

**BEFORE HEARING COMMISSIONERS APPOINTED BY CANTERBURY REGIONAL  
COUNCIL AND WAIMAKARIRI DISTRICT COUNCIL**

IN THE MATTER OF                      the Resource Management Act 1991

AND

IN THE MATTER OF                      Applications CRC204106, CRC204107, CRC204143 and  
RC205104 – to establish, operate and rehabilitate an  
aggregate quarry at 309 West Belt, Rangiora

**STATEMENT OF EVIDENCE OF JON FARREN  
FOR TAGGART EARTHMOVING LIMITED**

19 April 2021

## **1. INTRODUCTION**

- 1.1 My name is Jon Farren. I am the Manager and Principal of the Christchurch office of Marshall Day Acoustics (**MDA**).
- 1.2 My area of expertise is noise.

### **Qualifications and Experience**

- 1.3 I hold a Bachelor of Engineering with Honours in Electroacoustics from the University of Salford in the United Kingdom. I hold full Membership of the Institute of Acoustics (UK), a requirement of membership being that I am active in the field of professional acoustics and satisfy the Institute's requirements with regard to level of qualifications and experience.
- 1.4 I have been employed as an Acoustic Consultant for 28 years, approximately 20 of which have been with Marshall Day Acoustics (MDA). I have considerable experience in the areas of planning with regard to noise, the assessment of noise and vibration, and noise control in relation to both environmental noise and building acoustics.
- 1.5 Of specific relevance to this proposal, I have assessed noise and vibration effects and performed compliance monitoring at over 25 quarries and mineral extraction sites across the South Island, where product extraction, processing and its transportation are the dominant noise sources. My experience includes several gravel quarries in Canterbury for various operators.

### **My Involvement in the Proposal**

- 1.6 My role in this proposal to date has been as technical reviewer and supervisor for all noise monitoring, modelling and analysis. Working with my colleague Alex West of MDA, I was responsible for reviewing and providing input to the *Assessment of Noise Effects* (dated 16 September 2020) prepared by MDA that accompanied the application, and for responding to the subsequent Requests for Information (**RFI**).
- 1.7 My MDA colleagues and I have been to the site at varying times of day, and days of the week, to observe the existing noise environment.
- 1.8 In preparing my evidence I have reviewed the following documents:
  - a) the resource consent applications;
  - b) the relevant submissions on the applications which relate to noise and vibration; and
  - c) the s42A report prepared by Adele Dawson, including the noise evidence/report of William Reeve who is the acoustic advisor to Waimakariri District Council.

- 1.9 Whilst this is a Council hearing, I acknowledge that I have read and agree to comply with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2014. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this statement of evidence are 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.

## **2. SCOPE OF EVIDENCE**

- 2.1 My statement of evidence will address:

- (a) The existing ambient noise environment;
- (b) The key noise sources of the proposal;
- (c) Relevant noise standards applying to the proposal;
- (d) Potential noise and vibration effects arising from the proposal and the mitigation measures proposed;
- (e) Submissions on the proposal in relation to noise and vibration; and
- (f) Acoustic-related matters raised in the s42A Report and consent conditions.

## **3. SUMMARY**

- 3.1 I have been involved in the project as technical reviewer and supervisor for all noise monitoring, modelling and analysis.
- 3.2 The existing noise environment has a rural character which is subject to elevated ambient noise levels from road traffic and aircraft.
- 3.3 The primary noise sources associated with the proposal are gravel extraction, stockpiling and backfilling. Unlike many other quarries in Canterbury, there will be no crushing and screening of gravel on site.
- 3.4 I have proposed noise limits that will result in acceptable noise effects and will provide an almost identical level of residential amenity as the District Plan permitted activity noise standards.
- 3.5 I consider it appropriate that topsoil removal and the formation of noise control bunds are assessed in accordance with the New Zealand construction noise standard – NZS6803:1999.
- 3.6 There are no material areas of disagreement between my assessment and that of Council's noise expert, Mr William Reeve, included with the s42A report prepared by Ms Adele Dawson.
- 3.7 My evidence provides further clarification on noise from the proposed truck haul route as requested by Mr Reeve. I also discuss vibration effects from the proposal as requested by Ms Dawson. Both of these aspects result in negligible change to my assessment and my conclusions remain unchanged.

