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BEFORE Independent Commissioners appointed by Tasman District Council

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of an application by CJ Industries Ltd for land use consent RM200488 for gravel extraction and associated site rehabilitation and amenity planting and for land use consent RM200489 to establish and use vehicle access on an unformed legal road and erect associated signage

EVIDENCE OF RHYS LEONARD HEGLEY ON BEHALF OF CJ INDUSTRIES (ACOUSTICS)

1. INTRODUCTION

1.1 My full name is Rhys Leonard Hegley. I am a partner at Hegley Acoustic Consultants.

1.2 The applicant has applied for resource consents authorising the extraction of gravel, stockpiling of topsoil and subsoil, and reinstatement of quarried land, with associated amenity planting, signage and access formation at 134 Peach Island Road, Motueka:

(a) RM200488 land use consent for gravel extraction and associated site rehabilitation and amenity planting and

(b) RM200489 land use consent to establish and use vehicle access on an unformed legal road and erect associated signage

1.3 My evidence addresses the acoustic assessment of the activities for which consent is sought.

Original filename - "112-20220715 Noise evidence FINAL.pdf"

Qualifications and Experience

1.4 I hold a Bachelor of Engineering from the University of Auckland (1993) and have attended specialist courses in acoustics in Australia and America. I am a member of the Institution of Professional Engineers New Zealand.

1.5 For the last 22 years I have specialised in the measurement and assessment of noise. This work has included the preparation of reports and compliance monitoring for resource consent applications and notices of requirement and attendance at council hearings, the Environment Court and Boards of Inquiry.

1.6 I have advised on a wide range of activities from the development of business activities such as childcare centres, service stations and workshops through to large scale industrial activities such as petrochemical plants, power stations, dairy factories and roading projects.

1.7 My technical skills and experience directly relevant to my assessment include working on hard rock quarries varying in size from small owner operated quarries through to Brookby Quarry which currently produces over 6.1 million tonnes of aggregate per annum. I have also worked on lime quarriers and a number of sand and pumice pits as well as numerous excavations for building sites.

1.8 I have visited the site and surrounding area.

Purpose and Scope of Evidence

1.9 The purpose of my evidence is to assess the noise effects of the proposal, and to provide recommendations to avoid, remedy or mitigate adverse effects of noise. Where appropriate, I have responded to submitter comments in the body of my evidence with outstanding queries being addressed in a separate section.

Code of Conduct

1.10 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014 and I agree to comply with it. My evidence is within my area of expertise, however where I make statements on issues that are not in my area of expertise, I will state whose evidence I have relied upon. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

2. EXECUTIVE SUMMARY

2.1 Analysis shows that the operational noise from the proposal will be below the levels that the Tasman Resource Management Plan (TRMP) considers appropriate for a rural environment. A comparison to the ambient sound shows that noise from the proposal will be apparent, but at levels that are comparable to the existing sound environment. From this, I have concluded that the effects of noise from the proposed quarry will range from minor to less than minor to the surrounding properties.

2.2 Analysis of noise from quarry trucks on the local road network show that while individual trucks may be apparent, there are too few trucks to result in a noticeable change to traffic noise in the surrounding area. As such, my conclusion with respect to truck movements is that the noise effects are less than minor.

3. EVIDENCE

The proposal

3.1 Topsoil and subsoil will be removed from extraction areas for the day using an excavator and will be transported to a stockpile using dump trucks.

3.2 Aggregates will then be extracted and transported to the stockpile (Figure 1) using an excavator and 30-ton dump trucks. The stockpile area is located centrally, behind the stop bank and its base is 1 m below ground level to reduce noise and visual effects. A front end loader will then back load the dump trucks with imported clean fill for transporting back to the excavation site where it will be spread with an excavator or bulldozer. At the end of each day, clean fill will replace extracted material so that the pit size will be no greater than 1600m2. i.e., 20 x 80m, although the shape may vary from time to time. In this way the extraction site will move daily. It is envisioned that extraction, transportation to the stockpile and the return of fill would only need to take place approximately one week each month.

3.3 Road trucks arriving on site will deposit any imported cleanfill near the stockpile before being loaded with aggregate using the front end loader for removal from site. It is understood that 15 road trucks per day are expected to visit the site (30 movements). This equates to an average of 1.5 return trips (3 movements) per hour. However, to demonstrate that there is some flexibility in the number of movements per hour and in my analysis, I have based my calculations on 4 return trips (8 movements) per hour.

