

Appendix L

Noise Assessment (Hegley Acoustics)



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McPHERSON QUARRY

MANGATAWHIRI

ASSESSMENT OF NOISE EFFECTS

Report No 18185

Prepared for:

*Kinetic Environmental
Hamilton
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1 INTRODUCTION

McPherson Quarry is proposing to obtain resource consent for their existing operation and for the expansion of the quarry to extract up to 490,000 tonnes of quarry material annually. The existing quarry is shown on Figure 1.



Figure 1. Quarry Location

This report considers the noise effects of the existing conditions and the proposed expansion and how the noise will be controlled to within a reasonable level for the neighbours.

2 DISTRICT PLAN REQUIREMENTS

The site and all surrounding land is zoned Rural in the Operative Waikato District Plan (Franklin Section). The only noise controls for the zone are set out in Rule 23A.5.2.A which states:

8. Noise

The extent to which the adverse effects of noise at a notional boundary of 20m from any dwelling house outside the site will be avoided, remedied or mitigated. This includes such effects associated with the use of particular access point to the site.

9. Vibration and Blast Noise

Whether there are activities in the vicinity, which could be sensitive to noise and vibration effects from blasting.

The extent to which vibration from mineral extraction activities avoids significant nuisance or adverse effects, taking into consideration the following guidelines:

- *Measurement of blast noise (air blast) and ground vibration from representative blasts in accordance with Appendix J of Part 2 of Australian Standard AS2187:2:1993*
- *Noise created by the use of explosives measured at a notional boundary of 20 metres from dwelling houses not exceeding a peak overall sound pressure of 128dB linear peak.*
- *Restriction of blasting to between 1000 and 1600 hours Monday to Saturday except where blasting is necessary for safety reasons.*
- *Confining blasting to two occasions per day except where blasting is necessary for safety reasons.*
- *Recording blasts with particular attention to details of charge weight and delay practice. Monitoring representative of all blasts at varying distances and positions of different sensitivity.*

It is noted that when taking into account the location of the closest dwellings and that the quarry is not a hard rock quarry, blast noise and vibration is well within a reasonable level at all times so is not addressed further in this report.

In the Proposed Waikato District Plan there is a detailed noise rule, which states.

Rule 22.2.1.1 Noise – General in the Proposed Waikato District Plan states:

P2 (a) Noise measured at the notional boundary on any other site in the Rural Zone must not exceed:

- (i) 50dB (L_{Aeq}), 7am to 7pm every day;*
- (ii) 45dB (L_{Aeq}), 7pm to 10pm every day;*
- (iii) 40dB (L_{Aeq}) and 65dB (L_{Amax}), 10pm to 7am the following day.*

P3 (a) Noise measured within any site in any zone, other than the Rural Zone, must meet the permitted noise levels for that zone.

P4 (a) Noise levels must be measured in accordance with the requirements of New Zealand Standard NZS 6801:2008 “Acoustics - Measurement of Environmental Sound”.

(b) Noise levels must be assessed in accordance with the requirements of New Zealand Standard NZS 6802:2008 “Acoustic- Environmental noise”.

Taking into account the lack of specific noise limits in the Operative District Plan (Franklin section) and the detailed levels in the Proposed District Plan the limits in the Proposed District Plan have been adopted for this assessment.

3 THE PROPOSAL

The assessment of the quarry noise has been undertaken assuming the following plant will operate:

- Cat 980H Loader
- Cat 980G Loader
- CatD10N Dozer
- Cat D8L Dozer
- Cat 336FL Excavator
- Cat 350A Excavator
- Cat 769D Dump Truck
- Rock drill
- Mitsubishi HD550 Grader
- Mack Metroliner Water Cart
- Finlayson 883 Screen
- Terex Finlay Jaw Crusher
- Sandvik QH331 Cone Crusher
- Road trucks and trailers

4 PREDICTED NOISE LEVELS

To predict the noise from the proposed quarry activities the predictions have been based on field measurements undertaken of quarry plant at separate sites that were at least as big as is being proposed at this site.

One of the noisiest activities at the quarry will be the drilling of rock to blast it so the fractured rock can be removed. Figure 2 shows a rock drill adopted for the drilling. Figure 3 shows the sound spectrum of the drill operating when measured at 20m from the drill.