- 3.8 In my opinion, the conditions of consent proposed in the s42A report are appropriate to address the noise effects of the proposal and reflect my recommendations. In Paragraph 9.17 of my evidence, I recommend a minor addition to the noise limits – the inclusion of a night-time noise limit – 70 dB  $L_{AFmax}$ .

#### **4. EXISTING NOISE ENVIRONMENT**

- 4.1 The *Assessment of Noise Effects* describes the existing noise environment in the vicinity of the site, including noise monitoring locations that are representative of the closest dwellings to the proposed quarry activity.
- 4.2 In summary, dwellings that are close to Lehmans, West Belt and River Roads experience a rural character which is subject to elevated ambient noise levels from road traffic and aircraft on a relatively continuous basis during the day. The closer a dwelling is to the road, the higher the traffic noise level it receives.
- 4.3 Existing noise levels in the area are described in the *Assessment of Noise Effects*, but I have broadly categorised the noise environment for the dwellings around the site, taking into account the range of distances from the road as:
- a) Lehmans Road 50 to 60 dB  $L_{Aeq}$
  - b) River Road 55 to 70 dB  $L_{Aeq}$
  - c) West Belt Road/Huntington Drive 40 to 50 dB  $L_{Aeq}$
- 4.4 The noise measurements indicate that many dwellings close to roads experience an existing noise environment above the District Plan permitted daytime noise limit for Rural and Residential Zones of 50 dB  $L_{A10}$ . Residential areas next to low volume roads, such as the dwellings in the vicinity of Arlington Park/Huntington Drive, experience noise levels that are below the 50 dB  $L_{A10}$  permitted activity standard.
- 4.5 The variation in noise levels is typical of the noise environment at dwellings affected by traffic noise on both collector and low volume roads.

#### **5. NOISE-SOURCES - THE PROPOSAL**

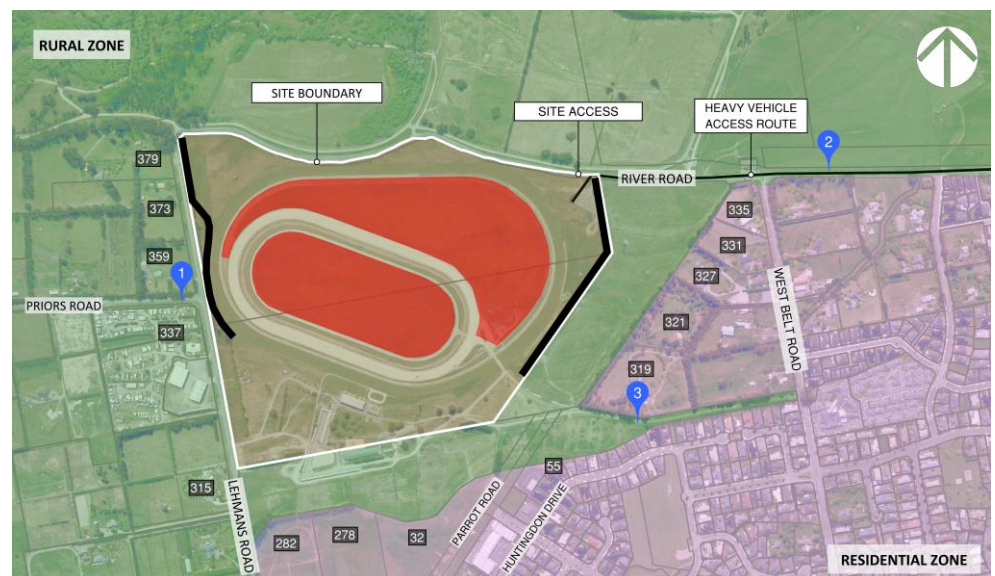
- 5.1 The key noise sources of the Proposal are outlined in detail in the *Assessment of Noise Effects* which was attached as Appendix C to the Application.
- 5.2 At the outset, I would like to highlight that this proposal is about extracting gravel. Many of the noisy activities typically associated with quarries such as crushing and screening will not occur on this site.
- 5.3 The proposal itself is described in the evidence of Mr Paul Taggart. Below I have described each of the key noise sources and how they might be perceived by the nearest residential neighbours, taking into account the noise mitigation proposed by Mr Taggart, such as the proposed noise control bund and prohibition of tonal reversing alarms on quarry vehicles:

- (a) The site will only operate 0700 -1800 during Monday – Friday and 0700 – 1500 on Saturdays. Only some activities will be audible beyond the site boundary. No extraction of aggregate will occur at night or on Sundays;
- (b) Activities will move around the site, as various stages occur. Each stage will be limited to 2ha in area;
- (c) Topsoil removal and formation of the perimeter bunds – this activity will only occur for a few weeks at the beginning of the activity. Bund formation is dominated by engine and track noise from slow moving earthmoving equipment;
- (d) Gravel extraction – a motor scraper is proposed to be used for up to 3.5 hours per day, for up to 275 days per year, to excavate the gravel. Trucks will then be used to move the excavated material to the stockpiles. At times, noise arising from use of the motor scraper will be audible at the closest residential dwellings to the site. As the pit is excavated, the noise of the motor scraper will reduce as it moves below existing ground level and its noise will be mitigated by the edge of the pit acting as a noise barrier;
- (e) Crushing and screening – unlike many other gravel quarries, no crushing and screening will occur at this site;
- (f) Backfilling – backfilling will occur intermittently on site and be undertaken in campaigns. Backfill material being deposited from trucks onto the floor/ excavated area may just be audible as a short duration rumble at a relatively low level. Mechanical engine noise from trucks and loaders will also be audible at a low level; and
- (g) Transportation – there will be engine noise from the front-end loader used to load truck and trailers from the stockpiles and the trucks and trailers themselves, along with the noise from the placement of the first scoop of gravel into an empty truck. However, none of these noise sources are likely to be particularly noticeable beyond the site boundary.

- 5.4 Predicted noise levels from the site are based on MDA noise surveys of comparable equipment operating under similar conditions, and of the actual motor scraper proposed to be used on the site. The predicted noise levels are based on several operational scenarios where all equipment is operating continuously and simultaneously in order to represent a worst-case situation. In reality, not all equipment will be operating simultaneously and noise levels will therefore often be lower than the predicted levels.
- 5.5 Over the course of several iterations, we have developed locations for noise control bunds in conjunction with flood modelling conducted by others. The result is two 3 metre high noise control bunds proposed at the locations shown in the Assessment of Noise Effects report and Figure 1 below. These bunds are proposed in addition to the noise barrier effect of the edge of the excavation pit which will be up to 5 metres deep.

- 5.6 Although traffic noise generation outside the site is not controlled by the District Plan noise standards, off-site truck movements are proposed between the quarry and Taggart's existing site at Cones Road. I will discuss the potential for any resulting adverse noise effects in more detail later in my evidence.
- 5.7 Vibration generated by normal operation of the proposed quarry will be imperceptible beyond the boundary of the site. No blasting is required at this site. It is unlikely that any vibration will be perceptible during construction of the perimeter bunds.

Figure 1 Site plan showing extraction area and bund location, as well as nearest receivers



## 6. RELEVANT NOISE STANDARDS APPLYING TO THE PROPOSAL

- 6.1 The applicable Waimakariri District Plan noise standards for this proposal are outlined in detail in Section 4.0 of the *Assessment of Noise Effects*. In summary, the residential and rural zone permitted activity noise standards are the same. These are:

0700 – 1900 hrs (Monday to Saturday) 50 dB  $L_{A10}$

All other times 40 dB  $L_{A10}$

2200 to 0700 hrs 70 dB  $L_{Amax}$

- 6.2 As discussed in Section 6.1 of the *Assessment of Noise Effects*, the maximum noise levels of the proposal are predicted to exceed the applicable daytime noise limits in the District Plan by 1 dB. While I consider this exceedance to be negligible, it is nonetheless a technical exceedance of the daytime noise limit. As a result, the activity status is *discretionary*, and it is appropriate to consider the potential adverse noise effects.
- 6.3 As there will be no extraction of aggregate on site at night or on Sundays, the proposal will comply with the 40 dB  $L_{A10}$  District Plan 'night-time' noise limit. I also

note that the applicant has volunteered a site end time of 1800 on weekdays and 1500 on Saturdays.