3.4 There will be no processing of rock, such as crushing and/ or screening, on site.

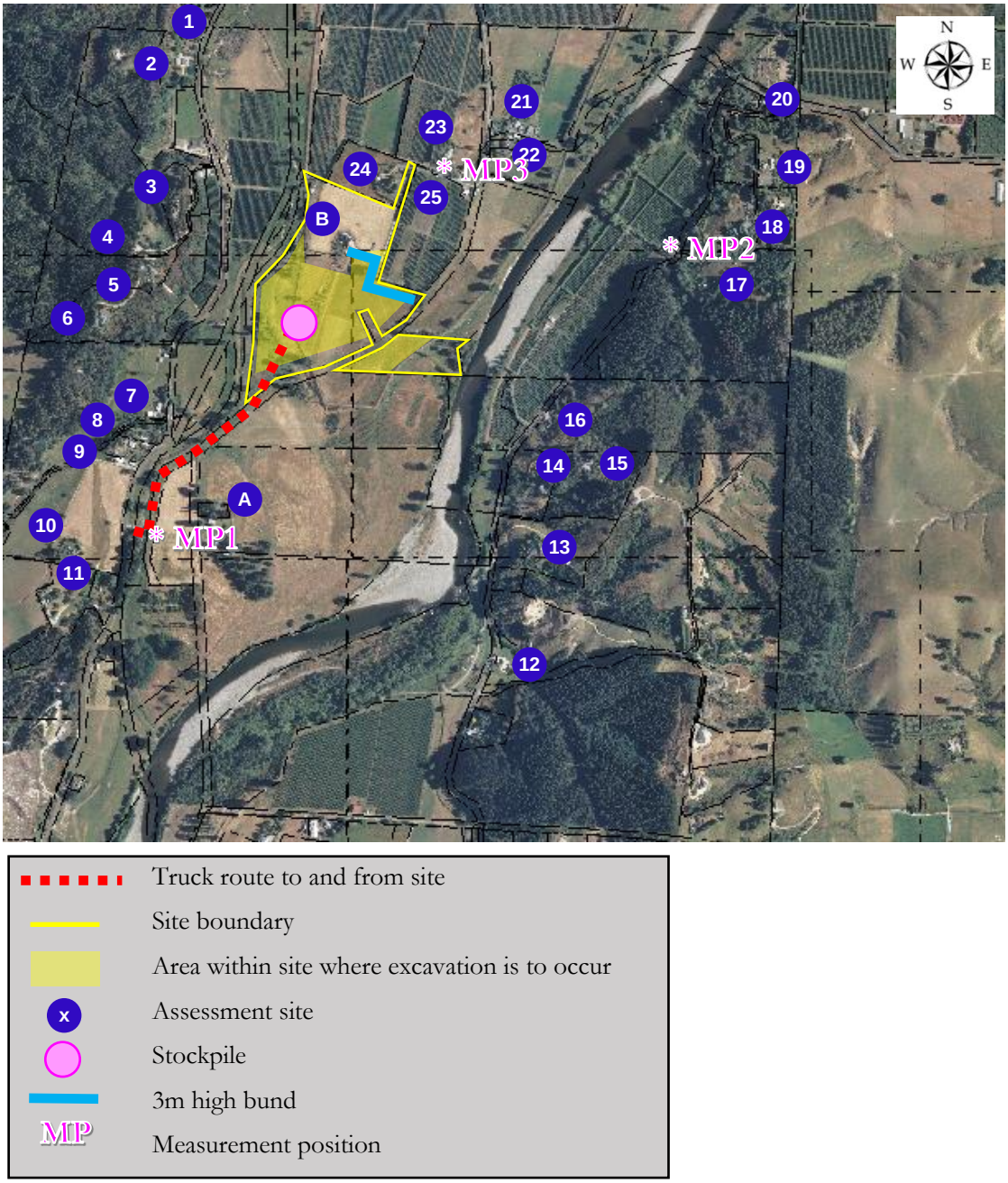

Figure 1. Aerial Photograph of Site and Surrounding Area

Prediction of Operational Noise Levels

3.5 The calculations of operational noise from the proposal were undertaken using the methods describe by the International Standards ISO 9613 parts 1 and 2[1]. These calculations were performed using the Predictor computer noise modelling software. This approach represents current best practice and, based on compliance monitoring I have undertaken not only of other quarries but of numerous other activities I have modelled in a similar way, I believe that it provides an accurate method of calculating the future noise levels from a project.

3.6 I provide a full description of the calculation method in my Assessment of Noise Effects (ANE) that was submitted with the consent application, and I do not repeat the technical details in my evidence. Since I prepared my ANE, the operation of the proposal has progressed and, for this evidence, I have updated the modelling in the following manner:

(a) For the ANE, I modelled road trucks being loaded at both the stockpile and from the excavation area. Modelling has now been amended so that the road trucks are limited to the stockpile only;

(b) For the ANE, modelling included a front end loader loading the road trucks, either at the work face or the stockpile. The model has been amended so that road trucks are only loaded at the stockpile;

(c) Modelling now also includes the use of a bulldozer to spread the imported cleanfill over the fill area;

(d) As discussed below, the dwelling at 131 Peach Island Road (which was omitted from the ANE) has been added to the noise model;

(e) A 3.0m high bund (Figure 1) is now proposed to screen 131 Peach Island Road from the effects of the proposal; and

(f) The alignment of the access road between Motueka River West Bank Road and the stockpile has been updated slightly. The applicant intends

[1] ISO 9613-1:1993 "Acoustics -- Attenuation of sound during propagation outdoors - Part 1: Calculation of the absorption of sound by the atmosphere"

ISO 9613-2:1996 "Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation"

to seal the access road. As part of the access road that traverses the marginal strip, both use of and sealing of the road are subject to DOC approval. At this point, analysis has adopted the conservative assumption of an unsealed access road as this will result in higher truck noise levels due to body rattle. If the access road is sealed, the effects will be reduced.

3.7 While the above changes have resulted in changes in noise level compared to those reported in the ANE, they are (with the exception of 131 Peach Island Road) too small to be noticeable (change <3dB). Appendix A sets out the noise levels from both the ANE and from Table 1 of this evidence side by side to allow a direct comparison.

3.8 Submitters have raised further queries on the modelling, which I have addressed below.

Topography

3.9 Submissions by J. Azzis, Wakatū Incorporation, A. Woodcock, P. Dixon-Didier, A. Garmey, K. Chamberlain, O. Langridge, N. Langridge and P. Taia all identify the importance of topography on noise propagation. The Predictor noise model was built using three dimensional ground contours for the entire area. In this manner, it is possible for the noise model to fully account for the effects of topography such as distance, screening and surface reflection. On this latter issue, Predictor requires the ground surface to be specified to ensure the correct ground absorption coefficients are used for the calculation.

3.10 The following Figure 2 provides a screenshot of the topography portion of Predictor only. It is viewed from above and from the south east showing the site and its stop banks, as well as land to the north and south and the hills to the east and west.

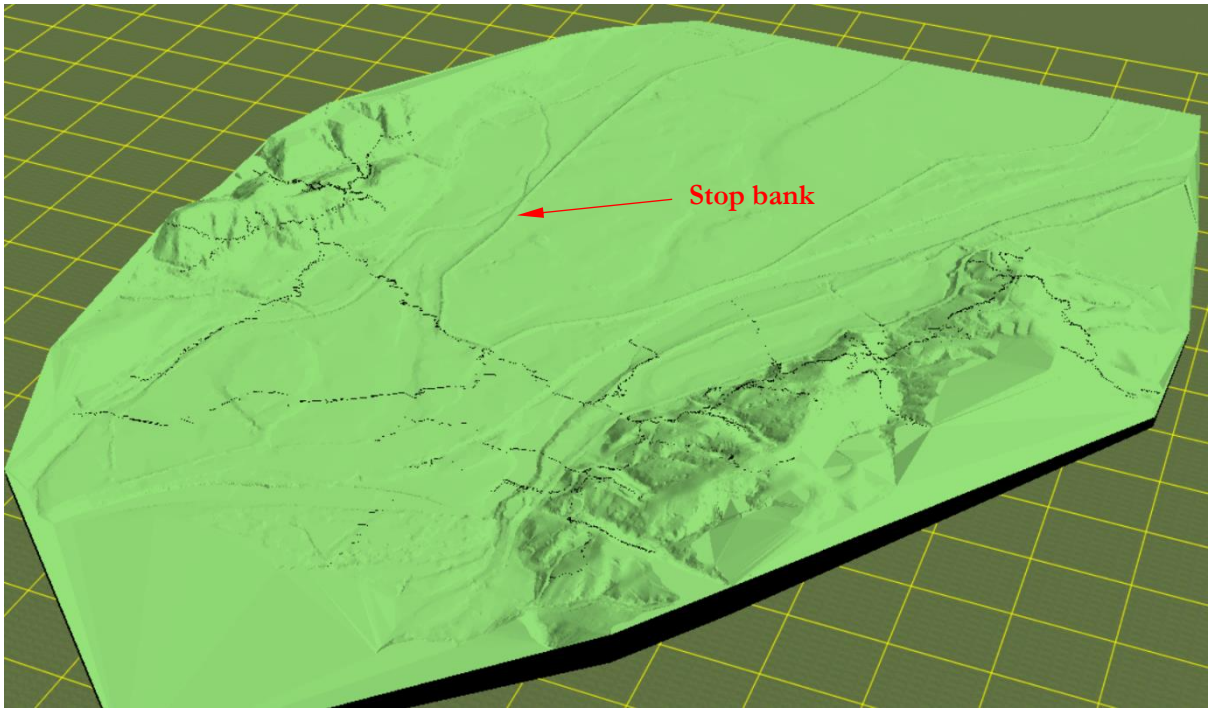

Figure 2. Aerial View from the South East of the Topography used for the Noise Predictions

3.11 In paragraph 3.52 below I confirm the accuracy of the Predictor noise model by comparing predictions and measurements of road traffic noise. The conclusion is that the model is accurate to within 1dB.