Figure 2. Rock Drill

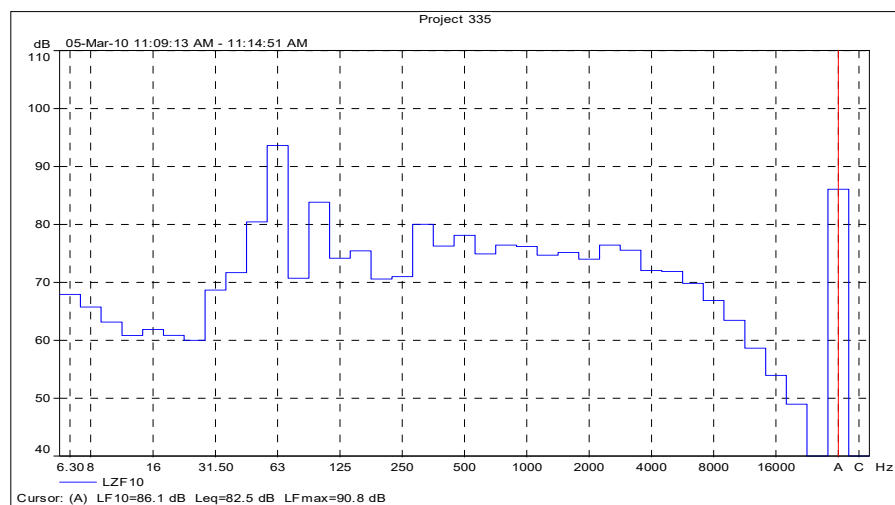


Figure 3. Sound Spectrum of Rock Drill at 20m

Figure 4 shows the Cat 336F excavator that would be used in the quarry and Figure 5 shows a noise trace of the excavator operating at 80m. The Cat 350 excavator is slightly smaller than the Cat 336 excavator (213kW compared to 213kW) so the noise output will be similar.



Figure 4. Cat 336F Excavator

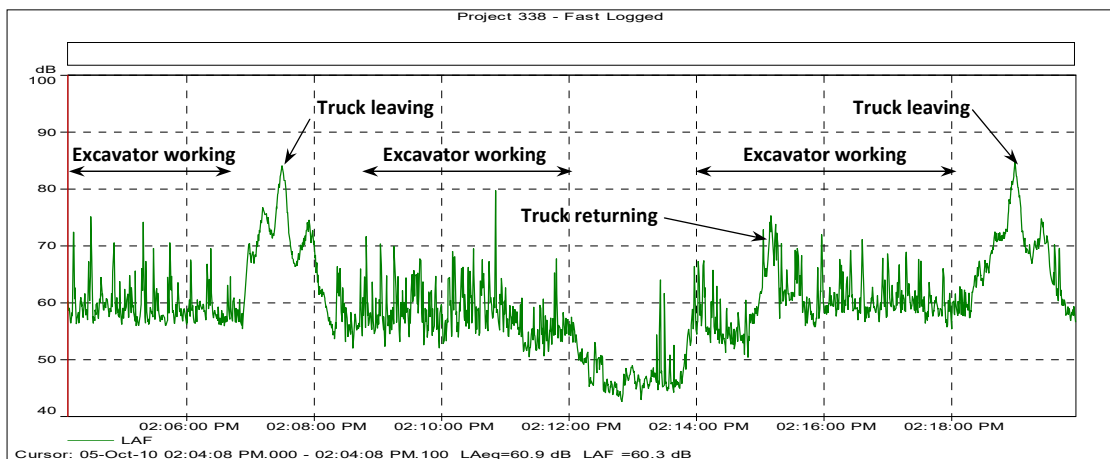


Figure 5. Sound Trace of Excavator at 80m

Figure 6 shows the Cat D10 bulldozer. Figure 7 shows the sound spectrum at 80m.



