# Noise and Vibration Impact Assessment

## Eulonga Quarry Project

### Eulonga Quarries Pty Ltd

Eulonga, Coolac NSW 2727

Prepared by:

**SLR Consulting Australia**

SLR Project No.: 630.032007.00007

14 March 2025

Revision: v1.0

## Revision Record

| Revision | Date | Prepared By | Checked By | Authorised By |
|---|---|---|---|---|
| v1.0 | 14 March 2025 | Martin Davenport | Aaron McKenzie | Martin Davenport |
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# Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Eulonga Quarries Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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# 1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Eulonga Quarries Pty Ltd (Eulonga Quarries) to undertake a Noise and Vibration Impact Assessment (NVIA) for a proposed new extraction area to the south west of the existing Eulonga Quarry.

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

# 2.0 Project Description

## 2.1 Project Overview

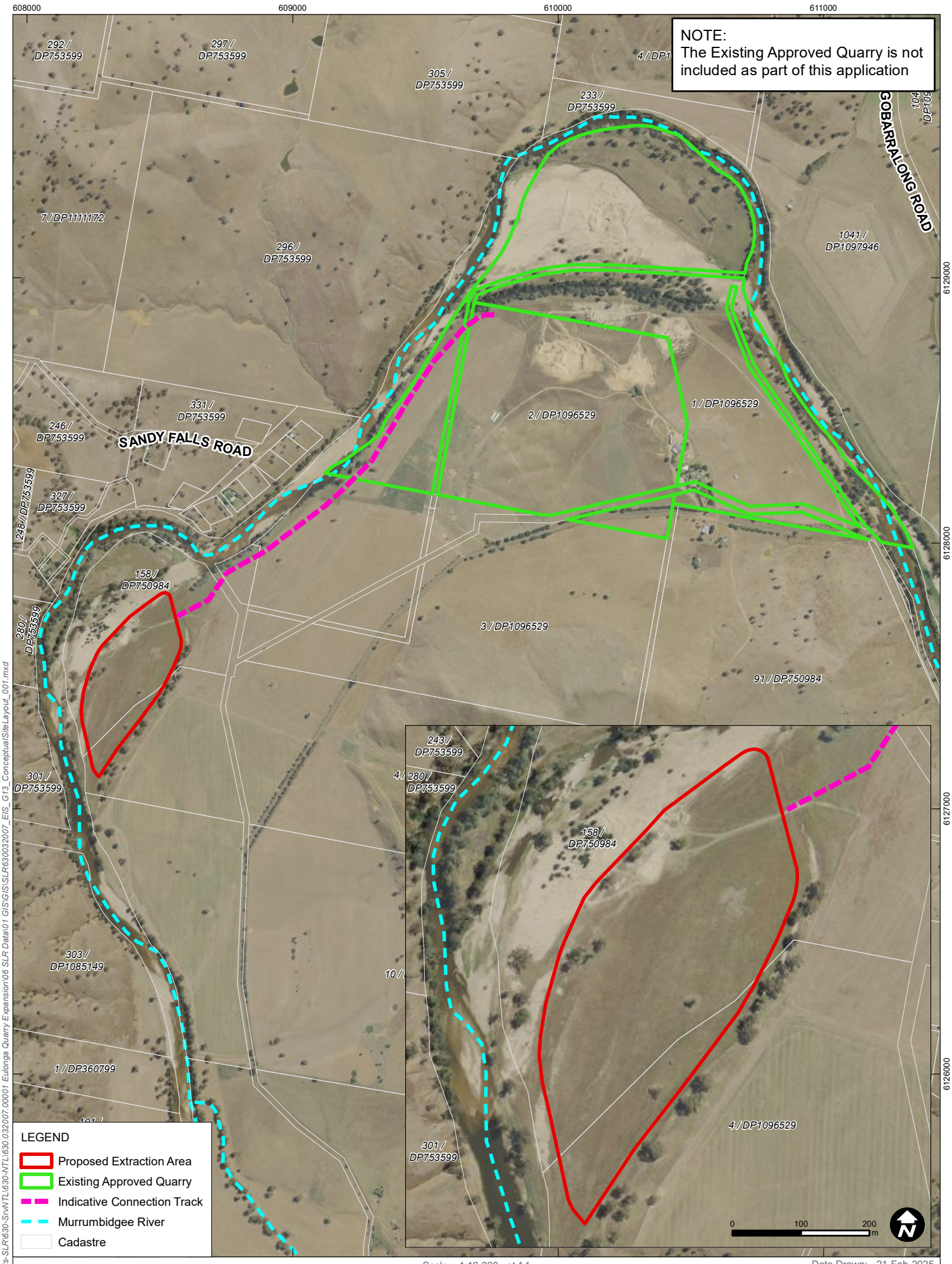
Eulonga Quarries operate the existing Eulonga Quarry at 338 Darbalara Road, Coolac, described as Lot 1 & 2 DP1096529 adjacent to the Murrumbidgee River.