Source Data

3.12 All noise predictions rely on accurate base noise data for the noise source being considered. I have measured a large number of examples of each type of plant proposed for Peach Island (e.g. excavators) and have adopted what I consider to be appropriate data. Submissions by J & V. Walker and G. & C. Le Frantz each provide noise levels from excavators operating. However, without knowing the distance at which the measurements were undertaken, they cannot be used for calculation. For reference, my source data consisted of the following sound power levels (which are independent of distance):

(a) Excavator – 103dBA;

(b) Loader – 105dBA

(c) Bulldozer – 106dBA;

(d) Dump trucks – 107dBA

(e) Road truck, full – 102dBA

(f) Road truck, empty – 108dBA

3.13 Submissions by E. Mahoney and P. Taia correctly note that the level of noise from empty road trucks as they pass over rough ground can be higher than from full trucks. My modelling differentiated between empty and full trucks to accurately model the effects of the proposal.

3.14 In response to the submission by D & J Stringer, no crusher, or any other processing, is proposed for the site.

Reversing Plant

3.15 The submission by M. Swainson requests that the backing sound from trucks be removed. Mobile plant often has an audible reversing signal that, if tonal, can be quite noticeable and result in annoyance. In my ANE, I proposed that should such warning devices be required by law for the plant domiciled on site (front end loader, excavator, bulldozer and dump trucks), broadband alarms (which sound like static) must be used instead of tonal alarms as they are much less distinguishable through the ambient sound and generally do not result in a noise nuisance. Road trucks visiting the site may be independently owned meaning the applicant will have no control over the type of alarm. As a result, the use of reversing alarms can be avoided by ensuring the trucks can only travel one way about the site, which removes any need to reverse. The above solutions are often used to effectively manage noise effects of mobile plant and are suggested as possible conditions.

131 Peach Island Road

3.16 In their submission G & C Le Frantz point out that I did not include their property at 131 Peach Island Road in my assessment. This is repeated by the submission of J & V Walker. I have added this dwelling into my analysis and provide the predicted level of noise and subsequent assessment below.

Recommendations to avoid, remedy, or mitigate effects

3.17 The mitigation measures adopted to control noise effects from the proposal are:

(a) A condition is proposed that if audible reversing alarms are required on any plant, it shall be of a broadband rather than tonal type;

(b) A condition is proposed requiring the trays of the road trucks to be lined with a plastic liner to reduce the impact noise resulting from the load being placed in the tray. Measurements commissioned by the applicant at another site have shown reductions in the order of 10dB are possible using liners[2].

(c) A condition is proposed to construct a bund at least 3m high along the eastern portion of the northern site boundary to screen the dwelling at 131 Peach Island Road;

(d) Operating hours are limited to 7 am to 5 pm Monday to Friday. The applicant now proposes an additional limitation whereby heavy machinery must not be used before 7.30 am on those days; and

(e) A condition is proposed that, subject to the necessary consents being granted, the access road on site will be sealed. This will reduce body rattle from trucks and, therefore, the noise levels reported in Table 1.

Noise from the On Site Activities

CONSTRUCTION NOISE

3.18 Building the 3.0m bund to part of the northern boundary is considered a construction activity, which 17.2B B(20) provides noise limits of 70dB L_{Aeq} and 85dB L_{AFmax} when measured 1m from the most exposed façade of a dwelling.

3.19 Noise from the construction of the bund has been predicted to 131 Peach Island Road (Site 25) only, as this is the closest site to the bund. Further, operational noise to all other sites will be louder than the construction noise as the operational quarry uses more

[2] Hemisphere Health, Simply Noise Survey – Tray Liner Control, 20/04/2021

plant than will be used for the construction of the bund and the remaining sites are not screened by the bund.

3.20 Analysis using predictor shows that the resulting level to 131 Peach Island Road from bund construction will be 51dB L_{Aeq} and 69dB L_{AFmax}. This level comfortably complies with the construction noise limits meaning the bund can be constructed in full compliance with accepted limits.

QUARRYING NOISE

3.21 Noise from plant operating on site will vary over time as the excavation moves across the site. The following Table presents the range of expected noise levels to each residence considered in the assessment over the life of the proposal. Like the ANE, the levels reported are for all of the plant operating (full site), which includes the extraction, transporting to the stock pile and then the loading from the stock pile and the road trucks transporting the material from site and the placement of cleanfill. Given that these activities will only occur together for an estimated one week per month, Table 1 also includes the noise levels from the more common situation of the road trucks visiting the site and being loaded from the stock pile (loadout) to provide a more detailed understanding of noise from the proposal. As the loadout occurs from a fixed location (the stockpile), there is no range in the levels.

Table 1. Predicted Noise Level from the Proposal

Site (Fig 1)	Site Address	Predicted Noise Level Range from Onsite Activities (dBA L_{eq})	
		Loadout Only	Full Site
1	352 Motueka River West Bank Road	32	35 - 38
2	370 Motueka River West Bank Road	33	37 - 40
3	392 Motueka River West Bank Road	39	43 - 47
4	394 Motueka River West Bank Road	29	35 - 37
5	396 Motueka River West Bank Road	41	45 - 48
6	398 Motueka River West Bank Road	40	42 - 45
7	458 Motueka River West Bank Road	47	48 - 50
8	470 Motueka River West Bank Road	49	50 - 51

Site (Fig 1)	Site Address	Predicted Noise Level Range from Onsite Activities (dBA L_{eq})	
		Loadout Only	Full Site
9	472 Motueka River West Bank Road	49	50 - 51
10	478 Motueka River West Bank Road	41	42 - 43
11	506 Motueka River West Bank Road	41	42 - 43
12	155 Motueka Valley Highway	32	34 - 36
13	133 Motueka Valley Highway	34	38 - 40
14	119 Motueka Valley Highway	33	36 - 38
15	Motueka Valley Highway	34	38 - 41
16	85 Motueka Valley Highway	36	39 - 44
17	45 Motueka Valley Highway	27	31 - 34
18	273 College Street	30	34 - 36
19	269 College Street	28	32 - 34
20	279 College Street	21	25 - 26
21	113 Peach Island Road	30	35 - 40
22	121 Peach Island Road	32	37 - 41
23	130 Peach Island Road	34	39 - 44
24	132 Peach Island Road	36	41 - 48
25	131 Peach Island Road	38	42 - 47

Potential effects on the environment

3.22 In considering the effects that will result from the predicted levels of noise from the proposal, I have referred to the relevant provisions of the TRMP which are contained within Chapter 5 Site Amenity Effects and Chapter 7 Rural Effects. At a high level, the key directions for the purposes of assessing noise effects appear to me to be:

(a) Objective 5.1.2 To avoid, remedy or mitigate the adverse effects from the use of land on the use and enjoyment of other land and on the qualities of natural and physical resources

(b) Policy 5.1.3.9 To avoid, remedy or mitigate the effects of: (a) noise and vibration … beyond the boundaries of the site generating the effect.

(c) Objective 5.2.2 Maintenance and enhancement of amenity values on site and within communities throughout the district.