- 6.4 In considering potential noise effects, I have reviewed guidance from the World Health Organisation, New Zealand Standard NZS 6802<sup>1</sup>, the District Plan and the existing noise environment.
- 6.5 In my opinion, noise from the proposal which complies with the following noise limits will result in acceptable noise effects and will maintain an almost identical residential amenity as anticipated by the District Plan permitted activity noise standards. I recommend that these noise limits apply at any point within the boundary of a residentially zoned site, or at any point within the notional boundary of dwellings in a rural zone:

0700 – 1900 hrs      50 dB L<sub>Aeq</sub>

1900 – 0700 hrs      40 dB L<sub>Aeq</sub> and 70 dB L<sub>Amax</sub>

- 6.6 I would like to point out that my proposed limits are presented in terms of the 'L<sub>Aeq</sub>' metric as opposed to the District Plan's 'L<sub>A10</sub>'. The L<sub>Aeq</sub> metric represents current best practice and is gradually replacing L<sub>A10</sub> in all District Plans across New Zealand, as required by the National Planning Standards.
- 6.7 For completeness, I note that use of L<sub>Aeq</sub> as a noise limit would usually mean that a noise level is applied across all 7 days in a week. '7 day' noise limits are common in many District Plans and will be a common factor in future Plan reviews, as a requirement of the National Planning Standards. However, extraction of aggregate will not occur on Sundays and therefore this issue does not have a practical bearing on this application.
- 6.8 District Plan Rule 31.12.1.13 requires construction noise to be assessed against the provisional 1984 version of the New Zealand construction noise standard NZS6803:1984P.
- 6.9 As the proposed activity is discretionary, I consider that construction noise effects should be assessed in accordance with the most up-to-date 1999 version of the Standard - NZS 6803: 1999 "*Acoustics - Construction Noise*". In practice, the anticipated residential amenity is very similar between both the 1999 and 1984 versions of the Standard.
- 6.10 As per the Standard, the construction noise limits will only apply to the topsoil stripping and the construction of noise control bunds, not to the normal day-to-day gravel extraction or backfilling.

## **7. PREDICTED NOISE EFFECTS OF THE PROPOSAL AND MITIGATION PROPOSED**

- 7.1 Below I have summarised the key aspects of the noise predictions that are described in more detail in Section 5.0 of the *Assessment of Noise Effects* report. These are:

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<sup>1</sup> New Zealand Standard NZS 6802:2008 "Acoustics - Environmental Noise"

- (a) The noise sources;
- (b) Key assumptions; and
- (c) Extraction stages.

### **Noise Sources**

- 7.2 MDA has predicted the noise that will be generated by the proposal based on data collected at other quarrying sites around New Zealand. Therefore I am confident that the modelling undertaken is representative of the actual noise emissions that will be generated from the proposed site. In the case of the motor scraper, which will be used to win gravel, my colleagues have measured noise from the actual machine that Taggart propose to use on site.
- 7.3 Other noise sources include excavators, front end loaders and quarry trucks. As gravel will not be processed on site, there will be no crushers or screens which are typically some of the highest noise levels that can be encountered at a quarry.
- 7.4 Traffic movements on public roads are exempt from compliance with the District Plan noise limits. However, I have assessed potential noise effects from additional truck movements travelling along River Road between the proposed site and the Taggart processing site at Cone Road. I do not anticipate that daily average traffic noise levels will increase for residents along River Road as a result of the proposal. The traffic that will be generated by the proposal is addressed by Mr Matthew Noon in his evidence.

### **Key Assumptions**

- 7.5 For each of the stages, which I address below, I have assumed that all gravel extraction and loadout noise sources will be operating at the same time. In other words, my predictions assume that the motor scraper, excavator, front end loader and quarry trucks will be generating noise in unison. As such, the noise predictions are conservative as, in practice, not all noise sources will be operating simultaneously.
- 7.6 If reversing alarms are required on site, then these will be of the broadband noise type. Broadband reversing alarms provide appropriate safety warning to staff on site but are generally inaudible off-site. I note the requirement for broadband noise reversing alarms is proposed as a condition of consent in the Application and included in the set of conditions in the s42A report.<sup>2</sup>
- 7.7 The noise predictions incorporate the noise reduction provided by 3 metre high noise control bunds at the location shown in Figure 1.
- 7.8 Motor scraper operation will be limited to no more than 3.5 hours on any day (Monday to Saturday). NZS 6802 recognises that if a sound is not present all of the time, it is likely to create lesser annoyance than the same sound if it were present continuously. The noise predictions therefore apply a -5dB correction to account for the limited duration operation of the motor scraper.