Eulonga Quarries propose to establish a new extraction area (the Project) to the south west of the existing quarry operation, on land being described as Lot 158 DP750984 and Lot 4 DP1096529 to feed into and provide increased security for the ongoing operation of the existing Eulonga Quarry.

Key aspects of the Project include:

- A 14ha extension to the existing extraction area, with an annual extraction rate of 172,000 tonnes per annum from an estimated total source of 2.5M tonnes.
- Development of an internal access road linking the new extraction area with the existing Eulonga Quarry.
- No processing of material in the new extraction area.
- The existing operational parameters for the existing approved quarry operation (including the extraction rate, hours of operation, processing of material, product sales, loading and export of material via road going trucks, staff numbers, etc) will be maintained.

The Project layout is shown in **Figure 1** with the nearest receivers shown in **Figure 2.**




Scale: 1:18,000 at A4
Coordinate System: GDA2020 MGA Zone 55

Date Drawn: 21-Feb-2025
Project Number: 630.032007

Data Source: Basedata supplied by NSW SS (November, 2024)
Imagery © Department of Customer Service 2020

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**CONCEPTUAL SITE LAYOUT PLAN**

**FIGURE 1**

\\au.slr.local\Corporate\Projects-SLR\630-NTL\630.032007.00001 Eulonga Quarry Expansion\06 SLR Data\01 GIS\GIS\SLR630032007_EIS_G13_ConceptualSiteLayout_001.mxd

607000 607500 608000 608500 609000 609500 610000 610500 611000 611500 612000 612500

6130000 6129500 6129000 6128500 6128000 6127500 6127000 6126500

GOBARRALONG ROAD

SANDY FALLS ROAD

NOTE:
The Existing Approved Quarry is not included as part of this application

R1

R2

R3

R4

R5

R6

R7

Eulonga homestead occupied by land owner and operator of the quarry

LEGEND
- Proposed Extraction Area
- Existing Approved Quarry
- Indicative Connection Track
- Murrumbidgee River
- Nearby Houses
- Cadastre

0 250 500 m

Scale: 1:15,000 at A3
Coordinate system: GDA2020 MGA Zone 55

Date drawn: 21-Feb-2025
Project number: 630.032007

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# NEARBY HOUSES

FIGURE 2

\\au.slr.local\Corporate\Projects-SLR\630-SrvNTL\630-NTL\630.032007.00001 Eulonga Quarry Expansion\06 SLR Data\01 GIS\GIS\SLR630032007_EIS_G18_NearbyDwellings_001.mxd

## 2.2 Environmental Assessment Requirements

The NSW Department of Planning, Housing and Infrastructure (DPHI) has issued the Environment Assessment Requirements (EARs) for the preparation of the required Environmental Impact Statement.

The scope of the NIA assessment has been developed to address the EARs relating to noise and vibration.

**Table 1** outlines the SEARs relevant to this assessment along with a reference to where these are addressed.

**Table 1 Environmental Assessment Requirements Relevant to Noise, Vibration and Blasting**

| EAR | Section of report where it is addressed |
|---|---|
| **Noise –** including a quantitative assessment of potential: | |
| Construction and operational noise impacts in accordance with the Interim Construction Noise Guideline (ICNG), NSW Noise Policy for Industry (2017) and NSW Road Noise Policy respectively | **Section 6.0** |
| Reasonable and feasible mitigation measures to minimise noise emissions; and | **Section 7.1** |
| Monitoring and management measures | **Section 7.2** |

This NVIA has also taken into account the NSW Environment Protection Authority's (EPA's) input to the EARs and EPA NVIA assessment requirements.

# 3.0 Noise and Vibration Impact Assessment Requirements

## 3.1 Noise Policy for Industry Noise Levels

The EPA has regulatory responsibility for the control of noise from 'scheduled premises' under the *Protection of the Environment Operations Act 1997*. In implementing the *Noise Policy for Industry* (NPfI), the EPA has two broad objectives:

- Controlling intrusive noise levels in the short term; and
- Maintaining noise amenity levels for particular land uses over the medium to long-term.