Figure 6. Cat D10 Bulldozer

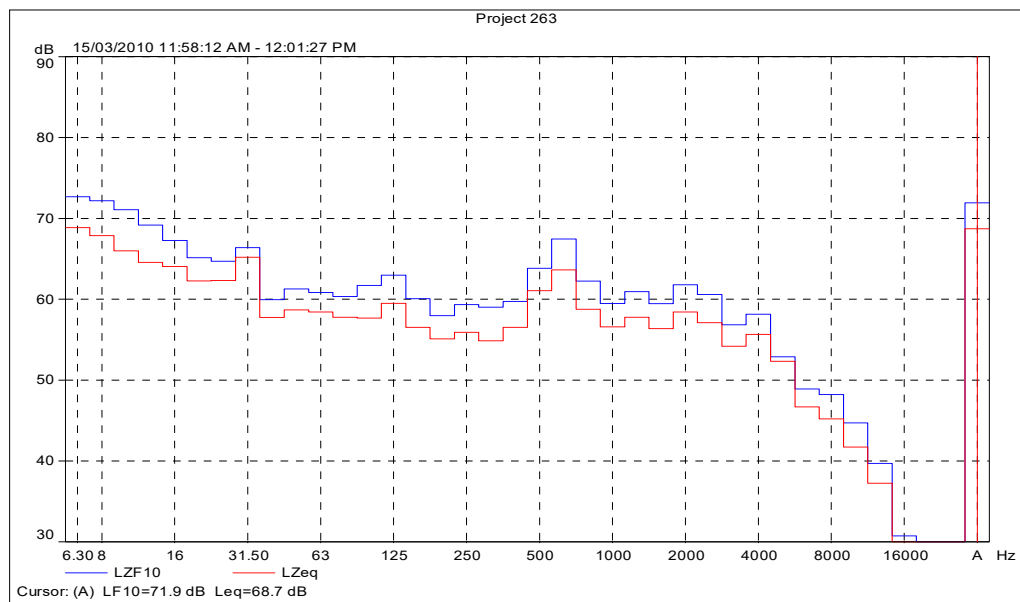


Figure 7. Cat D10 Bulldozer at 80m

Figure 8 shows the Cat D8 bulldozer. Figure 9 shows the sound spectrum of this bulldozer operating at 76dB L_{Aeq} when measured at typically 20m from the bulldozer.



Figure 8. D8 Bulldozer

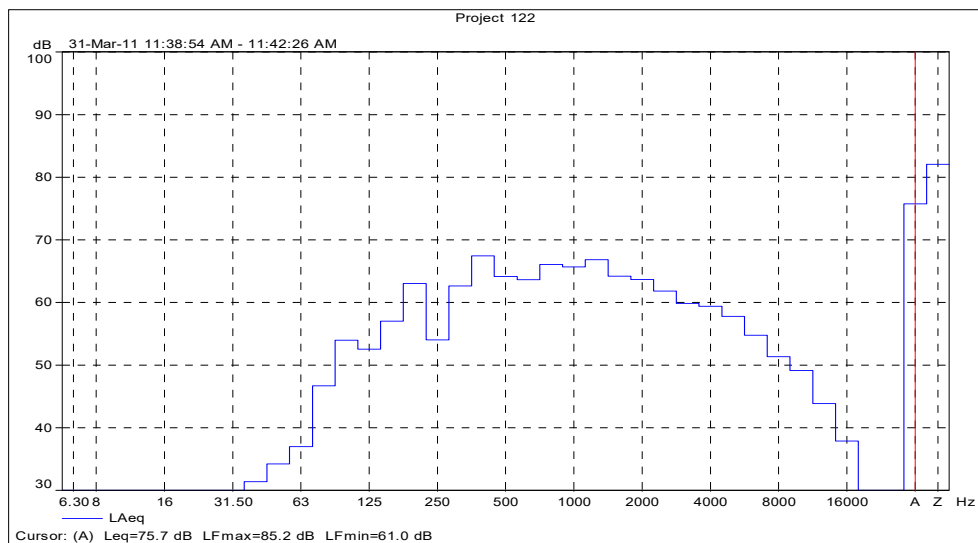


Figure 9. D8 Bulldozer sound spectrum

The quarried rock will be transported from the quarry face to the processing area using a Cat 769D Dump Truck such as shown on Figure 10 with the noise level typically 71dB L_{Aeq} when measured at 40m as shown on Figure 11.



Figure 10. Cat 769D Dump Truck

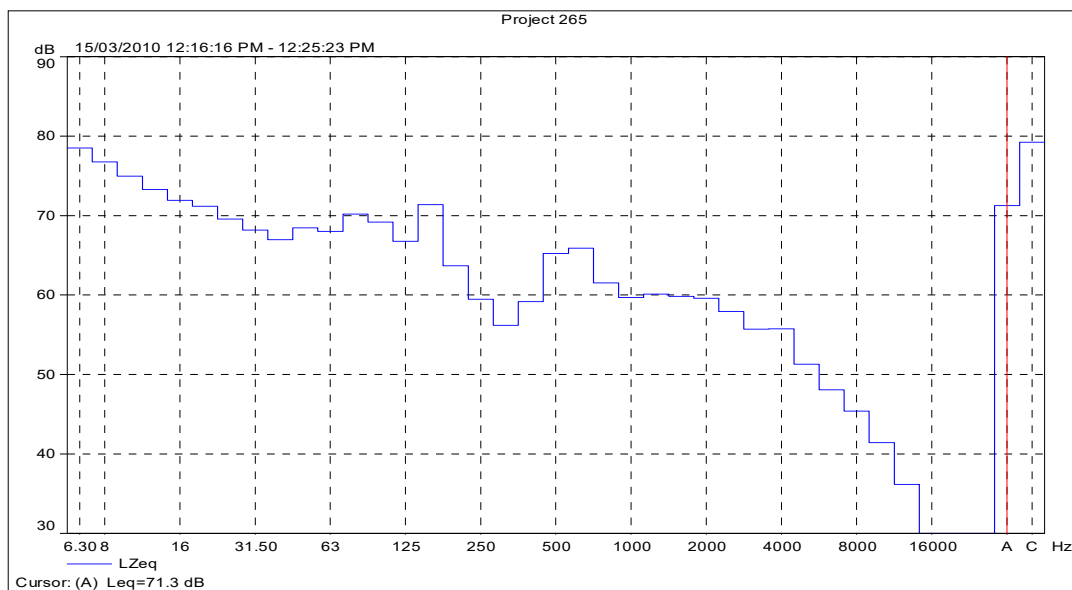


Figure 11. Dump Truck Sound Spectrum at 40m

Once the quarried material is transferred to the processing area the rock will be loaded into a mobile crusher, such as shown on Figure 12 to be crushed and stockpiled.



