

MARSHALL DAY Acoustics

CLEVEDON QUARRY EXPANSION
ASSESSMENT OF NOISE EFFECTS

Rp 001 20250989 | 30 October 2026

148 Durham Street
PO Box 803
Tauranga 3144
M: [redacted]
www.marshallday.com

Project: **CLEVEDON QUARRY EXPANSION**

Prepared for: **Stevenson Aggregates Limited**
Private Bag 94000
Manukau City
Auckland 2241

Attention: **Kelsey Bergin**

Report No.: **Rp 001 20250989**

Disclaimer

Reports produced by Marshall Day Acoustics Limited are based on a specific scope, conditions and limitations, as agreed between Marshall Day Acoustics and the Client. Information and/or report(s) prepared by Marshall Day Acoustics may not be suitable for uses other than the specific project. No parties other than the Client should use any information and/or report(s) without first conferring with Marshall Day Acoustics.

The advice given herein is for acoustic purposes only. Relevant authorities and experts should be consulted with regard to compliance with regulations or requirements governing areas other than acoustics.

Copyright

The concepts and information contained in this document are the property of Marshall Day Acoustics Limited.
Use or copying of this document in whole or in part without the written permission of Marshall Day Acoustics constitutes an infringement of copyright. Information shall not be assigned to a third party without prior consent.

Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Draft	-		23 Dec 2025	Carlos Medina Panta	James Whitlock
Draft	R01	Updated Stages	27 Jan 2026	Carlos Medina Panta	James Whitlock
Approved	R02	Client comments	16 Jun 2026	Carlos Medina Panta	James Whitlock
Approved	R03	Client comments	6 July 2026	Carlos Medina Panta	James Whitlock
Approved	R04	Updated plant and pit drawings	29 Oct 2026	Carlos Medina Panta	James Whitlock
Approved	R05	Client comments	30 Oct 2026	Carlos Medina Panta	SAL project team

Cover Photo: Creative Agency 514-806-1644

TABLE OF CONTENTS

1.0 SUMMARY AND CONCLUSIONS 4

2.0 PROJECT DESCRIPTION 4

2.1 Background 4

2.2 Proposed changes to the quarry 5

3.0 PERFORMANCE STANDARDS 9

3.1 Existing Consent 9

3.2 Auckland Unitary Plan (AUP) 10

4.0 EXISTING SOUND ENVIRONMENT 10

4.1 We measured existing ambient noise levels at 546 McNicol Road 10

4.2 Modelling existing activities helped to calibrate the noise model 12

5.0 PROPOSED CHANGES TO QUARRY ACTIVITIES 13

5.1 Quarry topography, equipment and their locations will change 13

5.2 Modelling of overburden activities for Stage 1 14

6.0 FRONT OF HOUSE 19

7.0 PREDICTED NOISE LEVELS 19

7.1 Receivers are clustered together in three directions 19

7.2 Our predicted noise levels are conservative 19

7.3 We have predicted noise levels and generated noise contour maps 19

7.4 Residential receivers will comply 20

8.0 ASSESSMENT OF NOISE EFFECTS 21

8.1 We predict that overall, noise effects will be reasonable 21

8.2 Dwellings may experience a change in daytime sound character 22

8.3 Communication with neighbours will be important during the development 23

9.0 RECOMMENDED CONDITIONS 23

APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B CLEVEDON QUARRY PROPOSED EQUIPMENT

APPENDIX C EXISTING AMBIENT LEVELS

APPENDIX D MODEL RESULTS

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

1.0 SUMMARY AND CONCLUSIONS

Stevenson Aggregates Limited (SAL) has engaged Marshall Day Acoustics to assess the potential noise effects associated with expanding the existing Clevedon Quarry at 546 McNicol Road, Clevedon.

The existing quarry is proposed to be expanded to the south-east of the current quarrying area, in five indicative stages over a 50-year period.

We have measured the existing ambient noise levels in the area, revised our previous computer noise model from 2015, and created a new computer noise model to estimate noise levels from existing and three future quarrying stages (Stage 1, Stage 3 and Stage 5), including the new quarry layout, along with revised haul roads and mobile crushing plant areas. We have also assessed activities with the proposed overburden disposal area (OBDA) at the top of the hill to the east of the life of quarry extent.

We assessed noise from the front of house (FOH) area, which is located at the entrance and base of the quarry and forms part of the area proposed to be retained under the proposed variation to the 2018 consent. A separate resource consent application is being sought in parallel to authorise extraction of aggregate and associated activities across the proposed quarry expansion area.

We have not assessed blasting noise or any vibration from the proposed quarry expansion activities as these are addressed in other specialist reports.

Overall, we predict that:

- quarry noise levels will increase and be more audible for most receivers around the quarry, because equipment operating within the proposed expansion area will be closer to neighbouring dwellings
- noise levels will comply with the existing consent conditions for noise (which are in line with the AUP limits and zone rules)
- noise from the FOH area complies with the same 55 dB L_{Aeq} daytime limit at all assessed receivers, with a maximum predicted FOH level of 49 dB L_{Aeq} at 498 and 520 McNicol Road
- noise effects from the proposed expansion will be reasonable.

Appendix A provides a glossary of terminology.

2.0 PROJECT DESCRIPTION

2.1 Background

Clevedon Quarry is a regionally significant quarry contributing to regional aggregate demand. It has been in operation since the 1970s, initially operated by Warren Shaw Limited. In 1995 the site was purchased by Warren Fowler (Fowler Quarries Limited) and was known as 'Fowler Quarry'. Fulton Hogan subsequently purchased the Quarry in April 2016. It was later transferred to Fulton Hogan's subsidiary, SAL in 2019.

Resource consent was granted as a result of an Environment Court hearing in 2000 (Walker v Manukau City Council C34/2000 – "the 2000 consent") which allowed expansion of the quarry to an annual 201,152 tonne limit over 16 hectares (ha).

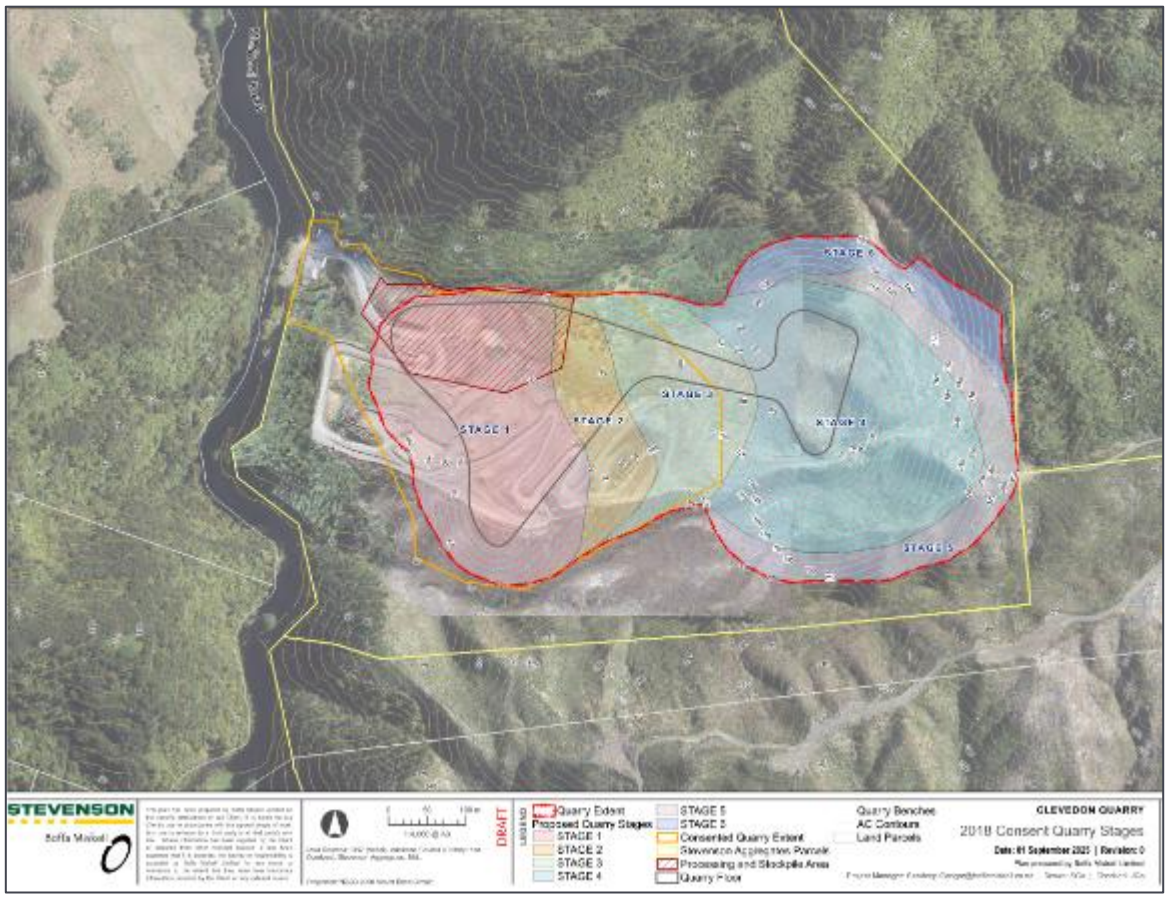
Fulton Hogan then obtained resource consent in the Environment Court in 2018 (decision [2018] NZEnvC 96 - "the 2018 consent") for a further expansion to increase annual production of up to approximately 3 million tonne (MT) per year, totalling 60 MT of aggregate and overburden in six stages over a 35-year term. The consented quarry covers approximately 29 ha in area with a consented pit depth of RL -50 in the final stages (the current depth of extraction is RL-35). Stages 1-3 account for the extent of the previous resource consent (the 2000 consent), while stages 4-6 expand into the area provided for by the 2018 consent. See Figure 1 illustrating the consented stages 1-6.

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Through the Auckland Unitary Plan (AUP) IHP Hearings process, Fulton Hogan sought the expansion of the Quarry Zone for the 'Fowler Quarry' to cover both the existing resource consent area and the southern portion of the site, being 546 McNicol Road.

More recently, Plan Change 89 (PC89) was approved in 2024 and resulted in a rezoning to alter the extent of the Special Purpose – Quarry Zone (SP-QZ) from the northern part of the site to the south and eastern direction of the current quarrying area. The reason for this rezoning was to reflect the preferred direction of expansion, to avoid the SEA and NSMA areas to the north of the site, and to provide a visual and acoustic barrier to the majority of neighbouring properties. The zoning of the quarry site is SP-QZ, which now extends to a total area of approximately 73.78 ha in an eastwards and southwards direction from the current quarry.