In general terms, the NPfI sets out procedures for establishing the project intrusiveness noise level ($L_{Aeq(15minute)}$) and project amenity noise level ($L_{Aeq(period)}$), with a view to determining the lower (that is, the more stringent) being the Project Noise Trigger Level (PNTL), NPfI Section 2.1 states:

> *The project intrusiveness noise level aims to protect against significant changes in noise levels, whilst the project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Applying the most stringent requirement as the project noise trigger level ensures that both intrusive noise is limited and amenity is protected and that no single industry can unacceptably change the noise level of an area.*

For assessing intrusiveness, the existing background noise generally needs to be measured. The intrusiveness trigger level essentially means that the equivalent continuous noise level ($L_{Aeq}$) of the source should not be more than 5 A-weighted decibels (dBA) above the measured (or default) Rating Background Level (RBL).

The amenity assessment is based on amenity noise levels specific to the land use and associated activities. The recommended amenity noise levels from the NPfI are shown in **Table 2** and relate only to industrial-type noise and do not include road, rail or community-related noise. Based on the NPfI land use descriptions residences surrounding the development have been classified for the purposes of this noise assessment as 'rural residential'.

**Table 2 Noise Policy for Industry Recommended Amenity Noise Levels**

| Type of Receiver | Noise Amenity Area | Time of Day | Recommended Amenity Noise Level, $L_{Aeq(Period)}$, (dBA) |
|---|---|---|---|
| Residential | Rural | Day[1] | 50 |
| Note 1: Day: Monday to Saturday 7:00 am to 6:00 pm, Sunday and Public Holidays 8:00 am to 6:00 pm | | | |

The PNTLs are then determined in accordance with NPfI Section 2.1 *Project Noise Trigger Level* by identifying the lower of the project amenity or project intrusiveness noise levels (following conversion of the $L_{Aeq(period)}$ value project amenity noise level to an equivalent $L_{Aeq(15minute)}$ value). NPfI Section 2.2 *Noise Descriptors* assumes a default conversion factor of +3 dB for the conversion of $L_{Aeq(period)}$ values to $L_{Aeq(15minute)}$ values.

## 3.2 Interim Construction Noise Guideline Noise Management Levels

The *Interim Construction Noise Guideline* (ICNG) sets out noise management levels (NMLs) for residential and other noise-sensitive receivers and outlines how they are to be applied. The policy suggests restricting the hours of construction for activities that generate noise at residences above the 'highly affected' NML. A summary of the NMLs at residential receivers from the ICNG is contained in **Table 3**.

**Table 3 Interim Construction Noise Guideline Noise Management Level at Residential Receivers**

| Time of Day | NML $L_{Aeq(15minute)}$[1] | How to Apply |
|---|---|---|
| Recommended standard hours<br>Monday to Friday<br>7 am to 6 pm<br>Saturday 8 am to 1 pm<br>No work Sundays or public holidays | Noise Affected RBL[2] + 10 dBA | The noise affected level represents the point above which there may be some community reaction to noise.<br>• Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>• The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details. |
| | Highly Noise Affected 75 dBA | The highly noise affected level represents the point above which there may be strong community reaction to noise.<br>• Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:<br>1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences.<br>2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |
| Outside recommended standard hours | Noise Affected RBL[2] + 5 dBA | • A strong justification would typically be required for works outside the recommended standard hours.<br>• The proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>• Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.<br>• For guidance on negotiating agreements see section 7.2.2. |

Note 1: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise-affected residence.

Note 2: RBL: Rating Background Level, as defined in the NSW NPfI.

## 3.3 Offsite Road Traffic

The Project does not interface with any public roads and there is no expected change to the existing approved traffic movements associated with Eulonga Quarry based on construction or operation of the Project. Therefore off-site road traffic noise is not further considered in this report.

## 3.4 Vibration

Given the separation distance between the Project and the nearest residential receivers (greater than 200 m) vibration levels from activities at the Project are predicted to be negligible and generally below levels of human perception at the nearest residences. Given the above, the assessment of vibration from the Project is not further considered in this report.