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<sup>2</sup> Proposed condition 16, RC 205104



## Staging

- 7.9 Appendix A of the *Assessment of Environmental Effects* prepared by Pattle Delamore Partners shows the general layout of the site and the eight stages of the extraction over the proposed 15-year life of the quarry.
- 7.10 In terms of noise, this means that sensitive receivers around the perimeter of the site will experience varying noise levels as the extraction plant moves from stage to stage. This effect is demonstrated in the noise contour plots provided as Figures 3 to 6 in the *Assessment of Noise Effects* which show noise levels for the four stages closest to existing dwellings.
- 7.11 I would like to point out that Table 8 in the *Assessment of Noise Effects* presents the highest noise level that will be experienced at a particular dwelling during the quarry's 15-year life. It is not the noise level that will be received continuously at each dwelling. For reference, I have presented Table 8 below.

Table 8: Summary of highest  $L_{Aeq}$  noise levels compared against the proposed noise limit

Receiving Address	Assessment Position	Noise Level dB $L_{Aeq}$ (15 min)	Project limit dB $L_{Aeq}$ (15 min)	Difference to Limit
379A Lehmans Road	Notional Boundary	47	50	-3
379B Lehmans Road	Notional Boundary	45	50	-5
373 Lehmans Road	Notional Boundary	49	50	-1
359 Lehmans Road	Notional Boundary	49	50	-1
20 Priors Road	Notional Boundary	44	50	-6
337 Lehmans Road Holiday Park	Notional Boundary	50	50	0
315 Lehmans Road	Notional Boundary	46	50	-4
285 Lehmans Road	Notional Boundary	44	50	-6
Ballydoyle Lane	Site Boundary	48	50	-2
32 Huntingdon Drive	Site Boundary	48	50	-2
55 Huntingdon Drive	Site Boundary	48	50	-2
319 West Belt	Site Boundary	48	50	-2
321 West Belt	Site Boundary	48	50	-2
327 West Belt	Site Boundary	47	50	-3

- 7.12 The modelling predicts that noise levels will be at or below the 50 dB  $L_{Aeq}$  daytime project noise limit and will be met at all locations around the site for all quarrying stages.
- 7.13 In locations off Lehmans Road and River Road, ambient noise levels are currently considerably higher than the proposed project noise limit set out above. This means that the noise effects of the proposal are likely to be masked at times by other ambient sounds.

## Potential Acoustic Effects

- 7.14 Taking into account the proposed controls and mitigation measures I have outlined in the previous paragraphs, I consider that gravel extraction, backfilling and loadout activities will comply with the proposed project daytime noise limit of 50 dB L<sub>Aeq</sub>. As a result, I consider that noise effects will be acceptable at nearest dwellings and will be consistent with the noise amenity envisaged by the District Plan permitted activity standards for the zone.
- 7.15 As the site will not operate at night or on Sundays, there will be no adverse noise effects at these times.
- 7.16 During the construction of the noise control bunds, noise will be managed in accordance with NZS 6803:1999, which will ensure these construction-type noise effects are acceptable.
- 7.17 Based on the anticipated traffic distribution along River Road, my assessment indicates that truck movements will not result in any increased average traffic noise levels. As a result, there will be no increased adverse noise effects from traffic.

## **8. ISSUES RAISED BY SUBMITTERS CONCERNING NOISE AND VIBRATION**

- 8.1 Many of the submissions I have reviewed raise broad concerns about noise and vibration and I consider these are addressed both by my *Assessment of Noise Effects* report and in my evidence.
- 8.2 Submitter concerns with regards to specific noise generating aspects of the proposal are summarised and addressed by Mr Reeve in the s42A report and I agree with his analysis and observations.
- 8.3 Whilst not explicitly stated, some of the submitters' concerns may be due to a perception that a full working quarry (including crushing and screening) is to be established on the site. As these activities will not occur as part of the proposal, crushing and screening noise will not be a feature of this site.
- 8.4 In Paragraph 431 of the s42A report, Ms Dawson identifies several submitters who have raised specific concerns about vibration. I discuss vibration effects below in paragraph 9.12 to 9.15
- 8.5 I am satisfied that all submitter concerns have been appropriately considered and addressed as regards to noise and vibration. Adverse effects will be appropriately managed and mitigated by the conditions of consent set out in the s42A report.