(d) Policy 5.2.3.8 To avoid, remedy or mitigate the adverse effects of traffic (including noise) on the amenity of residential, commercial and rural areas

3.23 In paragraph 3.17 above, I set out the steps proposed to avoid, remedy or mitigate operational noise from the proposal. In this section, I consider whether the resulting levels of noise can be considered appropriate and, as a result, the magnitude of the proposal's noise effects. To complete this assessment, I have:

(a) Considered what level of noise can be deemed appropriate for the rural environment;

(b) How the predicted levels would compare to activities that can be expected in the rural environment (the permitted base line); and

(c) How the predicted levels compare to the ambient sound.

Expected Noise Levels within the Rural Environment

3.24 In terms of the expectations of those within the Rural zone, Rule 17.5.2.1(c) of the TRMP provides permitted levels of noise between sites as follows:

> *Except in the Richmond West Development Area, noise generated by the activity, when measured at or within the notional boundary of any dwelling in a Rural zone (other than any dwelling on the site from which the noise is being generated), Rural Residential, Papakainga or Tourist Services zone, or at or within any site within a Residential Zone, does not exceed:*

	Day	***Night***
L_{eq}	*55 dBA*	*40 dBA*
L_{max}		*70 dBA*

> *Except as required by condition (e), this condition does not apply to all noise from any intermittent or temporary rural plant and animal production activity, including noise from:*
>
> *(i) mobile horticultural and agricultural equipment;*
>
> *(ii) forest and tree harvesting activities …*

(iii) animals, except when associated with intensive livestock farming and animal boarding activities;

(iv) bird scarers and hail cannons.

N.B. Day = 7.00 am to 9.00 pm Monday to Friday inclusive and 7.00 am to 6.00 pm Saturday (but excluding public holidays).

Night = All other times, plus public holidays.

3.25 Over the daytime period when the proposal will operate, the TRMP considers 55dBA L_{eq} to provide a reasonable level of amenity to residential activities. Table 1 reports that the uppermost level predicted from the proposed activities is 51dBA L_{eq} to both 470 and 472 Motueka River West Bank Road (sites 8 and 9) while all plant is operating and in the most exposed location. Using this approach, the noise from the quarry can be considered to comply comfortably with levels that are reasonable for the area.

3.26 On this point, NZS 68023 (which is referenced by the rural zone noise rule) provides useful guidance. The scope of this Standard includes:

"… provides useful guidance for the setting of noise limits for consent conditions, rules or national environmental standards"

3.27 The guidance offered by NZS 6802 is that the 55dBA L_{eq} daytime limit of 17.5.2.1(c) is the upper level recommended for residential use. By adopting such a limit, it is my view that 17.5.2.1(c) is signalling its intention to be permissive of activities to the point permitted by residential amenity.

Permitted Baseline

3.28 My understanding of the permitted baseline is that decision makers have the discretion to disregard the effect of an activity on the environment if the plan permits an activity with that effect. In this context, it is the effect of noise that requires consideration, and which is assessed using level, duration and any particular characteristic of the noise. I do not, therefore, consider that the description of a type of activity is useful in assessing noise

[3] NZS6802: 2008 Acoustics – Environmental noise

effects. For example, the effect of noise from a truck operating is related to the level of truck noise and its duration but not where the truck is or the reason it is there in the first place.

3.29 As I described above, I consider that rule 17.5.2.1(c) of the TRMP sets the expectations for noise in the rural zone. It is relevant that this rule exempts some permitted activities, which I understand to include recontouring of the site, the formation of a road or track (up to 100m per hectare) and horticultural and agricultural activities. As such, the rural zone could expect higher noise levels than described by the numerical limits of the rule, or than predicted from the proposal, albeit for what would be over a limited, but unspecified, duration. My view is, therefore, that describing the permitted baseline through activity definitions alone is incorrect and that a first principle approach is necessary.

3.30 A likely difference between the description of the permitted activities and the proposal is the duration. It is generally accepted that a noise that is not present over the entire day is considered to have less effect than a continuous noise. The TRMP addresses this through its adoption of NZS 6802, which accounts for the duration of an activity by allowing periods of noise to be averaged with other parts of the day with no noise, by up to 5dB. In this manner, a measured level of, for example, 60dBA L_{eq} from a permitted and intermittent activity would be reported as 55dBA L_{eq}. In section 4.2 of my ANE I note that I have not averaged quarry noise at all. It is my view that the TRMP provides a mechanism to fairly compare noise effects of different durations.

3.31 A sound with a distinctive characteristic can affect its subjective acceptability. NZS 6802 also provides an assessment mechanism for such sounds through the penalty applied to activities considered to have a special audible characteristic, such as those that are tonal or impulsive. For the proposal, I do not consider that the noise from the plant being used should attract a special audible characteristic penalty.

3.32 My view is, therefore, that the permitted noise baseline for the rural zone is fully described by the noise limits of 17.5.2.1(c), and its reference to NZS 6802 which the proposal has been designed to meet comfortably.

Ambient Sound

3.33 To demonstrate how the noise from the proposal will compare to the current environment, the ambient sound was measured using a variety of long and short term measurements. The three measurement positions are identified on Figure 1. To describe the ambient sound, the L_{eq} and L_{90} metrics are reported. The L_{eq} matches that used by the TRMP and generally correlates to how an observer would describe the sound. The L_{90} is the sound level that is exceeded for 90% of the time, or nearly all of the time. This is used to describe the background sound, or the level that is nearly always present. When the L_{eq} and L_{90} are similar in level, the sound they are describing is tending towards constant (such as ventilation). When the L_{eq} and L_{90} differ, the sound environment consists of discrete noises that are elevated above the background sound. An example would be infrequent traffic.

SITES 8 and 9

3.34 Two receivers that are predicted to be more exposed to noise from the proposed quarry are 470 and 472 Motueka River West Bank Road (Sites 8 and 9) which are both relatively close to the road. To determine the ambient sound that these two properties experience a logger was left on the opposite side of the road, approximately 50m from the carriageway (MP1, Figure 1). Of sites 8 and 9, the closest building is between approximately 10m and 25m from the carriageway. As such, the logger will under-represent the ambient sound experienced by these two properties as both are closer to the road than the logger. Regardless, a direct comparison has been made on the understanding that the result is likely conservative.

3.35 The logger gathered information over 28 February and 1 March 2022. During this time the weather was generally fine and warm with light winds. Cloud cover varied between overcast and clear.

3.36 Figure 3 shows the ambient sound recorded by the logger at MP1. While the entire 24 hour period was recorded, Figure 3 only reports the 7am – 9pm period, as this matches the daytime as defined by the TRMP and covers the period when the quarry will operate (7 am to 5 pm Monday to Friday).

Figure 3. Ambient Sound Measurement at MP1

3.37 Figure 3 shows a reasonably steady noise environment. While on site, noise sources noted were distant traffic, livestock and passing vehicles on Motekoa River West Bank Road. Measured L_{eq} levels were in the mid 40 to low 50dBA range while the background sound (L_{90}) was typically in the mid 40dBA range throughout the measurement period. Table 1 shows that, for the majority of the time, when road trucks are being loaded out from the stockpile, the level of noise to these two sites will be 49dBA L_{eq}. During such times the noise from the proposal will be comparable to the ambient sound in both level and nature as it will be controlled by individual truck movements, which is currently the case from traffic on Motueka River West Bank Road.