# 4.0 Existing Meteorological and Noise Environment

## 4.1 Existing Meteorological Environment

### 4.1.1 Noise Policy for Industry Meteorological Conditions

In general terms, NPfI Fact Sheet D sets out procedures for establishing noise enhancing weather conditions, where two options are available to consider meteorological effects, as follows:

1. *Adopt the **noise-enhancing meteorological conditions** for all assessment periods for noise impact assessment purposes without an assessment of how often these conditions occur - a conservative approach that considers source to receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night.*

***Or***

2. *Determine the **significance** of noise-enhancing conditions. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night-time period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where noise enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.*

NPfI Fact Sheet D also contains several important notes, and in particular states:

> *Noise limits derived for consents and licences will apply under the meteorological conditions used in the environmental assessment process, that is, standard or noise-enhancing meteorological conditions. For 'very noise-enhancing meteorological conditions' (see glossary) a limit is set based on the limit derived under standard or noise-enhancing conditions (whichever is adopted in the assessment) plus 5 dB. In this way a development is subject to noise limits under all meteorological conditions.*
>
> *It should be noted that noise limit conditions will include the wind speed (scalar quantity without direction) under which noise limits will apply.*

### 4.1.2 Wind

Wind has the potential to increase noise levels at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind would obscure noise from most industrial and transport sources.

### 4.1.3 Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels at surrounding noise receivers. Temperature inversions occur predominantly at night during the winter months. Given that the Project would only operate during the NPfI defined day period, temperature inversions have not been considered as part of this assessment.

### 4.1.4 NPfI Noise Modelling Meteorological Parameters

To provide a conservative approach, the standard and noise enhancing meteorological conditions (NPfI Table D1), have been adopted and are presented in **Table 4**.

**Table 4 NPfI Table D1 Standard and Noise Enhancing Meteorological Conditions**

| Meteorological Conditions | Meteorological Parameters |
|---|---|
| Standard | Day: stability categories A-D with wind speed up to 0.5 m/s at 10 m AGL |
| Noise-enhancing | Day: stability categories A-D with light winds (up to 3 m/s at 10 m AGL) |
| Note: m/s = metres per second, m = metres, AGL = above ground level<br>Where a range of conditions is nominated, the meteorological condition delivering the highest predicted noise level should be adopted for assessment purposes. However, feasible and reasonable noise limits in consents and licences derived from this process would apply under the full range of meteorological conditions nominated under standard or noise-enhancing conditions as relevant. All wind speeds are referenced to 10m AGL. Stability categories are based on the Pasquill-Gifford stability classification scheme. | |

The adopted NPfI standard and noise enhancing meteorological conditions can be further defined for noise modelling purposes as presented in **Table 5**.

**Table 5 Meteorological Parameters Considered for Noise Predictions**

| Category | Period | Temperature (°C) | Humidity (%) | Wind Speed (m/s) | Wind Direction | Stability Class |
|---|---|---|---|---|---|---|
| Standard | Day | 20 | 60 | 0.5 | Source to receiver | D |
| Noise Enhancing | | 20 | 60 | 3 | | D |

## 4.2 Existing Noise Environment

The NPfI procedures require that noise impact assessments determine the relevant Rating Background Levels (RBLs) and relevant noise amenity receiver categories representative of potentially impacted residential receivers.

Given the remote rural nature of the area, the rural receiver category and the minimum applicable RBLs in accordance with the NPfI have been adopted for the Project and are presented in **Table 6**. It is noted that these levels conservatively assume the most stringent criteria for receivers in the absence of background noise monitoring data.

**Table 6 Adopted RBLs and Recommended Amenity Noise Level**

| Receiver Category | Period | Rating Background Noise Level (dBA)[1,2] | Recommended Amenity Noise Level |
|---|---|---|---|
| Rural Residential Receiver | Day[3] | 35 | 50 |
| Note 1: In accordance with NPfI Table 2.1, if the day-time RBL is < 35dBA, then 35dBA shall be the assumed RBL.<br>Note 2: In accordance with NPfI Table 2.1, if the evening or night RBL is < 30dBA, then 30dBA shall be the assumed RBL.<br>Note 3: Day-time Monday to Saturday 7:00am to 6:00pm, Sunday and Public Holidays 8:00am to 6:00pm. | | | |

# 5.0 Noise Criteria and Assessment Procedure

## 5.1 Construction Noise Management Levels

The construction NMLs during recommended construction hours, using the minimum assumed RBL of 35 dBA is provided in **Table 7**.

**Table 7 Construction Noise Management Levels – Standard Construction Hours**

| RID | ICNG Noise Criteria, $L_{Aeq(15min)}$ (dBA) | |
|---|---|---|
| | Noise Affected | Highly Noise Affected |
| All Residential | 45 | 75 |

## 5.2 Operational Noise Assessment Criteria

The PNTLs for operational noise from the Project are summarised in **Table 8**.