Figure 1: 2018 Consented Stages



2.2 Proposed changes to the quarry

2.2.1 Quarrying Area

SAL propose to expand the existing quarrying area in a south-eastern direction into the SP-QZ and within the Rural Production Zone (RPZ). The expansion area is to be approximately 74 ha in total area, developed across five stages, over 50 years. The annual extraction rate will remain at 3 MT per year (as per the 2018 consent). The proposed indicative staging plan is shown in Figure 2. The volumes and stages of the proposal are detailed in Table 1.

We understand the quarry currently operates well below its consented capacity, supplying approximately 200,000 to 330,000 tonnes of aggregate per year. The 2018 consented extraction rate of 3 MT per year will remain unchanged, as will operational parameters such as truck movements and hours of operation. Aggregate production is expected to increase gradually from current levels toward the consented limit of 3 MT per year as the new indicative staging areas are progressively developed.

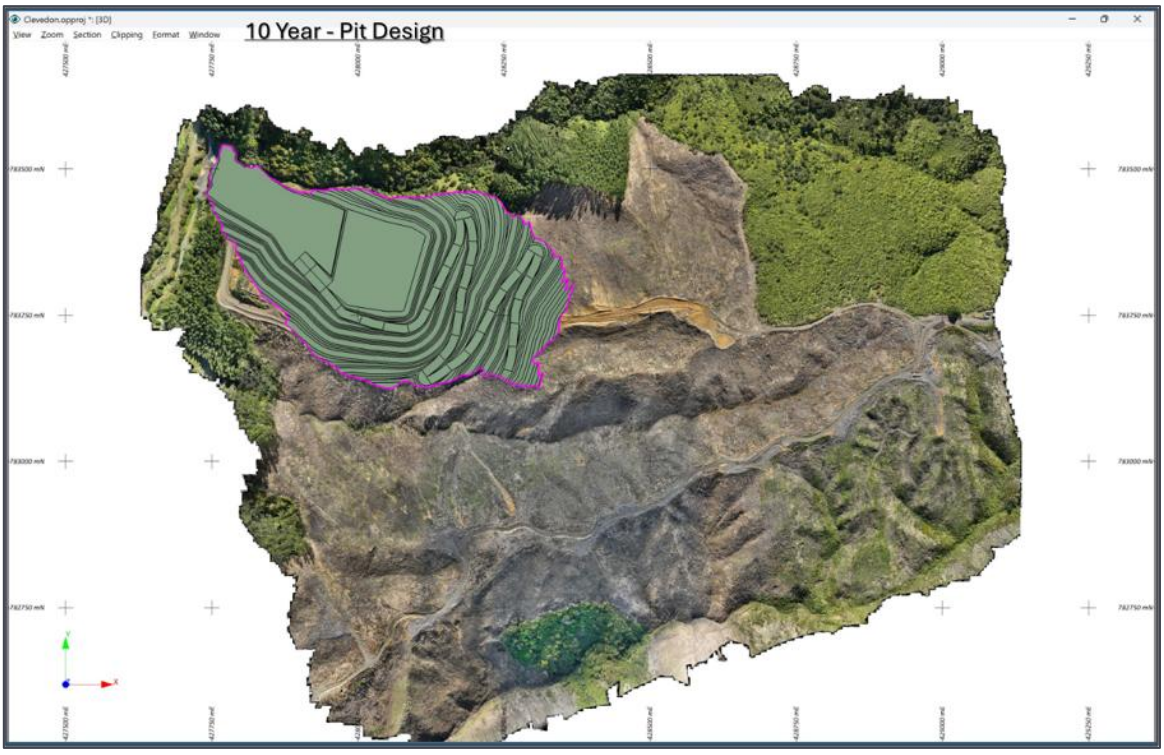
This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

The quarry entrance on McNicol Road will remain, with the weighbridge and office facilities changing location slightly. SAL is seeking a new standalone resource consent to authorise the construction and operation of the proposed quarry expansion. This application does not rely on the 2018 Environment Court consent; however, where appropriate, SAL proposes to adopt certain conditions from the 2018 consent unchanged as conditions of this new consent. SAL is not seeking an increase in the 2018 consented extraction rate or operational activities, such as truck movements or hours of operation.

The proposed quarry shape does not align with the SP-QZ. The eastern boundary of the SP-QZ largely aligns with the lot boundary and the straight edge is not practical for quarry shape purposes. The proposed quarrying area will extend outside the SP-QZ into the Rural Production Zone as shown in Figures 5 and 6, which will be reached as part of Stages 4 and 5, 40 and 50 Year – Quarry Design respectively.

Figures 2 to 6 show the proposed indicative staging design. Table 1 shows the proposed indicative staging quarry design evaluations.

Figure 2: Proposed Stage 1: 10 Year – Indicative Quarry Design



This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Figure 3: Proposed Stage 2: 20 Year – Indicative Quarry Design

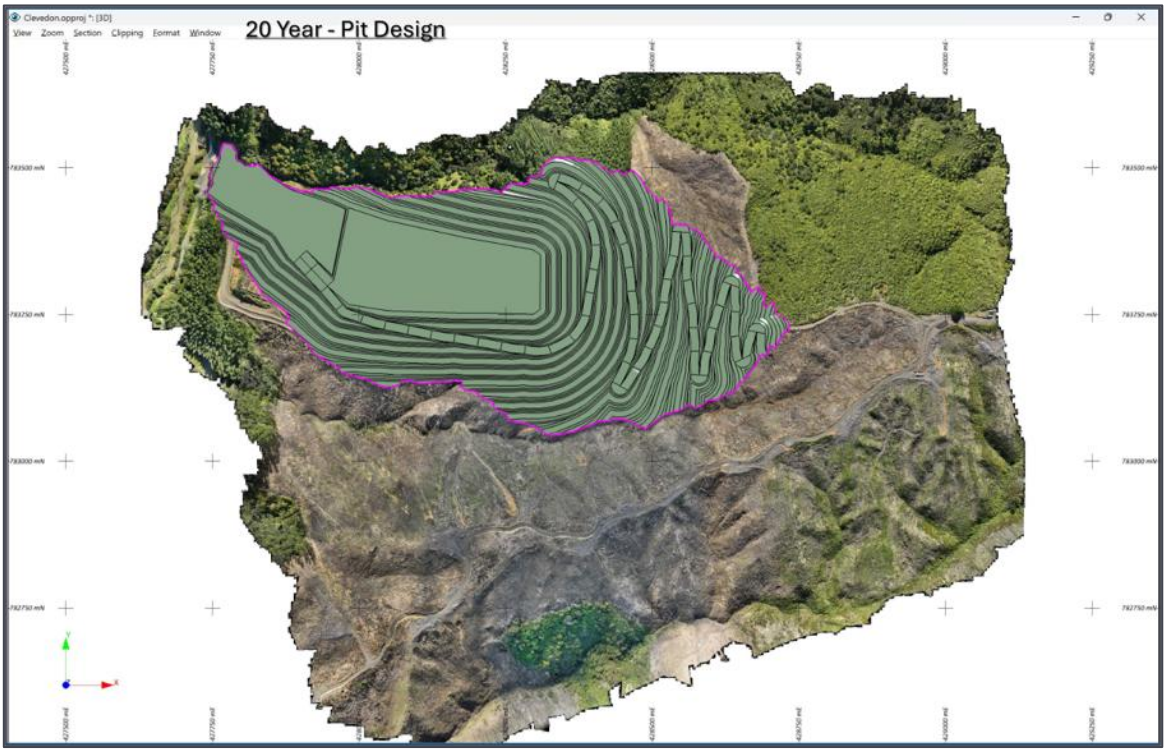
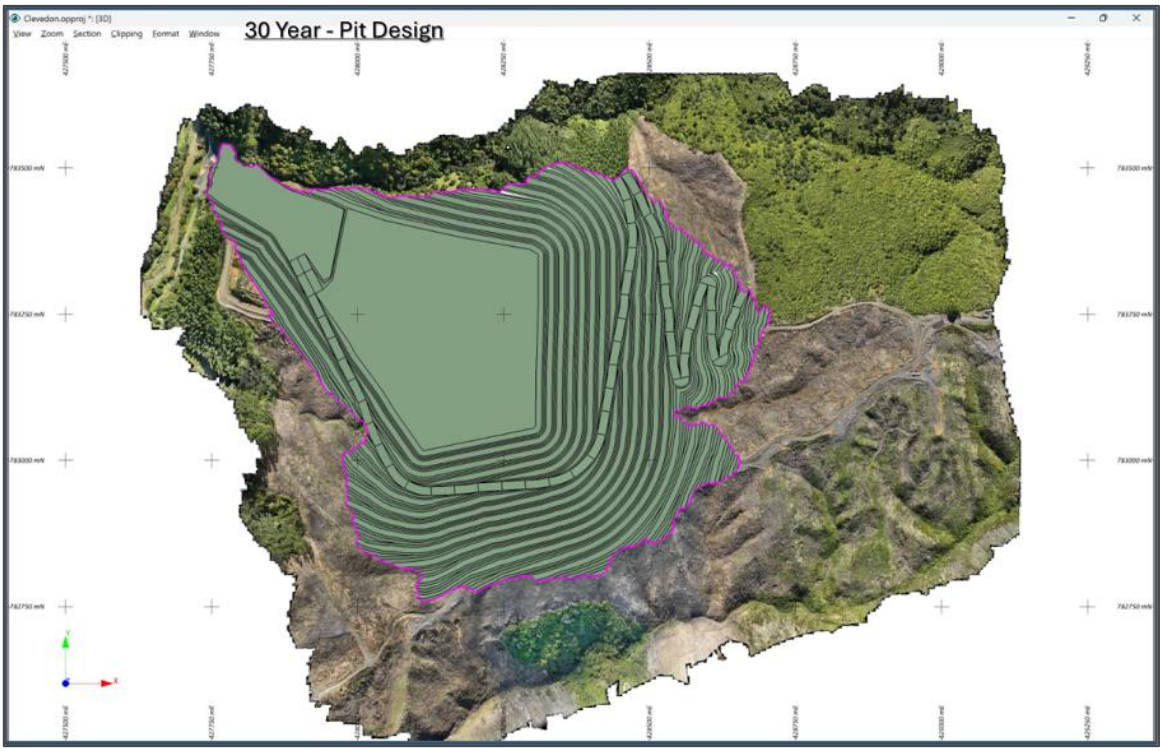


Figure 4: Proposed Stage 3: 30 Year – Indicative Quarry Design



This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Figure 5: Proposed Stage 4: 40 Year – Indicative Quarry Design