Figure 12. Mobile Crusher

As shown on Figure 13 the noise from this crusher is typically 82dB L_{Aeq} at 17m.

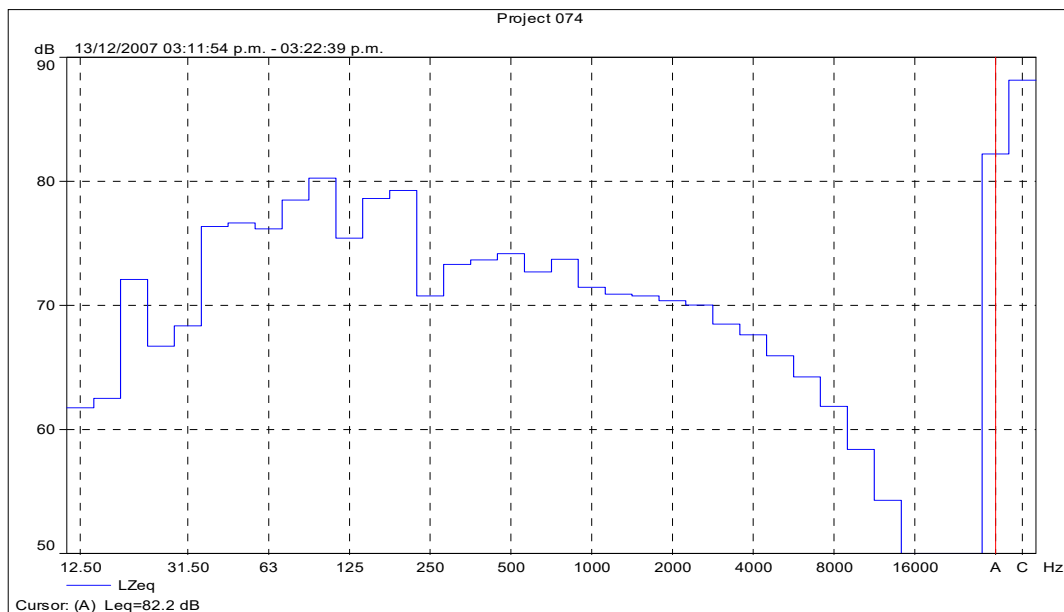


Figure 13. Crusher Noise at 17m

The crushed rock will be stockpiled using a loader, such as a Cat 980G as shown on Figure 14. The sound trace of this loader as measured at 30m is shown on Figure 15.



Figure 14. Cat 980G Loader

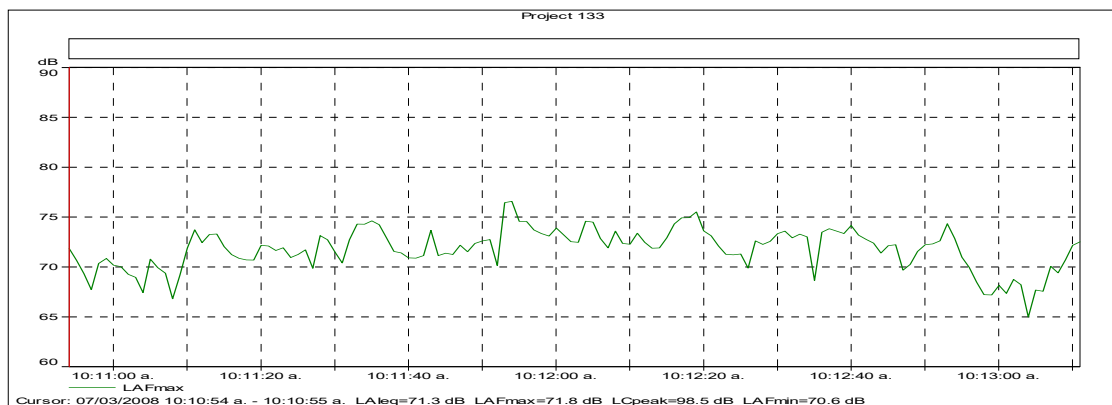


Figure 15. Cat 980G Loader Operating at 30m

The stockpiled metal will be loaded on to truck and trailer units using the loader and transported from the site. Figure 16 shows a typical truck used for the loadout.