**Table 8 Project Noise Trigger Levels (dBA)**

| RID | Period[1] | Project Amenity Noise Level $L_{Aeq(period)}$ | Adopted RBL | PNTL Criteria $L_{Aeq(15minute)}$ | |
|---|---|---|---|---|---|
| | | | | Amenity[2] | Intrusiveness |
| All | Day | 50 | 35 | 48 | **40** |
| Note 1: Daytime 7 am to 6 pm; On Sundays and Public Holidays, Daytime 8 am to 6 pm<br>Note 2: The Project amenity noise levels have been converted to a 15-minute level by adding 3 dB, as outlined in the NPfI. | | | | | |

In qualitative terms, the extent of noise protection provided by the PNTLs is described in the NSW EPAs *A Guide to the Noise Policy for Industry* (2017). In those cases where the NPfI PNTLs are not achieved, it does not automatically follow that all people exposed to the noise would find the noise "unacceptable".

### 5.2.1 NPfI Corrections for Annoying Characteristics (Modifying Factors)

Sources of industrial noise can cause greater annoyance where they contain certain characteristics, such as tonality, intermittency or dominant low-frequency content. The NPfI specifies the following modifying factors, shown in **Table 9**, which are to be applied where annoying characteristics are present. An assessment of modifying factors is provided in **Section 0**.

**Table 9 NPfl Modifying Factors**

| Factor | Assessment/ Measurement | When to Apply | Correction[1] |
|---|---|---|---|
| Tonal noise | One-third octave or narrow band analysis | Level of one-third octave band exceeds the level of the adjacent bands on both sides by the levels defined in the NPfl. | 5 dB[2] |
| Low-frequency noise | Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements | Measure/assess source contribution C and A weighted Leq,t levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and the level to which the thresholds defined in the NPfl are exceeded. | 2 dB[2] |
| Maximum adjustment | Refer to individual modifying factors | Where two or more modifying factors are indicated. | Max of 10 dB[2] |

Note 1: Corrections to be added to the measured or predicted levels.

Note 2: Where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

# 6.0 Noise Impact Assessment

A computer model was used to predict noise emissions from the operation of the Project. The operational noise modelling was undertaken using the CONCAWE algorithms within SoundPLAN v8.2 software. The CONCAWE noise prediction algorithms as implemented within the SoundPLAN software are commonly used and accepted by the EPA and DPHI for the assessment of industrial noise in NSW. Furthermore, the meteorological category used within the CONCAWE algorithm is assessed in accordance with Pasquill and Turner Stability Categories and aligns with the 'standard' and 'noise enhancing' NPfl meteorological conditions. The six meteorological categories used within the CONCAWE algorithm based on Pasquil Stability Category and vector wind speeds are shown in **Table 10**.

**Table 10 CONCAWE Meteorological Category**

| Meteorological Category | Pasquill Stability Category | | |
|---|---|---|---|
| | A, B | C, D, E | F, G |
| 1 | V[1]< -3.0 | - | - |
| 2 | -3.0 < V < -0.5 | V < - 3.0 | - |
| 3 | -0.5 < V < +0.5 | -3.0 < V < -0.5 | V < -3.0 |
| 4 | +0.5 < V < +3 | -0.5 < V < 0.5 | -3.0 < V < -0.5 |
| 5 | V > 3 | 0.5 < V < +3 | -0.5 < V < +0.5 |
| 6 | - | V> +3 | +0.5 < V < +3 |

Note 1: V = wind speed in m/s with a negative value meaning wind from receiver to source and a positive value meaning wind from the source to the receiver.

A three-dimensional digital terrain map providing relevant topographic information was used in the modelling process, together with noise source data, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

The adopted standard and noise enhancing meteorological conditions used in the noise model are presented in **Table 5**.

## 6.1 Construction Noise Impact Assessment

Construction of the access road would be conducted using a small grader and trucks to deliver and spread the road base material. Equipment Sound Power Levels (SWLs) have been obtained from an SLR database of similar equipment used in the construction of other similar access roads and is provided in **Table 11**.

**Table 11 Construction Noise Sources**

| Equipment | Sound Power Level $L_{Aeq}$ (dBA) | Height (m) |
|---|---|---|
| Grader | 104 | 1.5 |
| Articulated Haul Truck | 110 | 1.5 |

### 6.1.1 Predicted Construction Noise Levels

For each receiver, the noise level predicted indicates the noise level when all the construction plant and equipment in **Table 11** are in use at the closest point of the access road to each receiver.