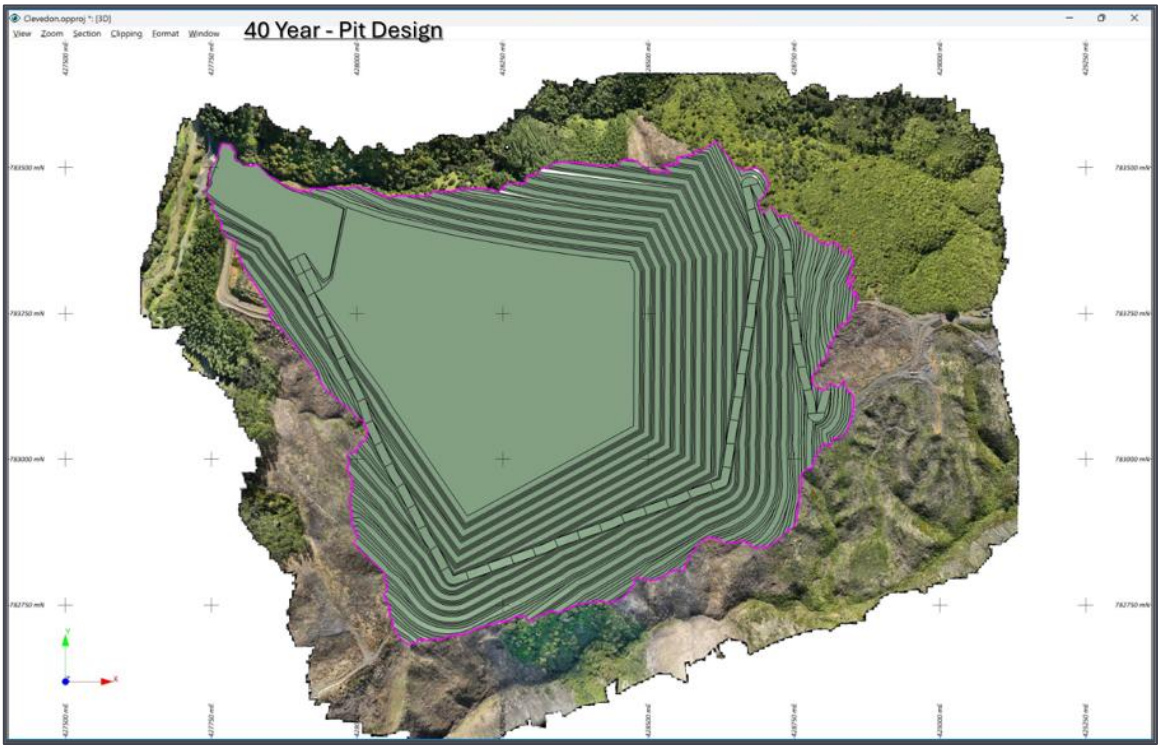
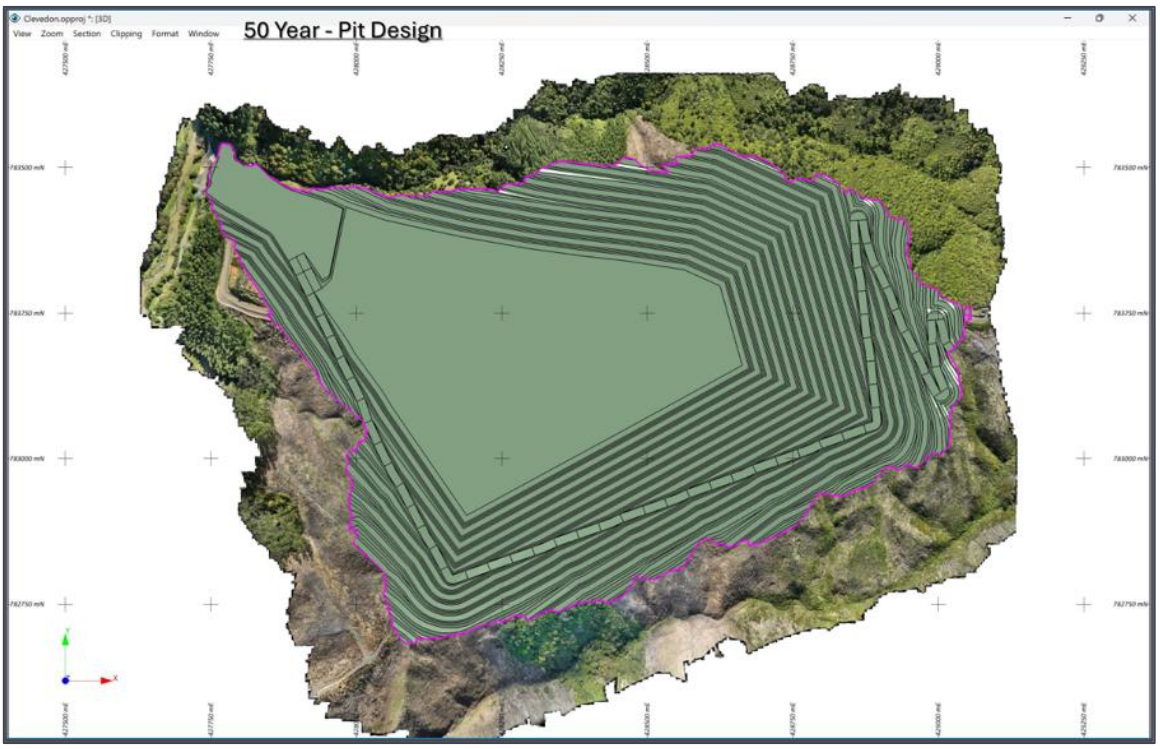


Figure 6: Proposed Stage 5: 50 Year -Indicative Quarry Design

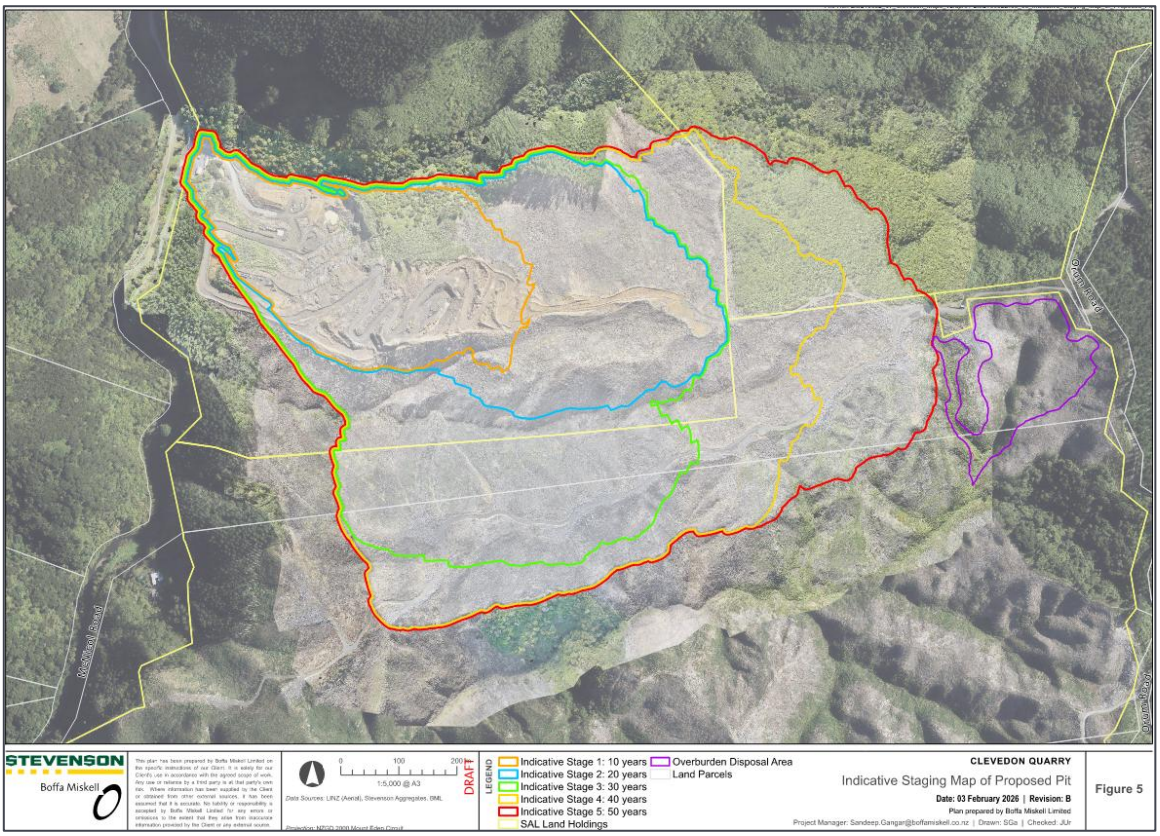


This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

2.2.2 Overburden

The OBDA will be located directly to the east of the life of quarry extent, as shown in Figure 7 below. We have assessed overburden activities at this location.

Figure 7: Overburden location



3.0 PERFORMANCE STANDARDS

3.1 Existing Consent

The existing 2018 consent conditions relating to noise are as follows:

35. Noise from mineral extraction activities within the Special Purpose – Quarry Zone must not exceed the noise levels in the table below at a notional boundary from any dwelling that existed at the date of commencement of this consent. (For the purposes of this consent, the closest dwelling that existed at the date of commencement of this consent outside the Special Purpose – Quarry Zone is 600 McNicol Road, approximately 480m away.)

Times	Noise levels
7am – 9pm, Monday to Friday	L_{Aeq} 55dB
7am – 4pm, Saturday	L_{Aeq} 55dB
All other times and on public holidays	L_{Aeq} 45dB L_{AFmax} 75dB

36. Noise must be measured and assessed in accordance with New Zealand Standard *Acoustics – Measurement of Environmental Sound* (NZS 6801:2008) and New Zealand Standard *Acoustics – Environmental Noise* (NZS 6802:2008). The details of measurement, any results obtained, and any noise complaints received in respect of noise from the quarry, shall be described in the

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

NMP. The NMP shall be completed and submitted to the Team Leader – Southern Monitoring for certification within three months of the commencement date of this consent.

37. Prior to the commencement of stage 3 of the quarry expansion (as shown on Riley Consultants Drawing Number 15211 Fig 20, dated 1/12/2017 Revision 2) and each stage thereafter, the consent holder shall arrange for monitoring, together with any details of complaints received about noise and any action taken in response, shall be described within the NMP and submitted to the Team Leader – Southern Monitoring.

    Advice Note
    The consent holder is reminded of its general obligation under section 16 of the Resource Management Act 1991 to adopt the best practicable option to ensure that the emission of noise from the quarry site does not exceed a reasonable level.

3.2 Auckland Unitary Plan (AUP)

Under the AUP, the Clevedon Quarry site incorporates land that is zoned SP-QZ and RPZ, and all receivers are in the RPZ. Table 2 summarises the SP-QZ Rule H28.6.2.1.1 and the RPZ Rule E25.6.3.1 noise criteria. They apply at the notional boundary[1] of existing dwellings. The same noise limits apply to quarrying within RPZ and SP-QZ, though the timing of the daytime periods is slightly different.