Figure 16. Typical Truck

In order to predict the noise from the quarry activities all of the above noise sources have been located at the most exposed position to the neighbours within the quarry for the existing conditions and for Stages 1 and 3 as shown on Figure 17. That is, the location selected for the analysis is with the quarrying being undertaken early in the stage development when the plant is at the maximum height in the quarry and hence has the minimum screening to the neighbours.

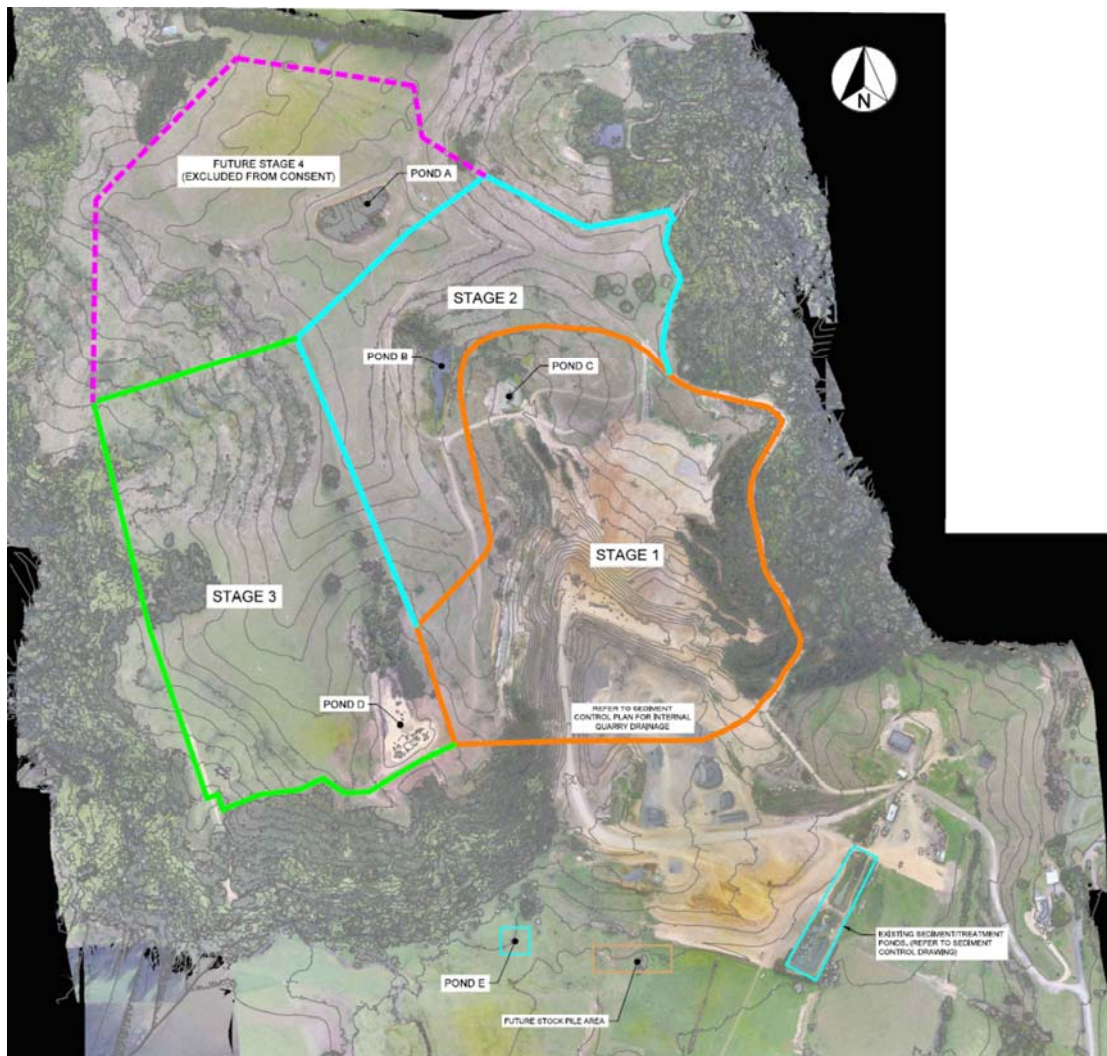


Figure 17, Quarry Stages

The noise has been predicted using the Brüel & Kjær Predictor program version 11.10. This software package uses a digital terrain model with each of the noise sources operating added. Calculations are undertaken in accordance with the

requirements of ISO 9613-1/2 Acoustics – Attenuation of Sound during Propagation Outdoors. A mild temperature inversion has been assumed with ground factor of 0.7, ground contours at 1m intervals over the area modelled and a grid size to calculate the noise contours varying between 10m – 30m.