The predicted airborne noise levels from the construction works is summarised in **Table 12**.

**Table 12 Predicted Construction Noise Levels**

| RID | Meteorological Condition | Predicted Construction Noise Level $L_{Aeq(15minute)}$ (dBA) | NML $L_{Aeq(15minute)}$ (dBA) |
|---|---|---|---|
| R1 | Standard | 34 | 45 |
| | Noise-Enhancing | 37 | 45 |
| R2 | Standard | 35 | 45 |
| | Noise-Enhancing | 38 | 45 |
| R3 | Standard | 44 | 45 |
| | Noise-Enhancing | **46** | 45 |
| R4 | Standard | 42 | 45 |
| | Noise-Enhancing | 45 | 45 |
| R5 | Standard | 18 | 45 |
| | Noise-Enhancing | 21 | 45 |
| R6 | Standard | 18 | 45 |
| | Noise-Enhancing | 21 | 45 |
| R7 | Standard | 17 | 45 |
| | Noise-Enhancing | 20 | 45 |

Construction noise levels are not predicted to exceed the relevant NMLs at any of the nearby noise sensitive receivers, with the exception of R3 where a 1 dB exceedance is predicted under noise enhancing weather conditions. Given the results are based on construction equipment being in use on the access road at the closest point to each receiver, there would frequently be periods when construction noise levels are much lower than the worst-case noise levels presented as works occur further away. Given the minor exceedance of the NML at R3 under noise enhancing conditions, impacts are likely to be minor.

Notwithstanding, all appropriate reasonable and feasible noise mitigation will be applied to the works and are discussed in **Section 7.0.**

## 6.2 Operational Noise Impact Assessment

### 6.2.1 Noise Modelling Scenarios

Noise sources associated with the Project would be:

- The excavation, stockpiling and loading of material into an articulated haul truck within the new extraction area,
- Hauling material from the new extraction area to the existing processing area.

It is understood that a single operator would operate the excavator and the haul truck, as such operation of the excavator and the articulated haul truck would not occur simultaneously. The operational noise modelling scenario together with SWL information for the equipment used in the assessment of the Project is provided in **Table 13** .

**Table 13 Operational Scenarios and Equipment Sound Power Levels**

| Equipment | Sound Power Level $L_{Aeq}$ (dBA) | Scenario | |
|---|---|---|---|
| | | Scenario 1 Excavation | Scenario 2 Hauling |
| Excavator (Volvo EC380D or similar) | 106 | ✓ | - |
| Articulated Haul Truck (Volvo A35E or similar) | 110 | - | ✓ |

To provide a conservative assessment the excavator has been modelled as working on the surface in the north of the extraction area (i.e closest to the nearest receivers).

### 6.2.2 Predicted Operational Noise Levels

Noise emission levels were predicted from the Project for the operational scenario described in **Table 13**. Predicted operational noise levels at the nearest potentially affected residential receivers are provided in **Table 14**.

**Table 14 Predicted Operational Noise Levels**

| RID | Meteorological Condition | Predicted Construction Noise Level $L_{Aeq(15minute)}$ (dBA) | | PNTL (dBA) |
|---|---|---|---|---|
| | | Scenario 1 Excavation | Scenario 2 Hauling | |
| R1 | Standard | 37 | 26 | 40 |
| | Noise-Enhancing | 40 | 29 | 40 |
| R2 | Standard | 34 | 28 | 40 |
| | Noise-Enhancing | 37 | 31 | 40 |
| R3 | Standard | 36 | 36 | 40 |
| | Noise-Enhancing | 39 | 39 | 40 |
| R4 | Standard | 30 | 35 | 40 |
| | Noise-Enhancing | 33 | 38 | 40 |
| R5 | Standard | 8 | 10 | 40 |
| | Noise-Enhancing | 11 | 14 | 40 |
| R6 | Standard | 9 | 11 | 40 |
| | Noise-Enhancing | 12 | 14 | 40 |
| R7 | Standard | 9 | 10 | 40 |
| | Noise-Enhancing | 12 | 14 | 40 |

The results presented in **Table 14** indicate that operational noise levels meet the PNTL at all residential receivers surrounding the Project.

Analysis of the results indicates that the Project does not result in any tonal, impulsive or low frequency components as per the definitions of 'modifying factor corrections' in accordance with the NPfI. As such no modifying factor corrections to the predicted noise levels is triggered for the Project.