Table 1: Operative District Plan permitted noise limits for dwellings

Times (Special Purpose Quarry Zone)	Times (Rural Production Zone)	Noise limits
7am to 9pm, Monday to Friday	7am to 10pm, Monday to Saturday	55 dB L_{Aeq}
7am to 4pm, Saturday	9am to 6pm, Sunday	55 dB L_{Aeq}
All other times and on public holidays	All other times	45 dB L_{Aeq} 75 dB L_{AFmax}

4.0 EXISTING SOUND ENVIRONMENT

4.1 We measured existing ambient noise levels at 546 McNicol Road

As the Clevedon Quarry expands to the east and south, it will get gradually closer to dwellings located outside of the site, in those directions.

During our visit to the quarry on 9 October 2025, we observed that it was not operating at its consented capacity. The crushing plant was not working and some earthworks were happening, therefore noise from the quarry to the closest receivers was less than expected and did not represent the consented activity.

We also noted that the topography of the quarry was diverse, starting from RL 35 at the base of the hill behind the existing quarrying area and going up to RL 300 at the top. Similarly, the surrounding receivers are also at various heights with various levels of shielding, depending on their location.

To establish a baseline of the existing sound environment, we undertook long-term noise monitoring at the notional boundary of the house at 546 McNicol Road. We deployed the logger from 22 October to 4 November 2025 and arranged for the quarry to operate at its full capacity on 4 November 2025 from 7am to 4pm.

We carried out our measurements generally in accordance with NZS 6801:2008 using a 01dB Cube noise logger. Weather conditions were generally suitable for environmental noise monitoring, but to

[1] A line 20 metres from any side of a noise-sensitive building, or the legal boundary where this is closer to the building.

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

make sure we reviewed wind and rain data from local weather stations to identify and remove any periods affected by weather.

Figure 8 shows the noise logger position in relation to the quarry.

Figure 8: Ambient noise monitoring positions

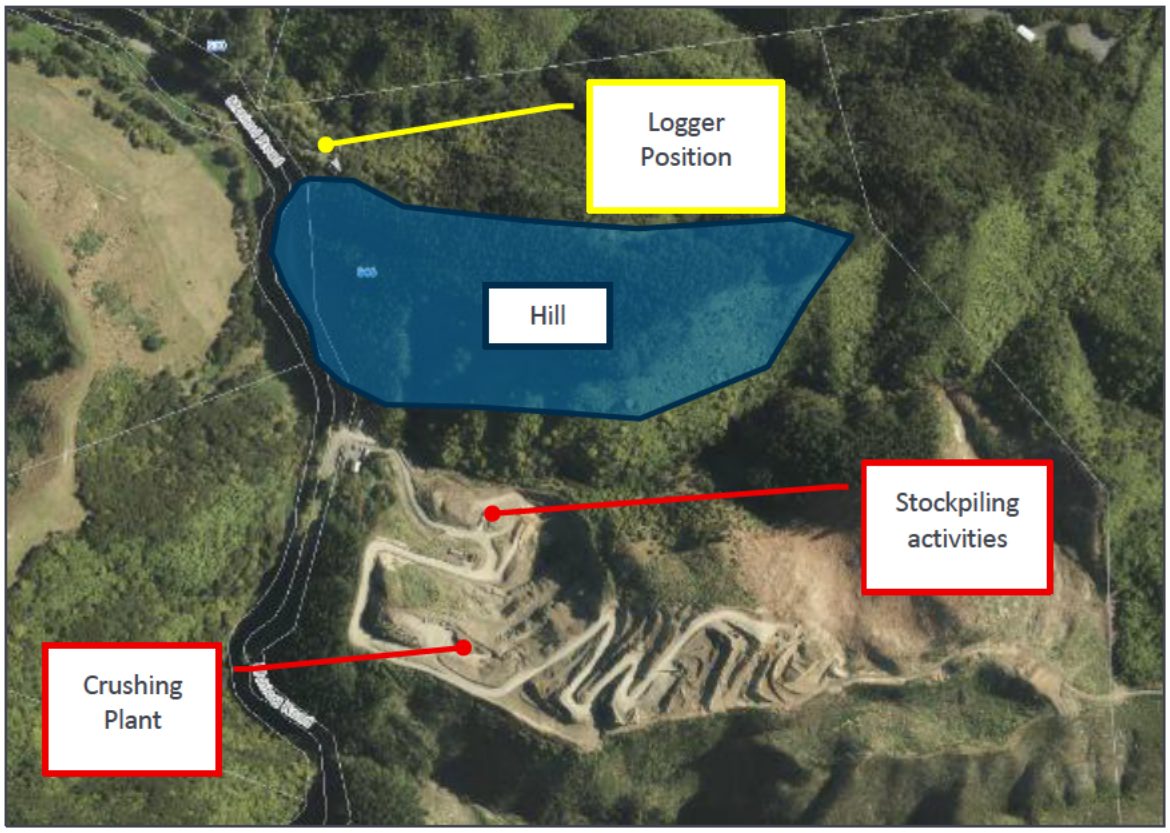


Table 2 shows the long-term measured levels, and the graph of the full dataset is attached in Appendix C. The graph shows the variation between daytime and night-time levels.

The results show daytime noise levels are between 35 – 57 dB $L_{Aeq,15m}$ until 7pm, gradually dropping down after 4pm. The rise from around 6am is likely due to traffic, and the dawn chorus birdsong.

On 4 November 2025, the noise from quarry activities at full operations were noticeable and louder than the other days. During the other days the dominant noise from the quarry was truck movements and mobile plant working.

The topography, with a hill as a bund (see Figure 8) is an important factor in existing ambient levels because it effectively reduces quarry noise for receivers to the north.

Table 2: Summary of existing ambient noise levels

Location	Dates	Average Noise Levels (dB L_{Aeq}) (7am – 5pm)	Comments
546 McNicol Road (notional boundary)	22 Oct. – 4 Nov. 25	49	Quarry activities and other ambient noise sources such as birdsong, insects and traffic on McNicol Road. Crushing plant audible

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

4.2 Modelling existing activities helped to calibrate the noise model

We have predicted quarry noise levels in accordance with ISO 9613-2:2024[2] using SoundPLAN® environmental noise modelling software. ISO 9613-2 considers a range of frequency dependant attenuation factors including atmospheric absorption, ground and barrier effects, directivity, as well as hemispheric spreading. It also adopts the conservative approach of assuming that wind is always blowing slightly from the noise source towards all receivers.

We visited the site on 4 November 2025 to measure noise from quarry operations, including mobile crushing plant, loader and road truck movements. We captured noise data for the following:

- Volvo SC3800DL 40t excavator
- Sandvick QE441 Mobile screen
- Metso Impactor mobile crusher Lokotrack LT1213S
- Conveyor Evoquip TC80 stacker bell
- Conveyor Evoquip TC65 stacker bell
- Volvo L180H 30t loader
- Truck and trailer movements entering and leaving the site

We used these measurements to calculate sound power levels for each activity and create an acoustic model of existing activities. We then used our measured levels at 546 McNicol Road to calibrate the model.

The results in Table 4 show the calibration measurement result and compare it to noise model outputs for the same position. The results show a good agreement of -1 dB (considering the influence of birdsong and traffic noise in our on-site measurements).

Table D1 in Appendix D presents the results of our existing quarry model.

Table 3: Noise model calibration verification

Receiver Position	Measured Level (dB L_{Aeq})	Calculated Noise Levels (dB L_{Aeq})	Difference (dB)
546 McNicol Road	49	48	-1

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

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

5.0 PROPOSED CHANGES TO QUARRY ACTIVITIES

The sections below describe the proposed changes to quarry activities associated with the proposed quarry expansion that are important to consider for noise. We have modelled Stages 1, 3 and 5 because in Stage 1: 10 Year – Quarry Design Overburden works will be occurring, Stage 3: 30 Year – Quarry Design the expansion works go significantly outside the natural topographical shielding, and Stage 5: 50 Year – Quarry Design involves the largest life of quarry, as shown in Figures 4 and 6 Section 2.2.

5.1 Quarry topography, equipment and their locations will change

The project involves consenting for a larger quarry, which will expand the existing consented quarry boundary to the south-east. Therefore, the expanded quarry topography will change, as will the locations of the crushing plant, and internal routes of the quarry and road trucks and other mobile plant. The model includes updated haul road locations, reflecting the internal routes that quarry and road trucks will use as the quarry expands.

Figure 9 shows the existing Clevedon Quarry layout. Figures 10, 11 and 12 show how the quarry will change with the Stage 1, Stage 3 and Stage 5 developments. Pink lines represent mobile sources (trucks, dump trucks, loaders, water cart and bulldozer) and their movements around the site and red dots indicate stationary noise sources (fixed and mobile crushers and screens, excavators and rock breaker).

The crushing, screening and stockpiling plant will generally remain at the base of the quarry within the FoH area, though mobile plant locations will shift progressively as the quarry expands.

As part of our assessments of Stages 1, 3 and 5, we considered different locations for the mobile crushing plant. The location for Stage 1 was at the RL-111 south area, for Stage 3 was at the RL-176 north area, and for Stage 5 was at the RL-192 south area. Compliance with the consented noise limits is achieved for all Stages. Refer to Figures 10, 11 and 12 for these area locations.

We understand that the future production (3 MT per year) is comparable to what Drury Quarry produces. We have a SoundPLAN model of Drury Quarry, and SAL advised us to use the same fixed and mobile plant, with modified equipment numbers, in the Clevedon Quarry model for the purpose of this assessment.

Table 4 lists the existing and future quarry equipment and their locations on site.

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Table 4: Quarry equipment

Existing equipment and location (refer Figure 3)		Future equipment and locations (refer Figure 4)	
3x 40T Loaders	All locations	4x Loaders	Stockpile, crushing plant
2x D8 Bulldozers	All locations	2x Bulldozers	Mineral extraction area, Overburden
3x CAT740 Dump trucks	All locations	6x Dump Trucks	Mineral extraction area, Overburden
2x 40T Excavators	All locations	3x Excavators	Mineral extraction area, Overburden
1x 50T Excavators	Mineral extraction area	1x Water trucks	All locations
1x water truck	All locations	2x Screens	1x at FOH, 1x mobile out of FOH: RL-111, RL-176, or RL-192
1x mobile screen	Processing area	4x Crushers	3x at FOH, 1x mobile at out of FOH: RL-111, RL-176 or RL-192
1x mobile impactor crusher	Processing area	90x Road truck movements per hour	Entrance to Stockpile area
2x conveyors	Processing area		
90x Road truck movements per hour	Entrance to stockpile area		

5.2 Modelling of overburden activities for Stage 1

Overburden removal is the first activity to take place in Stage 1 (the first 10 years of operations) We have used the proposed quarry extent topography for this stage and modelled the overburden activities (excavator, bulldozer, rock breaker and truck movements) occurring from the quarry to the OBDA. This can be seen in Figure 10 where a pink line (representing the overburden activity) traverses the quarry and stockpile area and the Eastern overburden area

From stage 2 onwards, overburden will be either removed off-site or temporarily stored on-site; the OBDA is proposed to be planted following Year 10 as part of the ecological offset package.