3.38 During the approximately one week per month when the excavation will occur, noise from the excavation alone will be in the 36 – 45dBA L_{eq} range which, when combined with the road trucks above (and rounding), results in the 50 – 51dBA L_{eq} range provided in Table 1. During these periods, the noise from the proposal can be likened to the current ambient sound as the steady noise from the excavation is well within the current background sound range. Noise from the discrete truck movements on site is, as described above, comparable to the traffic already on Motueka River West Bank Road.

Should quarrying occur for more than one week per month, the only change to the above would be the length of time that the lower levels of excavator noise (36 – 45dBA L_{eq}) were present.

3.39 Based on the above, I do not consider that the noise from the proposal will result in a noticeable reduction in amenity to sites 8 and 9, the most exposed to noise from the proposal and, consequently, that the proposal satisfies the provisions of the TRMP, which I have summarised in 3.22.

SITE 25

3.40 The loggers were supplemented with a short term, 15 minute, measurement on the road reserve outside 131 Peach Island Road (Site 25). At this location, the ambient sound was noted to be similar in nature, but not level, to MP1. The ambient sound at 131 Peach Island Road can, therefore, be approximated by adjusting the MP1 measurement by the difference between the 15 minute measurement and the measured level over the same 15 minute period at MP1. As a result, ambient sound (L_{eq})at 131 Peach Island Road ranges from the high 30dB to mid 40dB range while the background (L_{90}) was in the mid 30dB range. These levels describe a relatively quiet environment.

3.41 I understand that an Environmental Health Officer from the Council undertook a short measurement of the ambient sound in a similar location to myself. The reported level of 39dBA L_{eq} is consistent with the high 30dBA to mid 40dBA range I have reported above.

3.42 During the approximate three weeks per month when it is likely that the only activity will be loading and unloading of road trucks and truck movements, the resulting noise level of 38dBA L_{eq} would be comparable to the current ambient sound environment in both nature and level.

3.43 During times when excavation and backfilling is taking place as well (likely to be approximately one week per month), the noise from all proposed activities would be 42 – 47dBA L_{eq} and similar to the current ambient sound level (L_{eq}) but above the current level of background sound.

3.44 In assessing the magnitude of the adverse effect, one approach is the 'background plus' approach whereby the amount by which the predicted levels exceed the background sound (L_{90}) provides an indication as to the magnitude of the effect. This approach was referenced in early versions of NZS 6802 but was specifically removed from the current

edition due to its short comings, particularly in situations with high or low background sound. My view is that while a comparison to the ambient sound is relevant to the assessment, it must be undertaken in the context of the expectations for the area.

3.45 With this in mind, I consider that the noise from excavation and backfilling would be quite noticeable at Site 25. However, noticeability is not a metric used by the TRMP for assessing effects but rather the provisions reference to avoid, remedy or mitigating the adverse effects on the use and enjoyment of land and maintenance and enhancement of amenity values. (para 3.22). I therefore consider that the proposal will have an adverse effect on Site 25. In terms of the magnitude of this effect, I note that with the proposed mitigation, the predicted range of 42 – 47dBA L_{eq} is significantly below the 55dBA L_{eq} TRMP considers appropriate for the area and, on that basis, I consider that the predicted levels can be described as reasonable and appropriate which leads to the overall conclusion that the adverse effects on Site 25 would be minor, will be mitigated, and will maintain an appropriate level of amenity.

REMAINING SITES

3.46 It was not practicable to measure ambient sound to all other nearby sites. However, by demonstrating reasonable effects to the most exposed sites, and what is considered one of the quieter sites, it is considered that the conclusions for these two sites can be applied to all neighbouring sites.

3.47 I consider that the effects of operational noise have been avoided, remedied or mitigated such that the predicted levels are reasonable, the effects are no more than minor, and the level of noise would be consistent with maintaining the expectations of the local environment as to amenity.

Road Traffic Noise

3.48 My ANE was based on the effects of the gravel extraction project itself meaning it did not consider noise effects from activities undertaken outside of the site. A common theme of submissions[4] was noise from the quarry road trucks while on public roads. It is typical for District Plans throughout New Zealand to omit controls for noise from traffic

[4] C. Woollett, P. Prescott, P. Dixon-Didier, M. Major, T. Shuttleworth & J. Shay, I. Douglas & A. Nobel, P. Hart, M. Wilson, S. Meijer, W. Wallator, A. Massey, A. Garmey, B. & L. Evans and Valley RAGE.

on roads. Some Plans adopt NZS 6806[5] for assessing the noise effects of new roads or altered roads, but this Standard does not apply to the use of an existing road. Rule 18.8.2.1 of the TRMP states that any land use within the Road Area is a permitted activity provided the activity does not prevent or hinder the construction, reconstruction, maintenance or use of the road. There are no rules in the TRMP relating to the control of noise from roads.

3.49 I have considered noise from the predicted 15 return (30 total) truck movements per day. Traffic flow data for roads is generally provided as a daily flow. Road traffic noise levels are also calculated over the full 24 hour period ($L_{eq(24hr)}$) as this has been shown to correlate well to people's reaction to traffic noise. This metric differs from that used by the TRMP for noise between sites. I have not adopted the L_{max} metric for road traffic as this is used for sleep protection, which is not relevant to the daytime period when the trucks will be operating.

3.50 I have predicted road traffic noise using the same Predictor noise model as described above but using road noise algorithms[6] tailored specifically for New Zealand conditions[7] rather than the ISO method used for the prediction of operational noise. This is the generally accepted method of predicting road traffic noise in New Zealand.

3.51 The applicant's traffic engineer, Mr Clark, has provided the existing traffic data for Motueka Valley Highway and Motueka River West Bank Road. In terms of the additional traffic as a result of the quarry, I understand that all truck movements will be to/ from the south of the quarry on Motueka River West Band Road where they will cross Alexander Bridge and head north along Motueka Valley Highway.

3.52 The accuracy of the Predictor noise model can be checked through a comparison to the measured levels (for two days) at measurement positions 1 and 2 (Figure 1) as these were controlled by road traffic. This comparison is presented in Table 2 below.

[5] NZS 6806: 2010 'Acoustics – Road – Traffic Noise – New and Altered Roads'

[6] 'Calculation of Road Traffic Noise', Department of Transport Welsh Office, 1988.

[7] 'Traffic Noise from Uninterrupted Traffic Flows', Transit New Zealand Research Report No. 28. 1994

Table 2. Verification of Noise Model

Site	Noise Level (dBA $L_{eq(24hr)}$)		
	Measured (2 days)	Predicted	Difference (2 days)
MP1	46, 46	45	-1, -1
MP2	58, 60	59	-1, +1

3.53 Table 2 shows good correlation between the measured and predicted noise levels and confirms the accuracy of the model.