Figure 18 shows the results of the noise modelling for the existing quarry with all plant operating on a busy day.

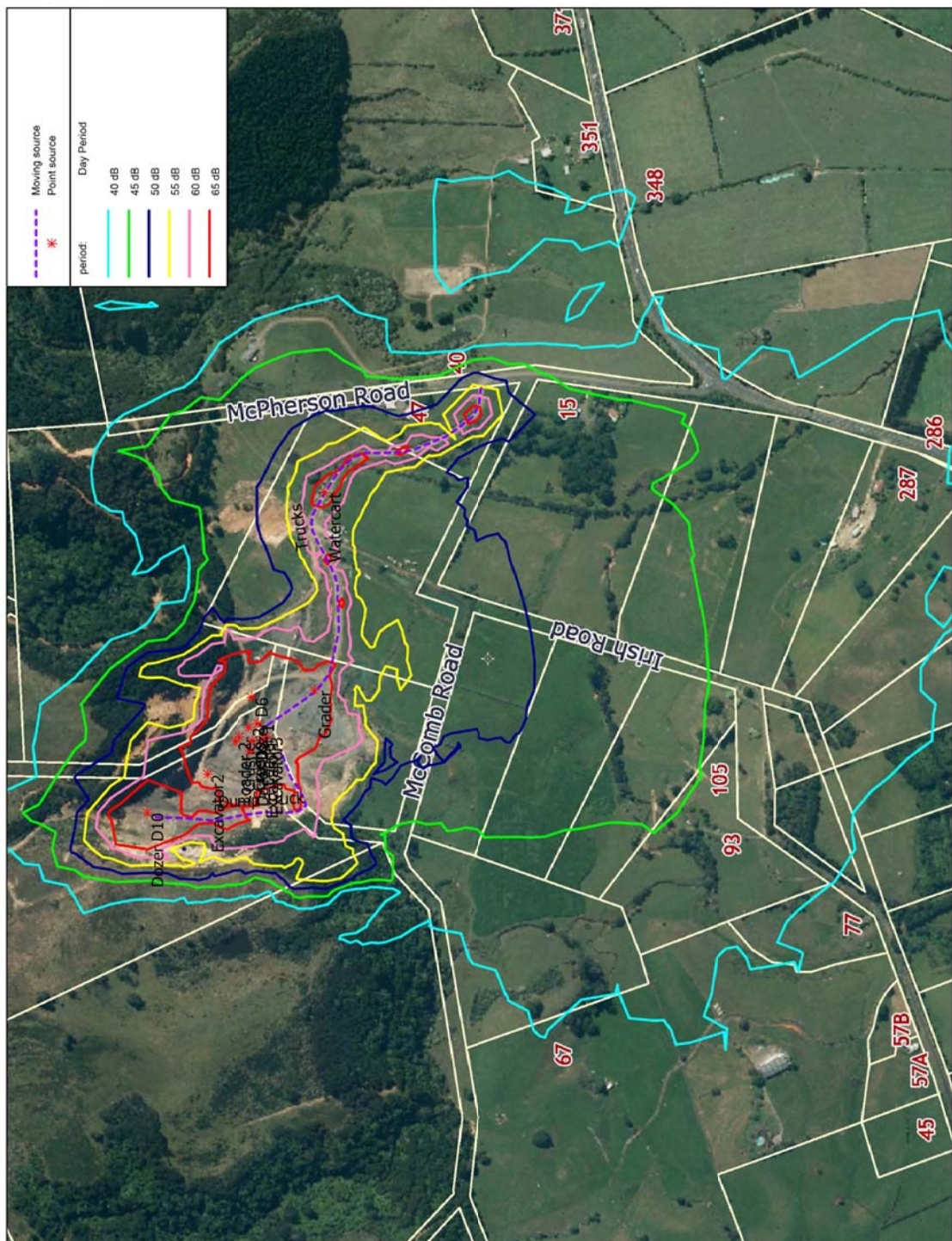


Figure 18. Noise Contours for Existing Quarry Operation - dB, L_{Aeq}

Figure 19 shows the results of the noise modelling with quarrying at the top of the Stage 1 and closest to the dwellings on a busy day.

