the interaction of heavy vehicles with pedestrians. Again we note that the observations appears to be based on weekday, rather than weekend, volumes but we concur that the wide berms on Aylesbury Road provide opportunities for pedestrians to walk within a rural Arterial Road. We agree that there does not appear to be any need for formal crossing locations based on pedestrian levels of service, but also acknowledge that the speed environment is not conducive to safe crossing movements. However this is an existing scenario on this part of the road

network and is present irrespective of the presence of the quarry. We also consider that truck passing movements of cyclists and pedestrians can be addressed through a Traffic Management Plan in due course.

Amenity matters are addressed in paragraph 10.8 of the TAR. We note that the extent to which Local Roads are used by quarry-related traffic can be controlled through conditions of consent, and therefore although we accept that most traffic could be expected to use Arterial Roads (as they are the most convenient), use (or preventing use) of Local Roads will need to be considered through conditions in due course.

Stantec proposes that Aylesbury Road from the site access to Two Chain Road should be widened to 8m, based on the expected increase in traffic arising from the proposed quarry, to accommodate the safe movement of trucks and also to prevent edge breakage. We agree, although we also note that Aylesbury Road south of Two Chain Road is described in the TAR as being 7.2m to 8.2m wide. Stantec has clarified that it is not proposed to widen these narrower sections where the seal width is more than 7m due to the quarry traffic having less of an effect in this location. However we do not consider that it would achieve the stated outcomes of widening if the seal was to vary between 7m and 8m, and we therefore consider that an 8m width should be available between the site access and the railway. In passing, we note that the additional width proposed between the site access and Two Chain Road will support cyclist safety by enabling an increased separation between these road user groups.

The manner in which widening is achieved is not discussed here, but we note that the widening of the road will have an implication for the design of the site access also, and in our view makes it more important that suitable carriageway markings are provided.

No improvements are proposed towards the north of the site access, where traffic flows are lower (although this also depends on which of the two scenarios is considered) as Stantec considers that the existing widths are sufficient for the low expected increase in traffic. The extent of traffic increase is dependent on the direction of trucks and this in turn depends on which of the two scenarios arise in practice. With a bias towards aggregate being used in Selwyn district, the increase on Aylesbury Road to the north of the site could potentially justify widening Aylesbury Road as far as Wards Road in our view. However it would be straightforward for a short calculation to be carried out to assess the probability that one truck would meet another, taking into account the vehicle frequencies and speeds.

At the railway level crossing, Stantec considers that the change in traffic flows is not significant and the proposed future roundabout can take into account the presence of heavy vehicles. It is noted in the TAR that there is a separation of 30m between the railway line and the limit line on the approach to State Highway 1, which is sufficient for five cars to queue between the railway and the highway. In practice, 30m will accommodate a truck+trailer configuration and so we do not consider that there is a particular high risk that a trailer may straddle the railway. However we consider that it is imperative that this matter is addressed in the Travel Management Plan to ensure that all drivers are aware of the potential risk.

TAR Section 11: Effects Summary

This section of the TAR acts as a summary of the previous few sections, and does not present any new information. We note that recommendations are made as to vehicle routing, which will require formalising through conditions of consent and/or a Traffic Management Plan.

TAR Section 12: Transportation Route Management Plan

On our reading of the TAR, it is not clear whether a Transportation Route Management Plan is proposed as part of the application. We note though that implementation of such a Plan is indicated elsewhere in the TAR (paragraphs 10.9 and Section 11 for example), and we therefore anticipate that such a Plan will be put in place. We support this approach, unless more specific conditions of consent are put in place to limit traffic volumes and routes. We also highlight that matters such as the interaction of truck with the identified school bus routes are not addressed in the TAR, but could be managed through the implementation of a Transportation Route Management Plan.

TAR Section 13: Operative Selwyn District Plan

Appendix A of the TAR sets out a detailed assessment of compliance with the transportation provisions of the operative District Plan. Having read through this, we agree that the site is likely to have a high degree of compliance with the various Rules.

In respect of the access being directly onto an Arterial Road rather than a lower-order road in the hierarchy, in our view the TAR does not address this in detail. However we are of the opinion that in this case, access onto the Arterial Road is preferred due to the nature of vehicles generated, the directness of traffic routing and reduced travel distances.

TAR Section 14: Partially Operative Selwyn District Plan

The assessment of the transportation provisions of the Partially Operative District Plan are the same as for the operative Plan, and we address these above.

TAR Section 15: Conclusion

This part of the TAR summarises Stantec's view on the proposal. Importantly, the TAR sets out a series of measures that Stantec considers are required to ensure that the roading network operates safely and efficiently. As set out at the start of this letter, the AEE considers that conditions of consent are more appropriately developed at a later stage, and so it is possible that Stantec's list of measures may be refined or otherwise changed. On balance we consider that the list set out is a suitable 'core' of improvement measures and other options for mitigation.

Carriageway Consulting Conclusions

While we largely agree with the assessment presented by Stantec, as discussed above we have set out above other issues that in our view should be considered:

- Further detail to support assertions of traffic volumes on Friday afternoons and Saturdays;
- Further detail to assess the potential interaction of cyclists with trucks, particularly on Saturdays;
- Further consideration of the crash record at the Aylesbury Road / Bealey Road / State Highway 73 intersections;
- Comment on the number of days per year when the maximum number of trucks can be expected;
- Comment on the number of light vehicles.

Overall though, there are a range of matters that will need to be controlled through conditions of consent which are not yet proposed, which makes it difficult to form a final view on the proposal. If suitable conditions were not to be in place, it is clear in our view that the proposal quarry has the



potential to give rise to adverse road safety and efficiency effects. However, with appropriate conditions of consent in place, we agree with Stantec's conclusions that the traffic-related effects of the proposed quarry will be no more than minor.

Please do not hesitate to contact me if you require any further information or clarification of any matters.

Kind regards

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