3.54 The predicted levels of road traffic noise to the surrounding dwellings are:

Table 3. Existing and Proposed Road Traffic Noise Levels

Site (Fig 1)	Address	Road Traffic Noise Level, dB $L_{Aeq(24hr)}$		
		Existing	Proposed	Increase
1	352 Motueka River West Bank Rd	47	47	0
2	370 Motueka River West Bank Rd	45	45	0
3	392 Motueka River West Bank Rd	43	43	0
4	394 Motueka River West Bank Rd	31	31	0.2
5	396 Motueka River West Bank Rd	41	42	0.6
6	398 Motueka River West Bank Rd	41	41	0.3
7	458 Motueka River West Bank Rd	55	55	0.4
8	470 Motueka River West Bank Rd	55	56	1.4
9	472 Motueka River West Bank Rd	52	53	1.3
10	478 Motueka River West Bank Rd	42	43	1.7
11	506 Motueka River West Bank Rd	47	50	2.3
12	155 Motueka Valley Highway	61	62	0.7
13	133 Motueka Valley Highway	49	50	0.8
14	119 Motueka Valley Highway	44	44	0.7
15	Motueka Valley Highway	39	39	0.7
16	85 Motueka Valley Highway	65	66	1.5
17	45 Motueka Valley Highway	45	46	0.7
18	273 College Street	47	48	0.8
19	269 College Street	43	43	0.7
20	279 College Street	52	53	0.7
21	113 Peach Island Rd	39	40	0.8
22	121 Peach Island Rd	39	40	0.8
23	130 Peach Island Rd	38	39	0.8
24	132 Peach Island Rd	37	38	0.9
25	131 Peach Island Rd	38	39	0.9

3.55 In terms of assessing the effects of the additional trucks to the road network, I have considered the resulting changes in noise level. It is generally recognised that a 3dBA change in noise (regardless of metric) is the smallest that the average person can detect while a 5dBA change is clearly noticeable and a 10dBA change is apparent as a doubling, or halving, in level. While it is typical to report levels to the nearest whole decibel, in this instance I have used 1 decimal place to demonstrate the magnitude of the changes.

3.56 Table 3 shows no change in the traffic noise level to the receivers on Motueka River West Bank Road north of the site accessway and increases in the order of 1 to 2 dB to all other receivers as a result of the quarry trucks. Based on the relatively small increases in noise level, it is concluded that, while individual trucks from the quarry may be apparent, the perception of neighbours would likely be that the road noise is unchanged as a result of the addition of the quarry trucks. Based on this, I do not consider that the quarry trucks on the road network will detract from the enjoyment of the land and that the proposal will have no noticeable effect on the amenity of the rural area. I consider the noise effects of the quarry trucks to be less than minor.

Matters raised in submissions

3.57 I have addressed the issues common to multiple submitters above. This section addresses the remaining issues.

T. Shuttleworth & J. Shay

3.58 Suggested condition 9 of this submission requests reduced speed limits for trucks on public roads and better road surface and conditions for the control of noise. I am advised that the applicant's traffic engineer, Mr Clark, has recommended reducing speeds of trucks using Motueka River West Bank Road to 60 km hour. This is unlikely to have any effect on traffic noise as reducing the speed by 30km/hr would be required for a noticeable reduction of 3dB and even then, it would have to apply to all vehicles on the road.

3.59 Resealing the road is unlikely to result in any noticeable reduction in noise level. While there are lower road noise surfaces available than the current chip seal, at speeds below 70km/hr (for trucks) it is generally engine noise that controls the noise to receivers, which is largely unaffected by road surface.

3.60 Improving the road surface would reduce body rattle from passing trucks. I am unable to determine the effects of any remedial works as there is no way of predicting body rattle from the new road surface.

Wildlife

3.61 Some submissions relate to the effect of noise on birds using the river. The effects are outside of my area of expertise and have been addressed by Mr Payne. In discussion with Mr Payne, I have prepared the following noise contour plots over the particular areas of river bank that he has identified as being of interest. The first shows the uppermost level of noise that would result when the excavation was occurring at the easternmost point of the proposal and, therefore, in the closest position to the river. When the excavation plant is operating in more westerly locations, noise to the river will reduce. Similarly, for the majority of the time when the only activity is material being transported to and from site (no excavation), levels will also be reduced. The resulting noise contour plot is shown below using the same L_{eq} noise metric as used by the TRMP. Care is required when comparing contours to reported noise levels (Table 1) as the contours only represent a plant in a single location and the method by which contours are produced means they are not as accurate as noise levels calculated at a specific location.