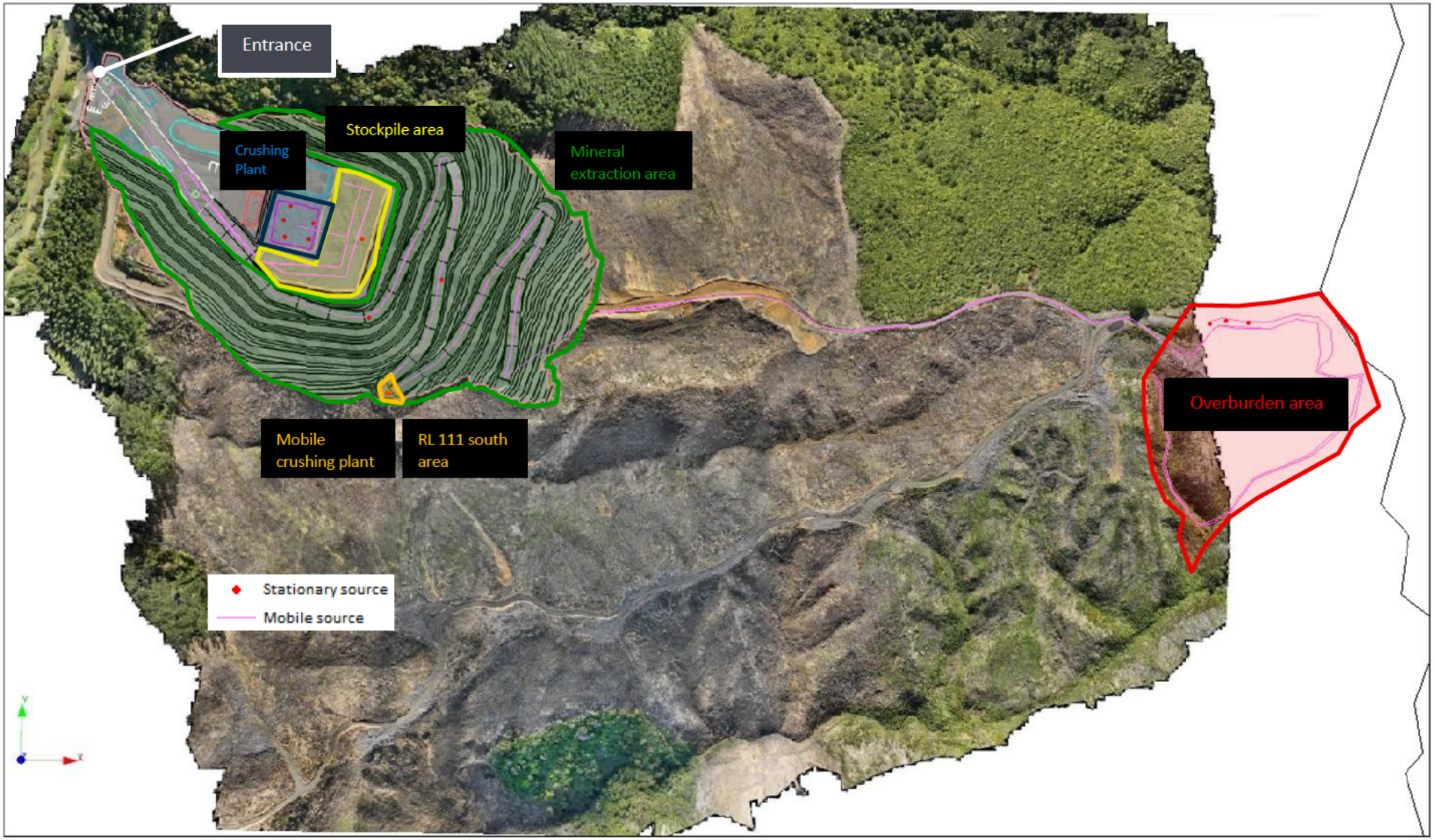
This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Figure 9: Existing quarry layout



This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Figure 10: Future quarry layout Stage 1: 10 Year – Indicative Quarry Design



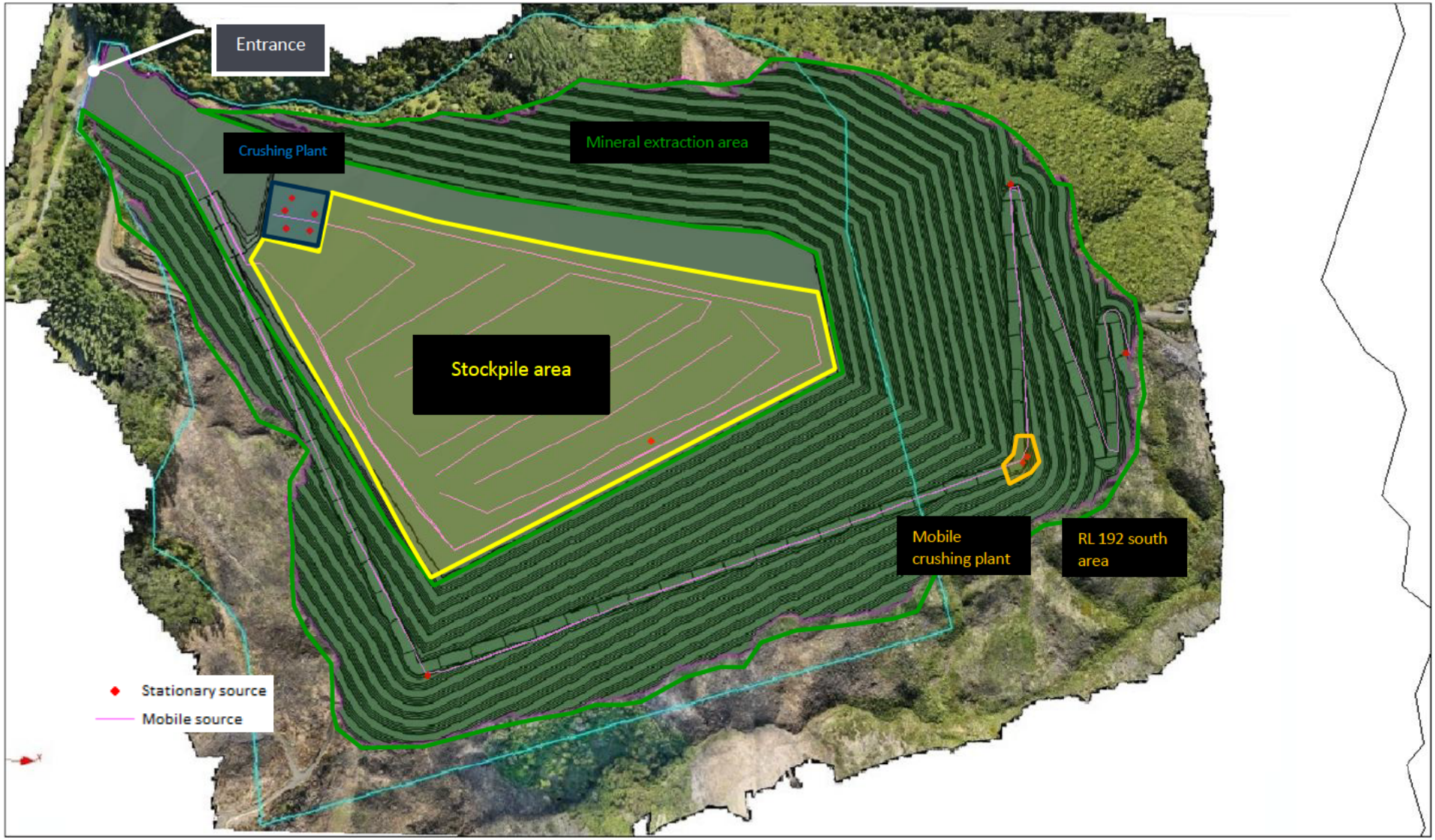
This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Figure 11: Future quarry layout Stage 3: 30 Year – Indicative Quarry Design



This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Figure 12: Future quarry layout Stage 5: 50 Year – Indicative Quarry Design



This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

6.0 FRONT OF HOUSE

The proposed variation to the 2018 Consent authorises ancillary front of house (FOH) activities that support quarry operations. These activities generally include processing, stockpiling, site access, and the off-site transport interface.

The FOH area is located at the entrance of the quarry and encompasses the full extent of the quarry floor. It is the primary location for all processing, stockpiling, and dispatch activities associated with the quarry.

We have modelled FOH activities in each of the future stages assessed (Stages 1, 3 and 5). The FOH is made up of:

- Fixed sources: the crushers, screens and associated processing plant in the crushing area
- Mobile sources: loaders and road trucks, modelled as line sources moving around the stockpile, crushing and entrance areas

The FOH does not include the mobile crushing plant and screen working outside the FOH area (at RL-111, RL-176 or RL-192; see Section 5.1) or extraction and overburden activities.

As well as the total quarry noise for each stage, we calculated the noise level from the FOH sources on their own. Table D1 in Appendix D shows the predicted FOH levels at the notional boundary of each receiver.

FOH noise is predicted to comply with the 55 dB L_{Aeq} daytime limit at all assessed receivers. The highest FOH level is 49 dB L_{Aeq} at 498 and 520 McNicol Road

7.0 PREDICTED NOISE LEVELS

7.1 Receivers are clustered together in three directions

We have included the following receivers in our assessment. They are clustered together around the existing quarry and future expansion stages. Refer to our noise contour maps in Appendix D for their locations.

- 373, 426, 450 and 494 Otau Mountain Road (north-east of the quarry site);
- 438, 448, 458, 498, 510, 520 McNicol Road, (north-west of the quarry site);
- 95 Pioneer Road, 119, 129, 130, 144, 154, 164C Highridge Road, 600 McNicol Road, 108 Skyhigh Road, and 49 Mathis Road (east of the quarry site); and
- 546 McNicol Road (owned by Clevedon quarry site).

7.2 Our predicted noise levels are conservative

We have modelled all equipment running at the same time and put the mobile plant in realistic worst-case positions around the quarry and haul roads (haul road extents shown in Figures 2, 4 and 6). We confirmed with SAL that we had modelled the operations correctly before proceeding with the calculations.

In reality, the equipment will move around, there will be periods where equipment is turned off and times when it is better screened from surrounding receivers by the quarry topography. And we understand it will be 5 – 10 years before the quarry is operating at a level where all equipment is running at the same time.

7.3 We have predicted noise levels and generated noise contour maps

Appendix D shows the full modelling results.

Table D1 shows our predicted noise levels at the notional boundary of each receiver.

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

We have also included noise contour maps in Figures D1 – D3 that show how the sound flows out of the quarry and around the natural topography to receivers, at 1.5m above ground.

7.4 Residential receivers will comply

At 546 McNicol Road (our modelling calibration position), we predict sound reduction of quarrying activities of up to 4 dB between existing and future stages.