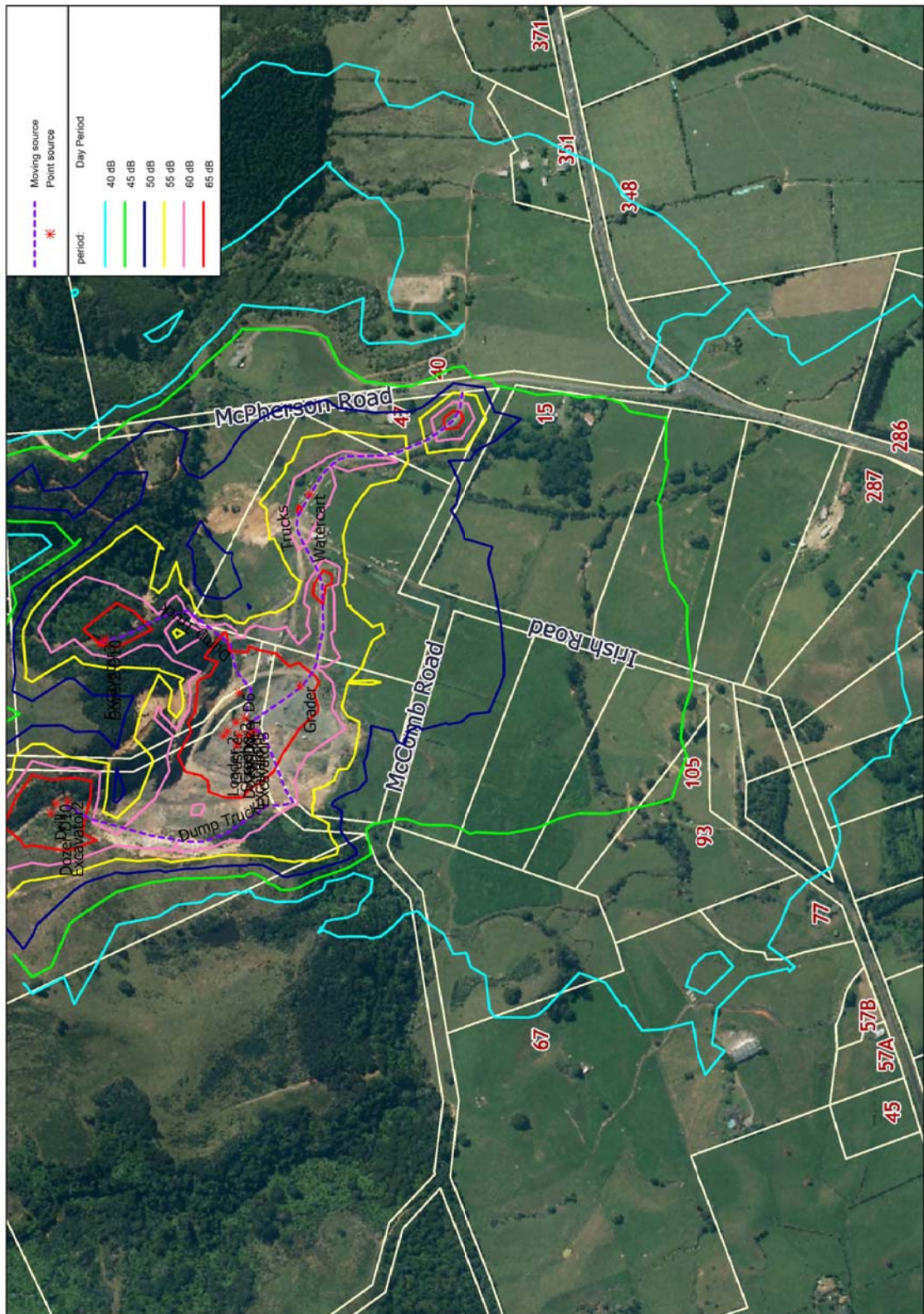


Figure 19. Noise Contours for Stage 1 Operation - dB, L_{Aeq}

Figure 20 shows the results of the noise modelling with quarrying at the top of the Stage 3 and closest to the dwellings on a busy day.