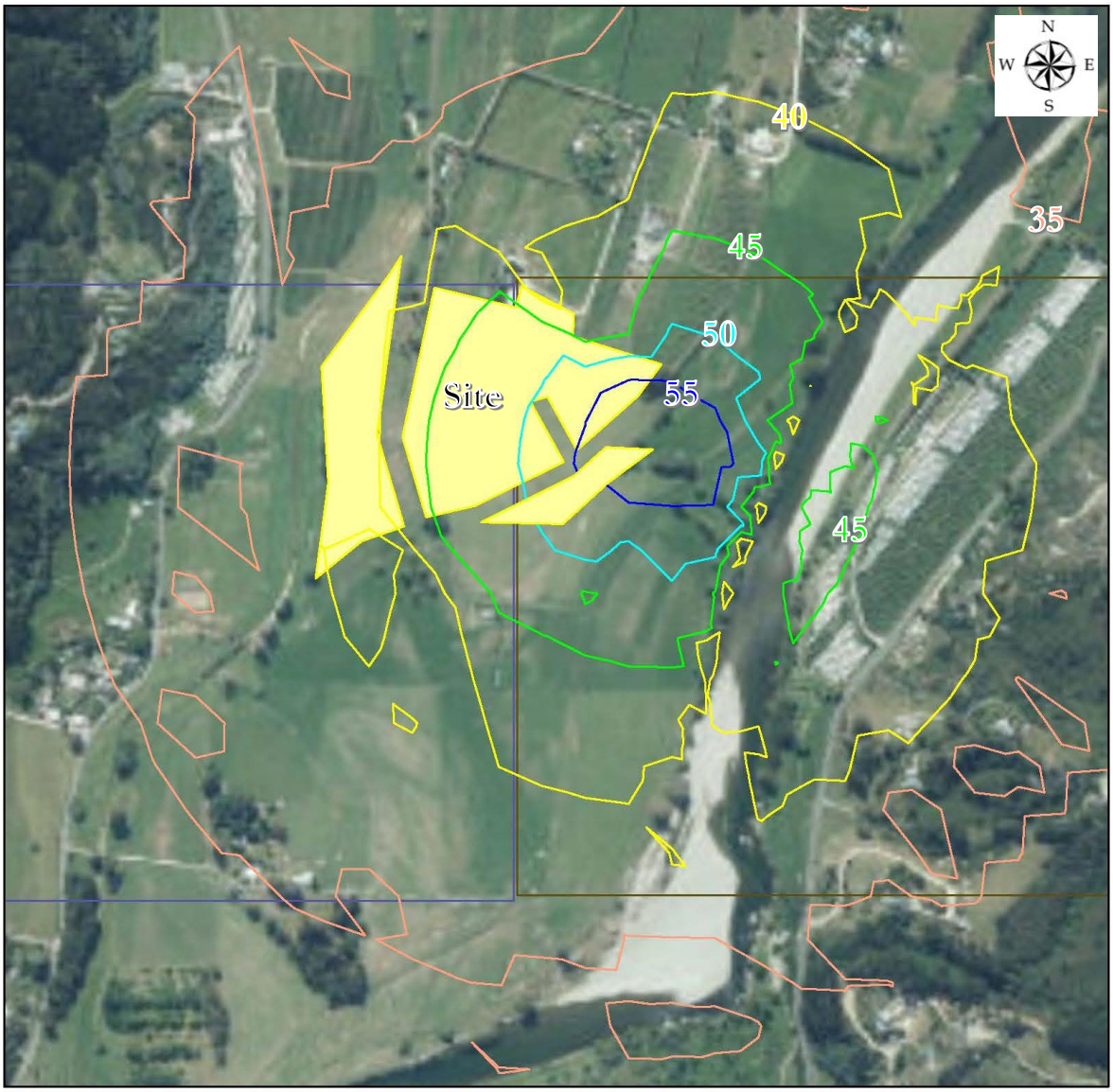

Figure 4. Operational Plant Noise Contours, dBA L_{eq}

3.62 To provide some context to the above levels, I have also provided the current levels of road traffic noise in the area and which are shown in the following Figure 5. As discussed above, the traffic noise is represented as an average noise level over a 24 hour period as opposed to the 15 minute period used for the proposal (Figure 4). As such, the two should not be compared and different colours have been used for the contour lines of Figures 4 and 5. However, the ambient measurement for the project demonstrates the generally observed trend for traffic noise where the levels over the daytime (Figure 3) are either at, or several dB above, the 24 hour level (Table 2). Using this approach, the following $L_{eq(24hr)}$ road traffic noise contours could be compared directly to the predicted

noise from the proposal with the knowledge that they are likely to slightly under represent the actual level of traffic noise during the period when the quarry will operate.

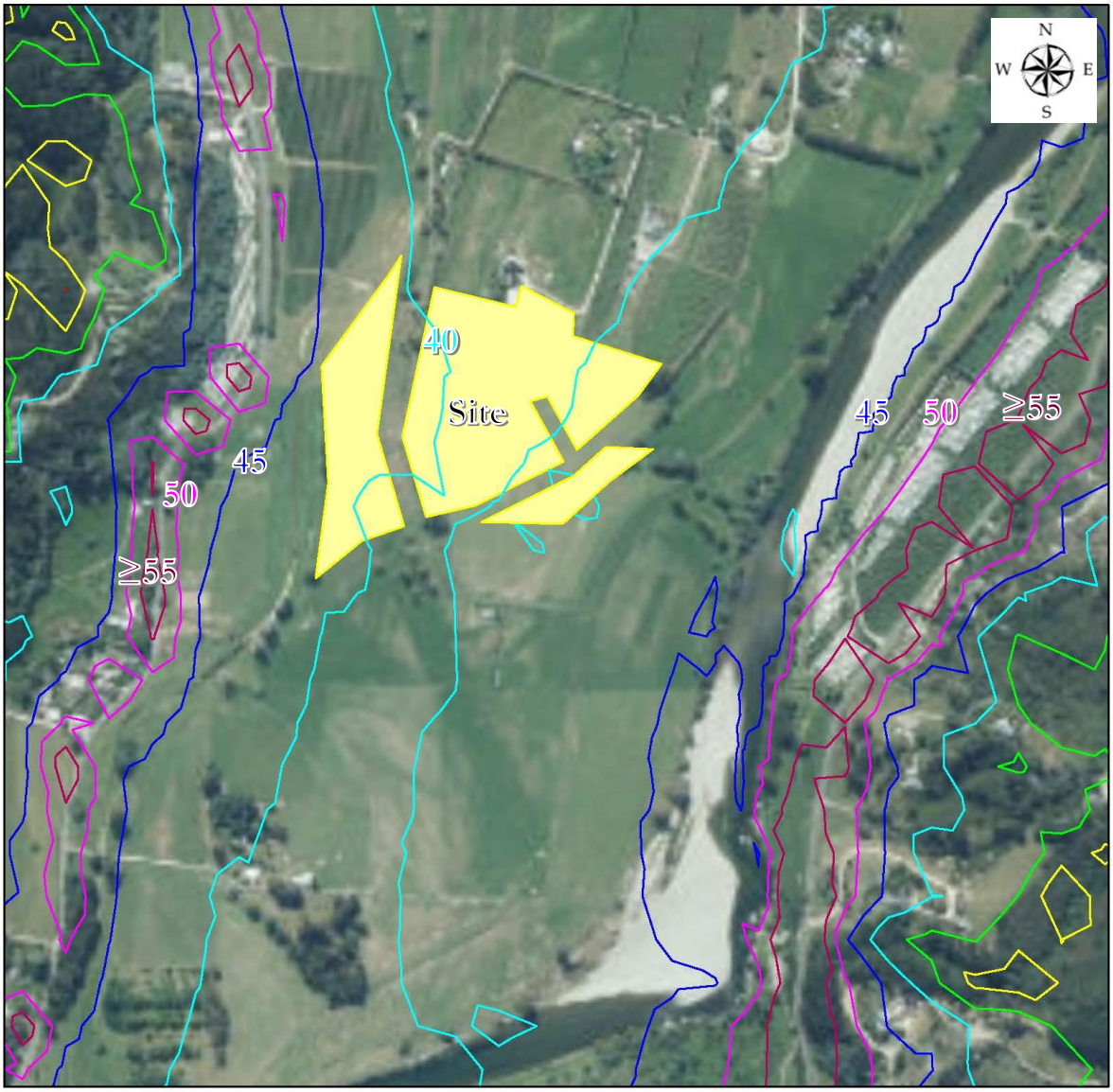

Figure 5. Current Road Traffic Noise Contours, dBA $L_{eq(24hr)}$

3.63 Figure 5 shows that the current levels of road traffic noise on the gravel bank immediately to the east of the site will be in the mid to low 40dBA $L_{eq(24hr)}$ range during the loudest periods of extraction meaning the L_{eq} range for comparison with the operational noise levels will be up to several dB higher. For periods when extraction is occurring further away, the levels will reduce. For the majority of the time, when the

only activity is the road trucks on site (no extraction), the levels will reduce to the mid 30dBA L_{eq} range (no contours have been prepared for this case).

H. Nash

3.64 This submission queries any negative impact that noise from the proposal would have on river uses. As discussed above a river user could expect levels up to the mid to low 40dBA L_{eq} as a result of the proposal while excavation was occurring, reducing to the mid 30dBA L_{eq} range for the majority of the time when road trucks were transporting material to and from the site. In terms of the effects on river users, I note that these levels are well within the levels considered suitable for residential amenity (rule 17.5.2.1(c)). Further, river users could reasonably expect noise from activities on the rural land (some of which have no control over noise levels) as well as from traffic on Motueka Valley Highway, which is clearly audible from the river in the vicinity of the proposal (Figure 5).