## **9. SECTION 42A REPORT AND CONDITIONS**

- 9.1 I have reviewed the s42A report prepared by Adele Dawson and the supporting report of William Reeve, the acoustic advisor for Waimakariri District Council.
- 9.2 I note that Mr Reeve agrees with my proposed noise limits for the proposal, and with the modelling methodology and analysis.
- 9.3 There are several noise and vibration matters raised in the s42A report by Ms Dawson and Mr Reeve that I discuss below.

### **Truck Access Point and Haul Route**

- 9.4 In Paragraphs 52 to 54 of his evidence, Mr Reeve correctly identifies that the truck access route used in my noise modelling does not match the access point shown in Figure 3 of the application. He correctly notes that trucks will travel closer to the dwellings to the south of the site with the potential for higher noise levels as a result.
- 9.5 To evaluate the potential noise effects of this discrepancy in the Application, we have re-modelled the truck access point and haul route for when extraction is occurring to the south east – this is the worst-case scenario for those dwellings to the south and east of the site identified by Mr Reeve.
- 9.6 The noise contours in Figure E1 show a comparison of the re-modelled site access and haul route compared with the original situation represented in Figure 3 taken from the *Assessment of Noise Effects*.
- 9.7 My analysis shows noise levels are identical at most dwellings as the motor scraper is the dominant noise source on site. However, a 1 dB increase is noted for some dwellings immediately to the east of the site (on West Belt) which is a negligible change and noise levels will remain below the 50 dB  $L_{Aeq}$  criterion. There is no change in noise levels for dwellings on Huntington Drive.
- 9.8 In relation to this issue, Ms Dawson states in Paragraph 447 of her report, that *“If the applicant can show the proposed consent limit will be met, I consider that the likely noise effects on the surrounding landowners and occupiers will be acceptable”*. My analysis shows that the proposed limit can be met and I agree with Ms Dawson that noise effects will be acceptable.

#### **Stockpile Activity**

- 9.9 In Paragraph 55, Mr Reeve notes the Application refers to the potential accessing of the stockpile from 0600 hours. However, I confirm that no activity on the site is proposed before 0700 hours.
- 9.10 In Paragraph 58, Mr Reeve discusses the possibility that trucks and water carts may drive onto the stockpile up to 5 metres high, which will be above the 3 metre high noise control bunds and therefore will not benefit from the noise reduction provided. I can verify that even if this were to occur, vehicle noise would comply with the proposed daytime noise limit of 50 dB  $L_{Aeq}$ .

#### **Heavy Vehicles on Public Roads**

- 9.11 My report presents an analysis of the likely increase in traffic noise along River Road as a result of the proposal. I note that Mr Reeve presents a slightly different assessment of traffic noise levels. I consider that there may be a perceptible change, while he states he considers it very likely there will be a noticeable change in the character and level of noise for nearby dwellings. However the conclusions we each reach are the same – that traffic noise effects will not be significantly different with the proposal.

#### **Vibration**

- 9.12 Ms Dawson correctly notes that vibration was not addressed in my *Assessment of Noise Effects* report. There are no significant vibration sources associated with the operation of the proposed quarry (noting that there is no blasting required).
- 9.13 In my experience, aggregate extraction results in very little vibration outside of the site. Of all activities that will occur on site, bund construction has the potential to generate vibration but even then, the distances to sensitive receivers are such, and the duration so short, that I anticipate vibration effects will be negligible. In my opinion it is not necessary to address vibration in the Quarry and Backfill Management Plan.
- 9.14 One resident (J Anderson) raises vibration from truck movements as a concern. Whilst there are no local or national criteria that govern vibration from road traffic, Marshall Day Acoustics has conducted traffic vibration measurements in the vicinity of several quarries in the Christchurch area.
- 9.15 Our measurements confirm that vibration generated by quarry trucks using the public road network does not result in any different level of effects to the traffic otherwise using those roads.

#### **Consent Conditions**

- 9.16 In my opinion, the conditions of consent proposed in the s42A report are appropriate to address the noise effects of the proposal and reflect my recommendations.
- 9.17 However, I recommend that Condition 13 (b) of RC205104 is amended to include a maximum noise level limit in line with best practice. The condition should read:  
“13 b) Other times: 40 dB  $L_{Aeq}(15\text{ min})$  and 70 dB  $L_{AFmax}$ ”.