We predict compliance with the 55 dB L_{Aeq} daytime limit at all receivers in all future stages.

The highest contributors to the levels are crushers and dump trucks on the haul roads.

Our model is conservative because it does not include any screening from stockpiles, bunds or intervening landform. Compliance therefore does not depend on any additional mitigation.

As part of adopting the best practicable option under section 16 of the RMA, we still recommend arranging the stockpile yard so that, as far as practicable, the aggregate piles block the line of sight between the mobile crushing plant operating above RL 30 and dwellings to the north. This would further reduce noise levels at those dwellings below the predicted levels, which already comply.

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

8.0 ASSESSMENT OF NOISE EFFECTS

Every person reacts differently to noise level changes, but research shows a general correlation between noise level changes and subjective response[3]. Table 6 indicates people's subjective responses to noise level changes.

Note that these are the impressions of immediate noise level change. The proposed expansion to Clevedon Quarry will develop gradually over many years so the subjective impression will likely be more moderate. Neighbours' opinions and acceptance (or otherwise) of the development as a whole will also influence their annoyance at the noise it generates.

Table 5: Noise level change and the compared with general subjective perception

Noise level change	General subjective perception[4]
1 – 2 decibels	Insignificant/imperceptible change
3 – 4 decibels	Just perceptible change
5 – 8 decibels	Appreciable to clearly noticeable change
9 – 11 decibels	Halving/doubling of loudness
> 11 decibels	More than halving/doubling of loudness

8.1 We predict that overall, noise effects will be reasonable

As discussed in Section 4.1, the existing background noise at 546 McNicol Road is typically 35 to 57 dB L_{Aeq} during the day.

Table 7 shows the measured existing ambient levels at selected locations around the quarry, and our predicted levels for future stages and the FOH area. Each location represents a cluster of receivers (refer Section 6.1), so potential effects for all dwellings are covered by this table.

We note that the Stage 1 level increases will not occur instantaneously. They will occur over a period of months and years as Stage 1 develops, and additional items of plant are brought on site and commissioned.

Table 6: Comparing existing ambient and future Clevedon Quarry noise (at notional boundaries)

Location	Daytime noise level (dB L_{Aeq})				
	Modelled existing	Stage 1	Stage 3	Stage 5	FOH
North-west cluster					
520 McNicol Road	49	52 (+3)	52 (+3)	51 (+2)	49
498 McNicol Road	46	51 (+5)	51 (+5)	51 (+5)	49
458 McNicol Road	46	50 (+4)	49 (+3)	49 (+3)	47
North cluster					
426 Otau Mountain Road	45	51 (+6)	48 (+3)	51 (+6)	33

[3] For instance, LTNZ Research Report No. 292: Road traffic noise: determining the influence of New Zealand Road surfaces on noise levels and community annoyance, Table 18.

[4] Based on research by Zwicker & Scharf (1965); and Stevens (1957, 1972)

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Location	Daytime noise level (dB L_{Aeq})				
	Modelled existing	Stage 1	Stage 3	Stage 5	FOH
494 Otau Mountain Road	42	51 (+9)	49 (+7)	46 (+4)	44
373 Otau Mountain Road	40	48 (+8)	45 (+5)	46 (+6)	31
West cluster					
129 Highridge Road	38	42 (+4)	44 (+6)	43 (+5)	30
164C Highridge Road	43	47 (+4)	46 (+3)	44 (+1)	34
600 McNicol Road	39	39 (+0)	39 (+0)	37 (-2)	33
95 Pioneer Road	43	45 (+2)	44 (+1)	42 (-1)	36
49 Mathis Road	26	38 (+12)	38 (+12)	33 (+7)	24

These results allow us to conclude that:

- The north-west cluster will experience an appreciable to clearly noticeable increase in quarry noise levels of up to 5 dB in Stage 1, reducing to 2-5 dB by Stage 5.
- The north cluster will receive a significant increase in noise levels of up to 9 dB in Stage 1, reducing to 4-6dB by Stage 5.
- The west cluster will experience varying increases in quarry noise levels as outlined below:
  - 129 Highridge Road – a just perceptible increase of 4dB in Stage 1. It rises to an appreciable 6dB in Stage 3, then reduces to 5dB in stage 5.
  - 164C Highridge Road - a just perceptible increase of 3-4dB in Stage 1 and 3, reducing to an imperceptible 1 dB in Stages 5.
  - 600 McNicol Road – no material change in quarry noise
  - 95 Pioneer Road – an insignificant or imperceptible change
  - 49 Mathis Road – a significant increase of up to 12 dB (likely inaudible at present, and may become audible)
- While the quarry is predicted to become louder at most receiver locations (and potentially more audible, depending on the ambient noise level at each location), the noise levels themselves will remain compliant with the relevant AUP limits and the proposed conditions, which mirror the 2018 consent.
- Noise from the front of house (FOH) area will comply with the relevant AUP limits and the proposed conditions, which mirror the 2018 consent. Our modelling confirm that FOH activities comply with the 55dB L_{Aeq} daytime limit at all assessed receivers, with the highest FOH level being 49 dB L_{Aeq} at 498 and 520 McNicol Road

Overall, given the noise levels will increase gradually during Stage 1 and remain the same over the following stages, and the predicted compliance with relevant controls, we consider that noise effects from the expanded quarry will be reasonable.

8.2 Dwellings may experience a change in daytime sound character

Our predicted levels show that quarry noise, while compliant with the AUP limits and proposed consent conditions, which mirror the 2018 consent, is likely to become more audible at some

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

dwellings, depending on their ambient noise level and the wind direction. This may change the character of their sound environment.

They may hear a general broadband noise from quarrying, and intermittent engine noise from particular mobile plant, which will move around the quarry and be shielded to a greater or lesser degree.

8.3 Communication with neighbours will be important during the development

We have predicted that future noise levels will comply with the consent conditions, and effects will be reasonable. But neighbours' reactions to ongoing quarry development will rely on many subjective factors, not all of which can be anticipated or satisfied by expert advice.

Communication is an essential tool in managing perceived effects. People are less likely to complain if they receive regular updates, know what to expect as the quarry develops, and have met the Stevensons personnel involved.

We note that SAL maintains regular communication with neighbouring properties regarding operation of the existing quarry. Continuing this proactive engagement throughout the quarry expansion will assist in managing expectations, fostering positive relationships with the surrounding community, and responding effectively to any concerns that may arise.

9.0 RECOMMENDED CONDITIONS

We have identified the aspects of the proposed Clevedon Quarry expansion and FOH activities that may generate noise effects. We recommend the following conditions to manage those effects in accordance with the best practicable option

(1) All activities authorised by these Consents must comply with the following noise levels in the table below at the notional boundary of any dwelling that existed at the date of Commencement of consent (for the purposes of these Consents; the closest dwelling that existed at the date of Commencement of consent is 600 McNicol Road, approximately 320 m away).

Times	Noise limits
7 am – 9 pm, Monday to Friday	55 dB L_{Aeq}
7 am – 4 pm, Saturday	55 dB L_{Aeq}
All other times and on public holidays	45 dB L_{Aeq}
	75 dB L_{AFmax}

Noise shall be measured in accordance with NZS 6801:2008 Acoustics – Measurement of environmental sound and assessed in accordance with NZS 6802:2008 Acoustics – Environmental noise.

(2) Within 3 months of every 10 years from the commencement of consent, the Consent Holder must engage a SQEP who is an acoustic engineer to prepare an updated noise monitoring report. The report must:

- Assess compliance with the noise limits set out in Condition (1) during typical full operations;
- Record any noise complaints received, and any action taken in response;
- Be submitted to the Auckland Council Team Leader – Southern Monitoring within 20 working days of completion; and
- If monitoring shows non-compliance, the consent holder shall implement remedial measures and carry out further monitoring to demonstrate compliance has been restored.

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

APPENDIX A GLOSSARY OF TERMINOLOGY

SPL or L_P	Sound Pressure Level A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 μPa RMS) and expressed in decibels.
SWL or L_W	Sound Power Level A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
dB	Decibel The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of Pr=20 μPa i.e. dB = 20 x log(P/Pr)
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
$L_{Aeq\,(t)}$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 *"Acoustics – Measurement of environmental sound"*
NZS 6802:2008	New Zealand Standard NZS 6802:2008 *"Acoustics - Environmental Noise"*