## 6.3 Cumulative Industrial Noise Impact Assessment

The NPfI notes:

> *Where the project amenity noise level applies and it can be met, no additional consideration of cumulative industrial noise is required.*

The NPfI seeks to protect against cumulative noise impacts and by setting the PNTLs at the more stringent of the project intrusiveness criteria or project amenity criteria, that aims to ensure intrusive noise is limited, and amenity is protected.

Notwithstanding, given the potential for cumulative impacts from operation of the Project and operation of the existing Eulonga Quarry, an assessment of cumulative noise levels has been conducted.

To provide a conservative cumulative assessment in the absence of measured noise emissions, the Eulonga Quarry noise criteria contained in EPL 12835 and predicted Project noise levels at receivers surrounding the Project have been cumulatively summed. The resulting cumulative operational industrial noise level from the Project and the existing Eulonga Quarry are provided in **Table 15**.

**Table 15 Cumulative Operational and Industrial Noise Levels**

| RID | Period | Intrusiveness Noise Levels $L_{Aeq(15minute)}$ (dBA) | | | Total Cumulative Amenity Noise Level[3] $L_{Aeq(period)}$ (dBA) | NPfI Recommended Amenity Noise Level $L_{Aeq(period)}$ (dBA) |
|---|---|---|---|---|---|---|
| | | Existing Eulonga Quarry[1] | Project Operation[2] | Total Cumulative Intrusiveness Noise Level | | |
| R1 | Day | 35 | 40 | 41 | 38 | 50 |
| R2 | Day | 35 | 37 | 39 | 36 | 50 |
| R3 | Day | 35 | 39 | 40 | 37 | 50 |
| R4 | Day | 35 | 38 | 40 | 37 | 50 |
| R5 | Day | 35 | 14 | 35 | 32 | 50 |
| R6 | Day | 35 | 14 | 35 | 32 | 50 |
| R7 | Day | 35 | 14 | 35 | 32 | 50 |

Note 1: Eulonga Quarry noise criteria contained in EPL 12835
Note 2: Highest noise level under noise enhancing conditions for excavation and hauling operational scenarios
Note 3: Amenity noise levels have been estimated as intrusiveness noise levels minus 3 dB

As presented in **Table 15**, the cumulative operational noise amenity noise levels are below the NPfI recommended amenity level at all locations. As such no significant cumulative impacts are predicted due to the concurrent operation of the Project and the existing Eulonga Quarry.

# 7.0 Construction and Operational Noise Mitigation and Management Measures

## 7.1 Mitigation and Management Measures

Notwithstanding a negligible 1 dB exceedance of the NML at R3 under noise enhancing meteorological conditions during construction and compliance with the PNTL at all receivers during operation, all appropriate feasible and reasonable mitigation measures would be applied to minimise the potential impacts from the Project, as far as practicable.

A number of potential mitigation measures for construction and operation activities that would be applied to the Project are detailed in **Table 16**.

**Table 16 Mitigation and Management Measures**

| Mitigation / Management Measure | Person Responsible | Timing / Frequency |
|---|---|---|
| **Project Planning** | | |
| Use quieter construction methods where feasible and reasonable. | Manager | Ongoing |
| **Training** | | |
| Training would be provided to all personnel on noise requirements for the Project. Inductions and toolbox talks to be used to inform personnel of the location and sensitivity of surrounding receivers. | Manager | Ongoing |
| **Plant and Equipment Source Mitigation** | | |
| All plant and equipment must be maintained in a proper and efficient condition, operated in a proper and efficient manner, and feature standard noise amelioration measures where applicable. | Manager | Ongoing |
| Spot checks of equipment in operation would be completed to ensure individual items are operating as expected. | | |
| Dropping materials from a height will be avoided. | | |
| Truck movements would be kept to a minimum, i.e. trucks are fully loaded on each trip. | | |
| **Monitoring** | | |
| Noise monitoring will be conducted (as appropriate) as detailed in **Section 7.2**. | Manager and appropriately qualified personnel/contractor | |

## 7.2 Noise Monitoring

In response to complaints received, where appropriately justified following an initial investigation, noise monitoring would be conducted. The exact nature and location of the noise monitoring would be dependent on the activities taking place.

Noise monitoring would be completed by suitably qualified acoustic specialists. The location and extent of attended monitoring would be determined in consultation with Project staff, regulatory authorities as appropriate and would be dependent on the activities taking place.