### **10. CONCLUSION**

- 10.1 I have assessed the noise and vibration effects from the operation of the proposed quarry. This involved noise level measurements, noise level predictions and consideration of the potential adverse noise effects from both quarry operations and quarry trucks on public roads.
- 10.2 I have recommended noise limits for the proposal based on published guidance which reflect current best practice and provide an equivalent level of residential amenity as the District Plan permitted activity noise standards.
- 10.3 I have also recommended noise mitigation measures and conditions of consent to ensure that quarry operations will comply with the proposed noise limits. Those recommendations are reflected in the conditions of consent included in the s42A report prepared by Ms Dawson.
- 10.4 I consider that with the controls provided for, the proposed activity will result in acceptable noise and vibration effects that will maintain an appropriate level of daytime and night-time residential amenity at the nearest dwellings.

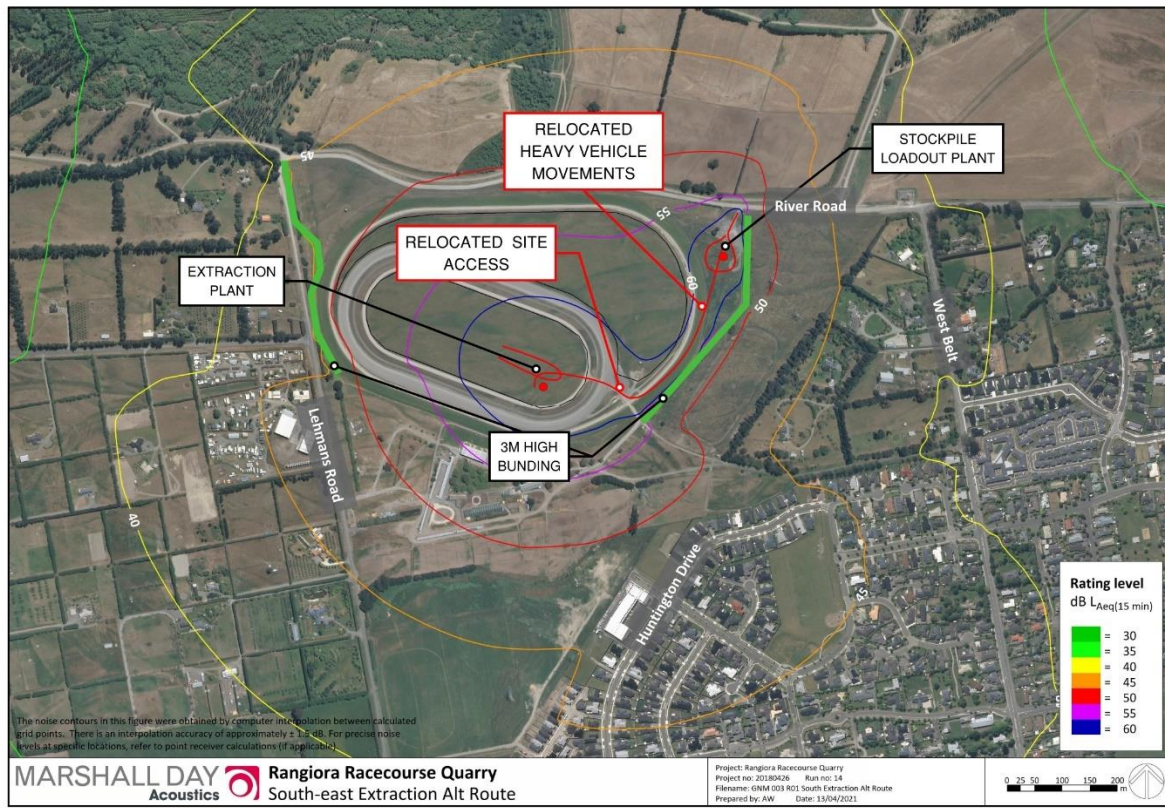
Jon Farren

19 April 2021



Figure E1 Comparison of Figure 3 from the September 2020 Assessment of Noise Effects report to the same scenario with an alternative truck access point

SITE NOISE EMISSIONS WITH ALTERNATIVE SITE ACCESS AND HAUL ROUTE, 13 APRIL 2021



FROM THE ASSESSMENT OF NOISE EFFECTS, 20 SEPTEMBER 2020

Figure 5: South-East Extraction Noise Contour