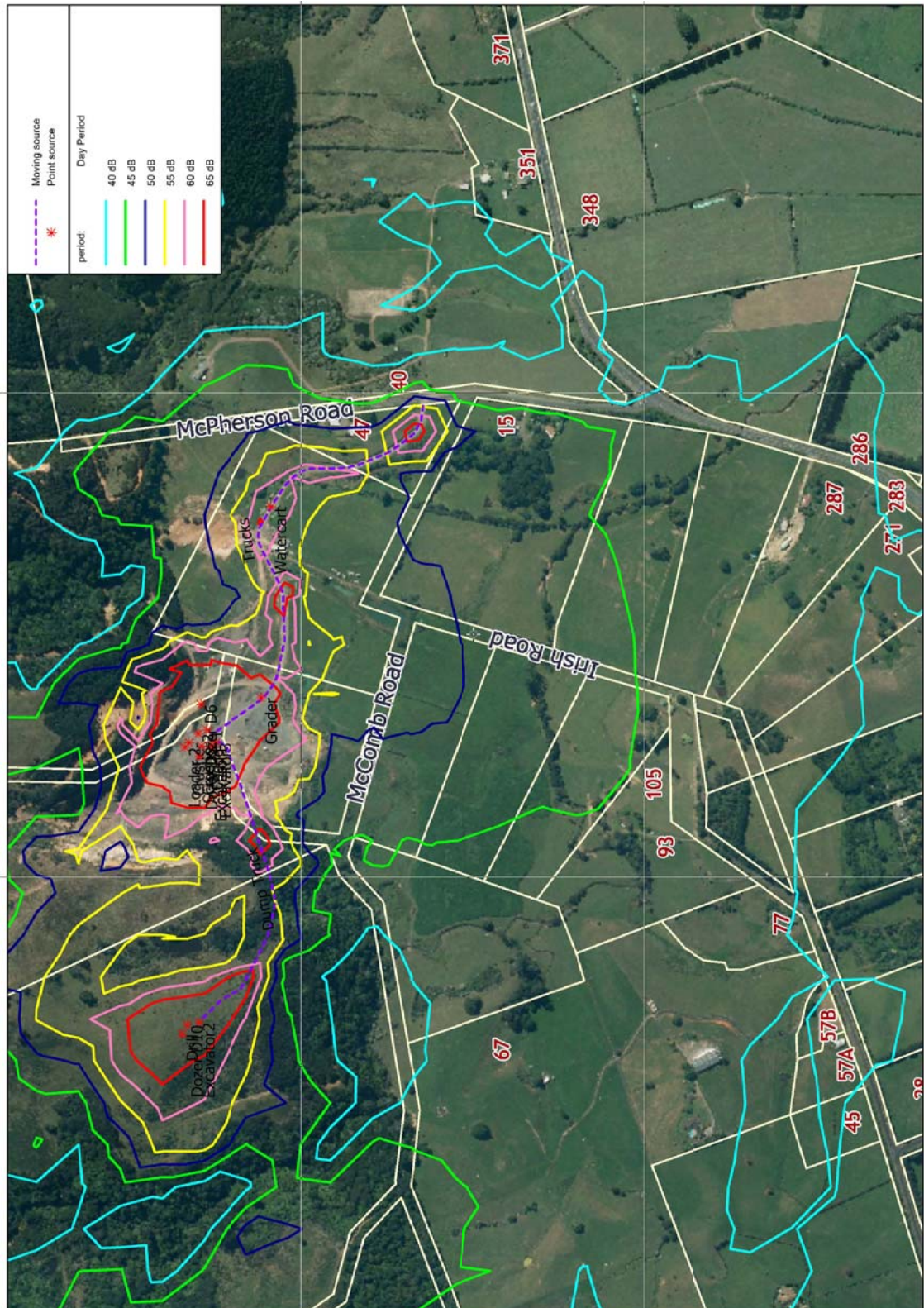


Figure 20. Noise Contours for Stage 3 Operation - dB, L_{Aeq}

In addition, the noise level at the most exposed notional boundary of the closer dwellings (as shown on Figure 1) has been calculated at 1.5m above ground level. The results are shown in Table 1.

House Site ¹	Noise Level – dB L _{Aeq}		
	Existing ²	Stage 1 ³	Stage 3 ⁴
15 McPherson Rd	48	48	48
40 McPherson Rd	45	48	45
77 Irish Rd	38	39	40
46 McMillan Rd	37	37	41
351 State Highway 2	40	41	40
371 State Highway 2	36	37	37

1 As shown on Figure 1

2 Figure 18

3 Figure 19

4 Figure 20

Table 1. Predicted Noise Levels at the Notional Boundaries

As shown in Table 1, the noise level from the existing and proposed quarry expansion with the maximum number of quarry trucks operating is well within the noise limit of 50dBA L_{Aeq} within the notional boundaries of properties not owned by the operator.

These levels represent the worst case scenario, which is unlikely to occur, and shows the noise level from the quarry operation is well within the daytime 50dBA L_{Aeq} requirement of the Proposed Waikato District Plan for the rural zone as set out above. Generally the noise from the quarry and processing area will be lower, as not all of the modelled noise sources will be operating at the same time.

5 CONCLUSIONS

The noise from the increase in quarry production has been predicted based on all of the equipment identified in the quarry and at the proposed stockpile area operating in an exposed location at the same time to reflect the upper level of noise ever likely to be experienced by the neighbours. For the majority of the time, there will be less equipment operating in the quarry and processing area than has been assumed in the analysis, and hence less noise to the neighbours.

Based on all quarry and processing area plant operating at the same time throughout the day, the noise level that will be experienced within the notional boundary of all existing rural dwellings in the area will be well within the requirements of the District Plan.

When taking all of the above into account, the noise effects of the existing and proposed quarry production is considered to be less than minor in terms of the requirements of the Resource Management Act.

* * *