Matters raised in s 42A report

3.65 With respect to the permitted baseline, paragraph 6.9 of the S42a report notes that "… the noises associated with a gravel extraction would be different in character, intensity and duration from 'typical rural noises' including intermittent and temporary plant activity." I discuss the permitted baseline in paragraphs 3.27 to 3.30 above where I note my view that the TRMP noise rules can be used to define the baseline and that they can appropriately address activities of different character, intensity and duration through the standard acoustic assessment techniques of adopting suitable noise limits for a particular zone, averaging and the use of special audible characteristics.

3.66 The s 42A report discusses noise as an amenity effect in paragraphs 8.3 – 8.23. I respond as follows:

(a) Paragraph 8.5 and 8.11-8.13: I consider the permitted activity standards are relevant in terms of the level of noise anticipated in the zone as they describe the expectations of those in the zone and, therefore, can be used to describe the permitted baseline for noise. However, I understand that, not being a permitted activity, the permitted activity standards do not provide the sole threshold for assessment. I have, therefore, also assessed

the potential adverse effects of the noise of the proposed gravel extraction activity and of associated vehicle movements by comparing predicted noise with the ambient sound (modelled and measured). My conclusions on effects are set out in paragraphs 3.39, 3.45 and 3.47.

(b) Paragraph 8.7: The dwelling at 131 Peach Island Road has been added to my assessment (see Table 1 and 3 and paragraphs 3.40 – 3.45 above).

(c) Paragraph 8.9-8.10: the assessment of vehicle noise within the quarry is now based on the haul road location shown in the application, and effects on dwellings to all neighbouring dwellings, including 458, 470, 472 and 478 Motueka River West Bank Road, have been assessed based on that haul road location (see Table 1).

(d) Paragraphs 8.16: relates to submissions on shortening the hours of operation. The application limited the activity to 7 am to 5 pm Monday to Friday. My view is that the proposal falls within the daytime period as described by the TRMP and meets the noise limits considered reasonable for the rural zone. This being the case, I do not believe there is a need for the applicant to reduce hours of operation. However, I am advised that the applicant is volunteering not to use heavy machinery before 7.30 am.

(e) Paragraph 8.17: I support the reporting planner's view that tonal reversing alarms should not be used on site. Subject to my comments below, I generally support recommended condition 51(b) requiring broadband alarms to mobile plant.

(f) Paragraph 8.18: I have expanded my assessment of effects in paragraphs 3.22 – 3.47 above.

(g) Paragraph 8.22: In this paragraph, the reporting planner uses the 500m setback of new buildings in the rural zone from the boundary of a quarry as an indicator of possible effects. While the 500m setback may provide a good starting point for assessment, it cannot replace a detailed analysis of a particular quarry as it takes no account of the layout of the quarry (where noise sources are located), the plant used (its size, amount of plant

and whether screens and crusher are proposed) and any mitigation (bunds and topography). As such, while of interest, I do not consider the 500m rule should be given any consideration when specifically assessing this project.

4. RECOMMENDED CONDITIONS

4.1 I generally support the conditions recommended in the s42a report. I do, however, believe that they could be strengthened in several areas.

(a) Condition 49: This condition provides operational noise limits for the quarry and seems to be based on TRMP rule 17.5.2.1(c). I consider that the daytime limit of 55dBA should use the L_{eq} (as the TRMP) rather than the L_{10} proposed by the condition.

(b) Further, the condition offers an L_{max} night time limit but not a L_{eq} limit. For consistency, I believe that the night time criteria should include the 40dBA L_{eq} limit of the TRMP.

(c) The requirement to measure for exactly 15 minutes is unnecessary as NZS 6802 provides a full description of the duration of measurements. I also consider that the condition is open to interpretation without inclusion of NZS 6801 and NZS 6802 as part of the condition (as opposed to the practice note where they currently reside).

(d) Condition 51(b): I support the use of broadband warning alarms plant but suggest that it only apply to plant owned or managed by the applicant on the basis that the applicant will have limited control on plant visiting the site, such as trucks from independent contractors. In such instances, reversing could be negated by site layout.

(e) Condition 54: Prohibiting machinery moving over stockpiled soil could make it impossible to construct bunds. I suggest that this condition begin with "Other than for the construction of the noise control bund to 131 Peach Island Road …"

(f) To allow the construction of the noise control bund to 131 Peach Island Road, I recommend that the construction noise limits of 17.2B B(20) be conditioned to clarify that some activities on site are subject to different noise rules.

5. CONCLUSIONS

5.1 I have predicted noise from the gravel extraction proposed for 134 Peach Island Road using computer modelling. This approach takes into account all factors that influence the propagation of noise. It represents best practice and I have observed good correlation with measured levels at numerous other modelled sites.

5.2 Mitigation is proposed for the activity, including:

(a) Construct a bund to screen 131 Peach Island Road;

(b) Replace tonal reversing alarms with broadband ones;

(c) Line the trays of trucks with a plastic liner to reduce impact noise as loads are added; and

(d) Subject to the necessary consents being obtained, the access road to the stockpile will be sealed to reduce body rattle.

5.3 The resulting predicted levels of operational noise are considerably below the noise levels that the TRMP defines as reasonable for the rural zone. A comparison to the ambient sound shows that the levels to the most exposed houses will be clearly audible but consistent with the ambient sound.

5.4 The conclusion of operational noise is, therefore, that it is reasonable.

5.5 Noise from trucks on the local road network has also been considered. Analysis shows that, while individual trucks will likely be audible their contribution to the overall level of road traffic noise will be too low to change the average resident's perception of the noise from the road.

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Appendix A. Comparison Between Operational Noise Levels of the ANZ and Evidence

Site (Fig 1)	Site Address	Predicted Noise Level Range from Onsite Activities (dBA L_{eq})		
		ANE	Evidence	Change
1	352 Motueka River West Bank Road	38	35 - 38	0
2	370 Motueka River West Bank Road	40	37 - 40	0
3	392 Motueka River West Bank Road	48	43 - 47	-1
4	394 Motueka River West Bank Road	38	35 - 37	-1
5	396 Motueka River West Bank Road	49	45 - 48	-1
6	398 Motueka River West Bank Road	45	42 - 45	0
7	458 Motueka River West Bank Road	50	48 - 50	0
8	470 Motueka River West Bank Road	50	50 - 51	+1
9	472 Motueka River West Bank Road	49	50 - 51	+2
10	478 Motueka River West Bank Road	44	42 - 43	-1
11	506 Motueka River West Bank Road	44	42 - 43	-1
12	155 Motueka Valley Highway	36	34 - 36	0
13	133 Motueka Valley Highway	41	38 - 40	-1
14	119 Motueka Valley Highway	38	36 - 38	0
15	Motueka Valley Highway	42	38 - 41	-1
16	85 Motueka Valley Highway	44	39 - 44	0
17	45 Motueka Valley Highway	34	31 - 34	0
18	273 College Street	37	34 - 36	-1
19	269 College Street	35	32 - 34	-1
20	279 College Street	28	25 - 26	-2
21	113 Peach Island Road	42	35 - 40	-2
22	121 Peach Island Road	44	37 - 41	-3
23	130 Peach Island Road	46	39 - 44	-2
24	132 Peach Island Road	49	41 - 48	-1
25	131 Peach Island Road	NA	42 - 47	NA