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

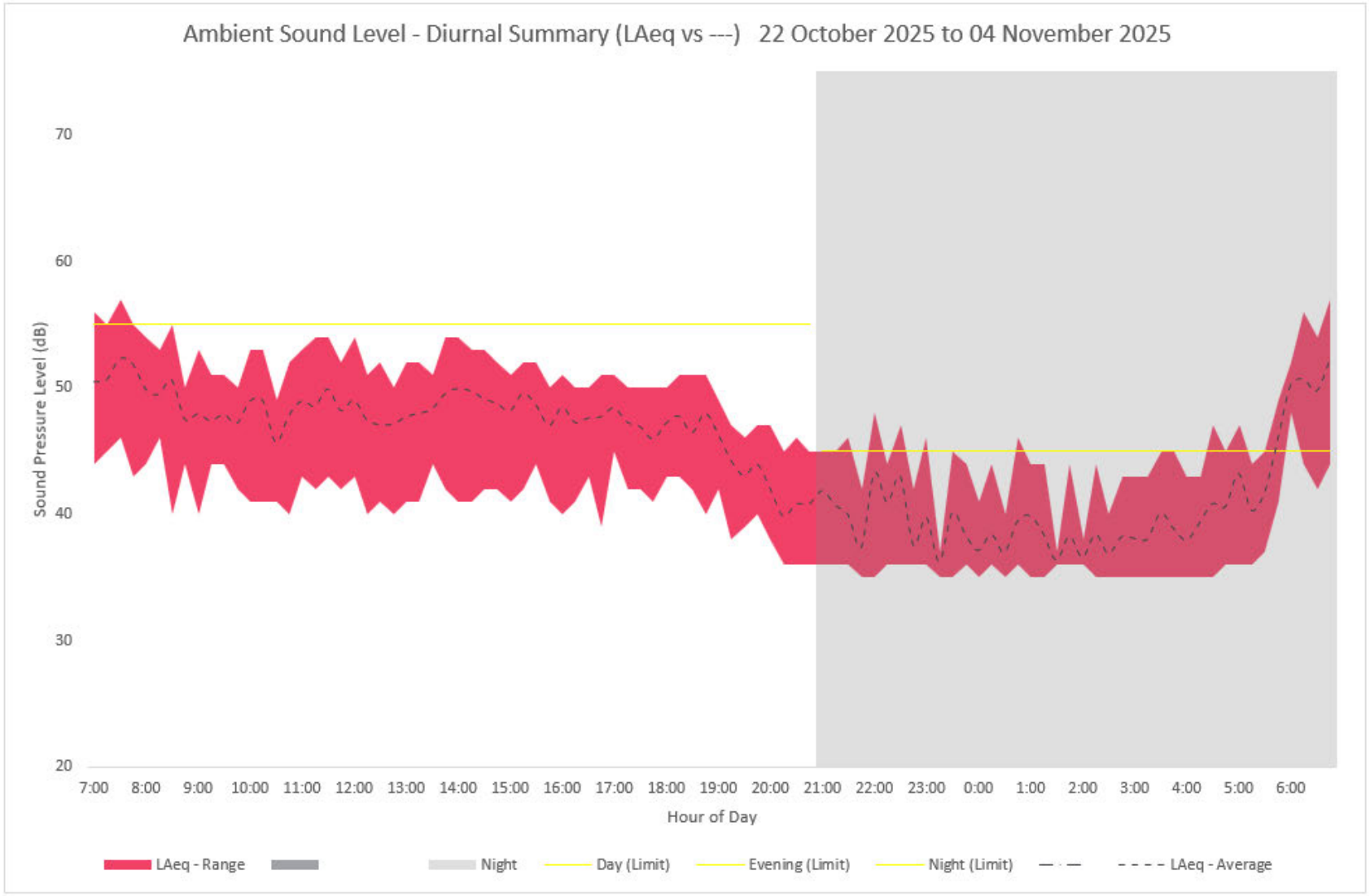
APPENDIX B CLEVEDON QUARRY PROPOSED EQUIPMENT

Quantity	Equipment	Sound Power Level (dB L_{WAeq})
8	Loader	106 - 118
4	Crushing plant	117 - 124
2	Screens	115 - 118
6	Dump Truck	113 – 115
3	Excavator	112 - 116
2	Bulldozer	112 - 123
1	8-wheel watercart	114
90	Road trucks per hour	98 - 112

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

APPENDIX C EXISTING AMBIENT LEVELS

(Data has been processed to eliminate high wind and rain events)



This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

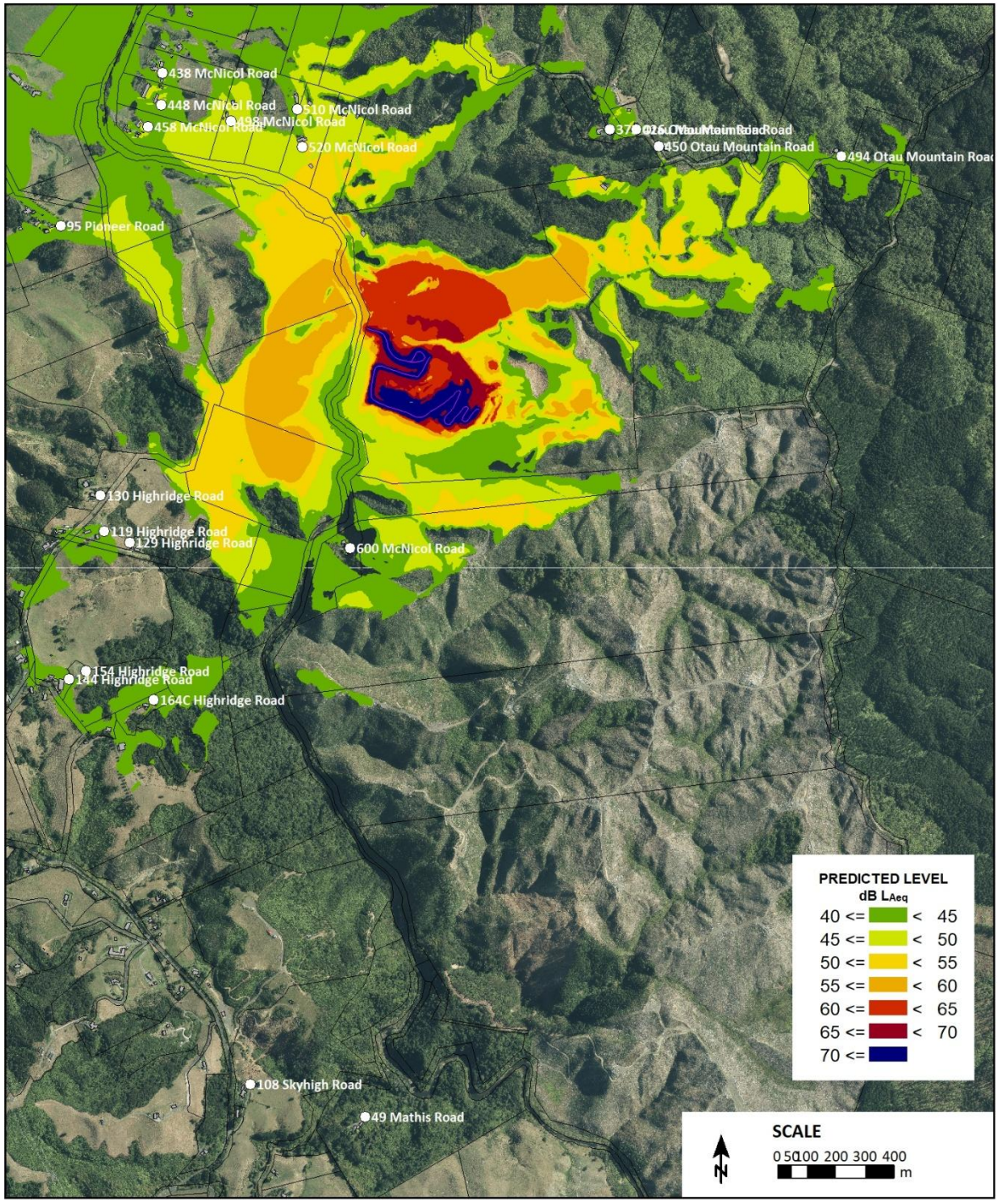
APPENDIX D MODEL RESULTS

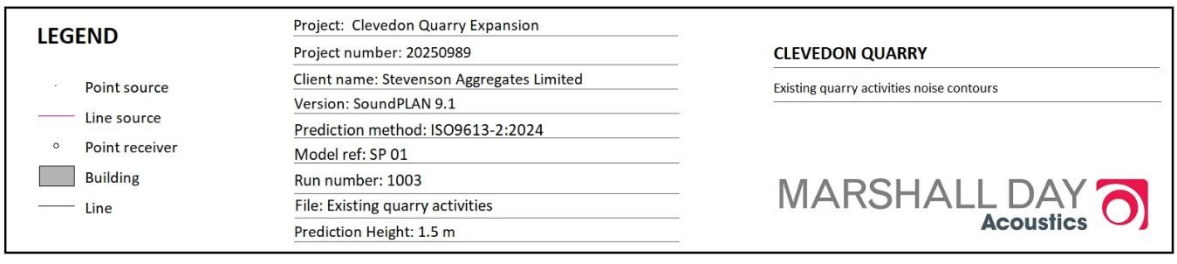
Table D1: Predicted daytime noise levels at notional boundaries. Proposed limit is 55 dB L_{Aeq}

	Predicted Noise Level at closest dwellings (dB L_{Aeq})						
Receiver	**Existing**	**Stage 1**	**Stage 3**	**Stage 5**	**FOH Stage 1**	**FOH Stage 3**	**FOH Stage 5**
108 Skyhigh Road	28	38	38	35	27	33	32
119 Highridge Road	41	43	44	43	33	36	37
129 Highridge Road	38	42	44	43	31	33	34
130 Highridge Road	29	38	40	41	28	28	28
144 Highridge Road	41	44	43	42	35	39	38
154 Highridge Road	39	45	43	42	33	39	38
164C Highridge Road	43	47	46	44	35	41	41
373 Otau Mountain Road	40	48	45	46	32	32	33
426 Otau Mountain Road	45	51	48	51	33	34	35
450 Otau Mountain Road	35	41	41	38	31	30	30
494 Otau Mountain Road	42	51	49	46	44	41	44
438 McNicol Road	43	47	45	45	43	43	42
448 McNicol Road	44	49	48	48	47	47	47
458 McNicol Road	46	50	49	49	48	47	47
498 McNicol Road	46	51	51	51	49	49	49
510 McNicol Road	43	47	43	43	33	34	34
520 McNicol Road	49	52	52	51	49	49	49
600 McNicol Road	39	39	39	37	34	35	35
49 Mathis Road	26	38	38	33	25	30	31
95 Pioneer Road	43	45	44	42	37	36	37
Owned by the quarry							
546 McNicol Road	48	44	44	45	39	39	39

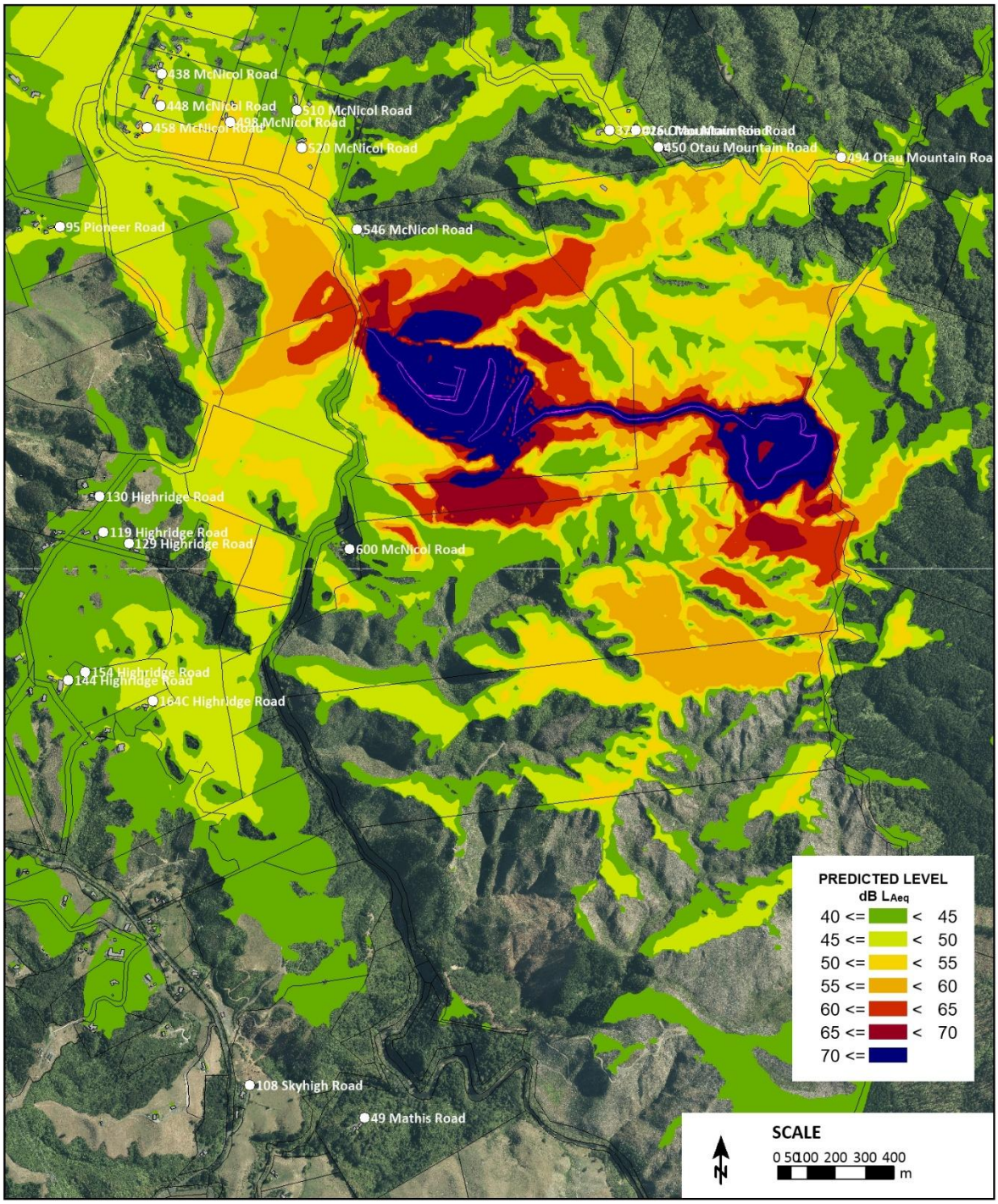
This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited

Figures D1 – D3: Noise contours for existing and proposed daytime quarry activities (Stage 1, Stage 3 and Stage 5)





This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited



LEGEND

- Point source
- Line source
- Point receiver
- Building
- Line

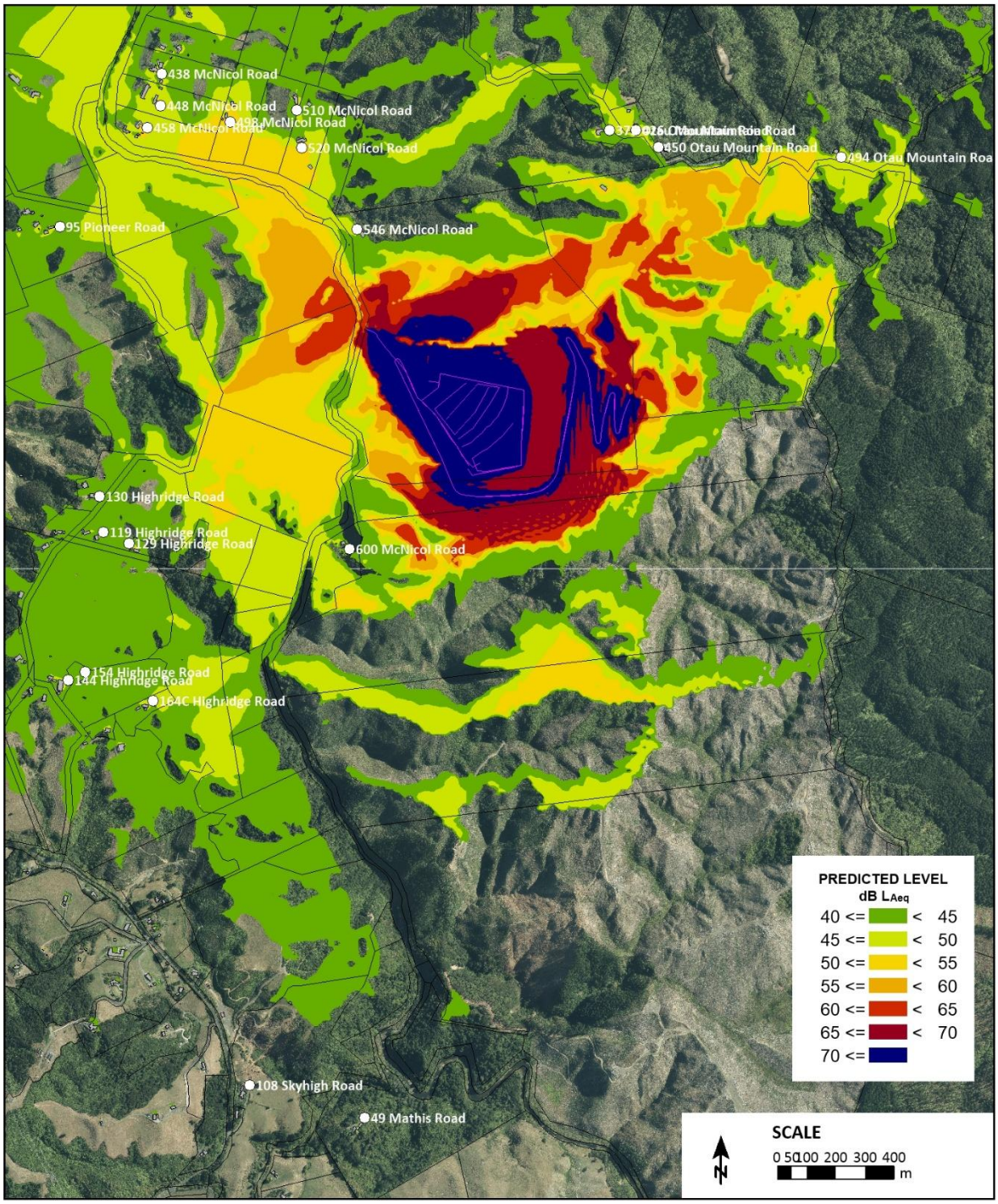
Project:	Clevedon Quarry Expansion
Project number:	20250989
Client name:	Stevenson Aggregates Limited
Version:	SoundPLAN 9.1
Prediction method:	ISO9613-2:2024
Model ref:	SP 01
Run number:	1100
File:	10 Year - Pit Design
Prediction Height:	1.5 m

CLEVEDON QUARRY

Stage 1: 10 Year - Pit Design quarry activities noise contours

MARSHALL DAY Acoustics

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited



LEGEND

- Point source
- Line source
- Point receiver
- Building
- Line

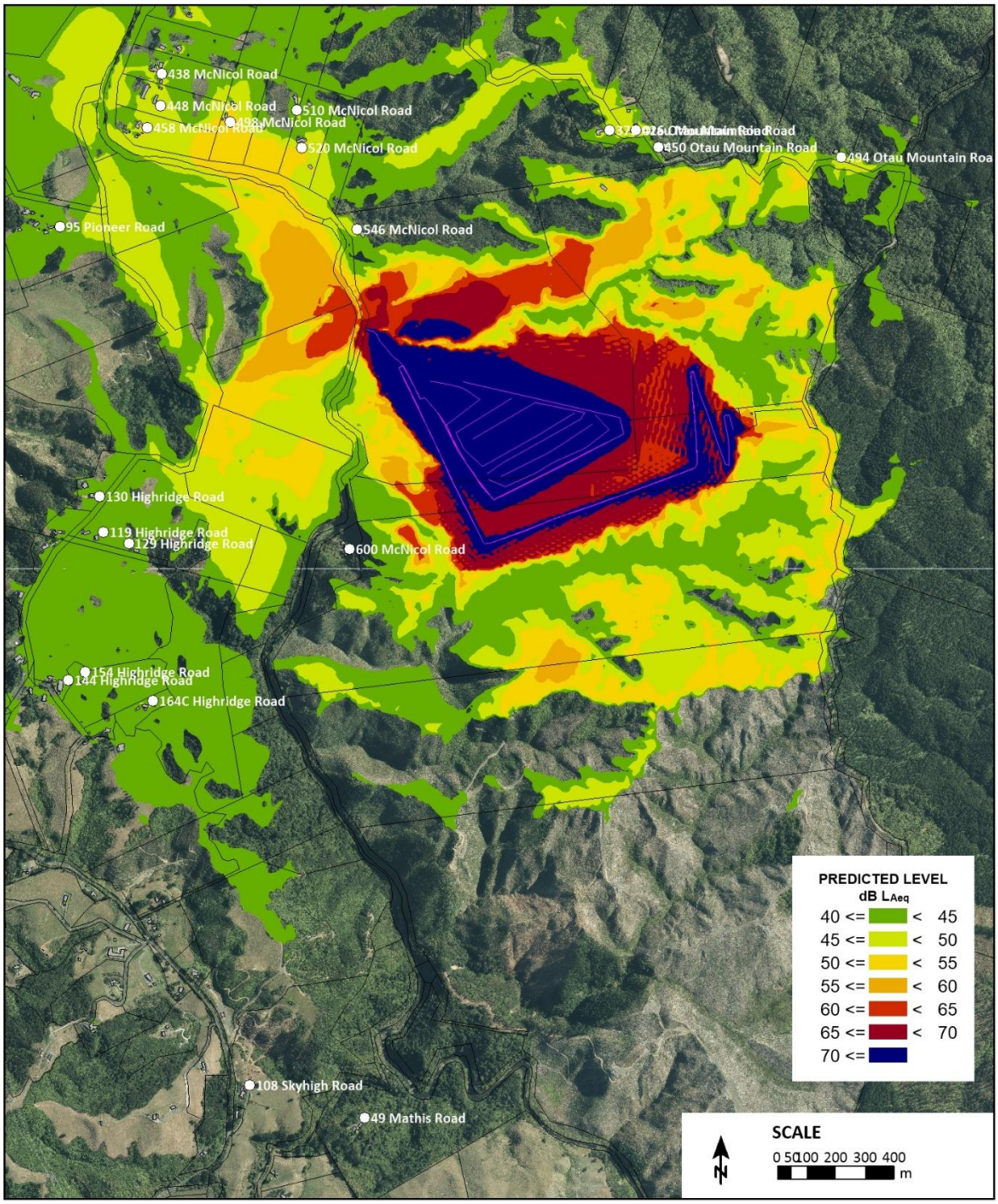
Project:	Clevedon Quarry Expansion
Project number:	20250989
Client name:	Stevenson Aggregates Limited
Version:	SoundPLAN 9.1
Prediction method:	ISO9613-2:2024
Model ref:	SP 01
Run number:	1101
File:	30 Year - Pit Design
Prediction Height:	1.5 m

CLEVEDON QUARRY

Stage 3: 30 Year - Pit Design quarry activities noise contours

MARSHALL DAY Acoustics

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited



LEGEND

- Point source
- Line source
- Point receiver
- Building
- Line

Project:	Clevedon Quarry Expansion
Project number:	20250989
Client name:	Stevenson Aggregates Limited
Version:	SoundPLAN 9.1
Prediction method:	ISO9613-2:2024
Model ref:	SP 01
Run number:	1102
File:	50 Year - Pit Design
Prediction Height:	1.5 m

CLEVEDON QUARRY

Stage 5: 50 Year - Pit Design quarry activities noise contours

MARSHALL DAY Acoustics

This document may not be reproduced in full or in part without the written consent of Marshall Day Acoustics Limited