The monitoring would take place during the expected noisiest operational periods, or periods where potential offsite noise impacts are likely to be highest and be representative/indicative of the impacts at the potentially affected sensitive receivers.

All items of acoustic instrumentation utilised would be designed to comply with AS/NZS IEC 61672.1-2004 Electroacoustics – Sound level meters and carry current calibration certificates.

A noise monitoring report would be prepared following each noise monitoring survey. These reports will be kept on file for reference and provided to the relevant regulatory authorities if requested. The results of the noise monitoring reports will be included in any compliance reporting for the development, where required.

The noise monitoring report must include the following, at a minimum:

- The type of measurements conducted (eg, direct measurement at compliance location, measurement at intermediate location, sound power level measurement of source, etc).
- Details of the noise monitoring location.
- Name and position of personnel undertaking measurements.
- The acoustic instrumentation used for the measurements, including serial numbers.
- Details of the date, time, and duration of the measurements.
- All relevant measurement details.
- Details of the weather conditions during the measurement, including the instrumentation and/or weather station where applicable.
- The results of the noise measurements at each monitoring location, including comparison to the noise limits at the relevant compliance locations.
- A statement outlining the development's compliance status, and the likely reasons or main noise source contributors to any identified non-compliance.

Where the development is found to be non-compliant, management would determine applicable additional noise mitigation and management measures to be implemented to manage the noise exceedance.

# 8.0 Conclusion

Operational noise predictions indicate that noise from the Project would be below the relevant PNTLs at all receivers.

Cumulative operational noise levels from the Project and the existing Eulonga Quarry are predicted to be below the NPfI recommended amenity noise levels at all receivers.

Construction noise levels are predicted to meet the NMLs at all receivers with the exception of one location where an exceedance of up to 1 dB is predicted under noise enhancing meteorological conditions. Given the minor exceedance of the NMLs impacts at this location are likely to be minor.

Notwithstanding, all appropriate feasible and reasonable construction and operational noise mitigation measures would be applied to the works with a view to minimise potential noise impacts as far as practicable.

Vibration levels from activities at the Project are predicted to be negligible and generally below levels of human perception at the nearest residences

# Appendix A Acoustic Terminology

## Noise and Vibration Impact Assessment

**Eulonga Quarry Project**

**Eulonga Quarries Pty Ltd**

SLR Project No.: 630.032007.00007

14 March 2025

### 1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is $2 \times 10^{-5}$ Pa.

### 2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

| Sound Pressure Level (dBA) | Typical Source | Subjective Evaluation |
|---|---|---|
| 130 | Threshold of pain | Intolerable |
| 120 | Heavy rock concert | Extremely noisy |
| 110 | Grinding on steel | |
| 100 | Loud car horn at 3 m | Very noisy |
| 90 | Construction site with pneumatic hammering | |
| 80 | Kerbside of busy street | Loud |
| 70 | Loud radio or television | |
| 60 | Department store | Moderate to quiet |
| 50 | General Office | |
| 40 | Inside private office | Quiet to very quiet |
| 30 | Inside bedroom | |
| 20 | Recording studio | Almost silent |

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

### 3. Sound Power Level

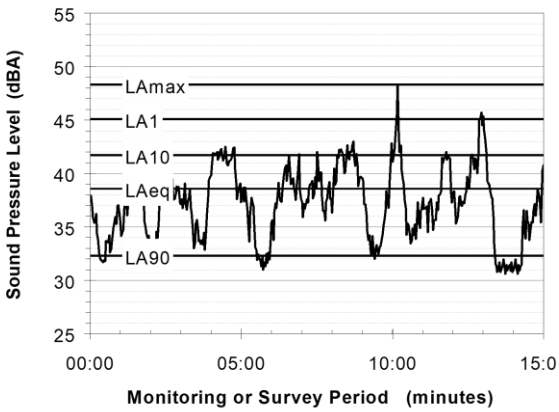
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit $10^{-12}$ W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

### 4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.




Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

### 5. Frequency Analysis

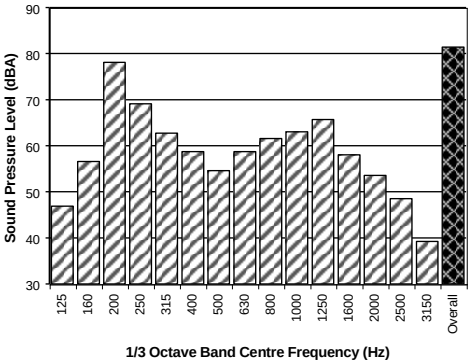
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

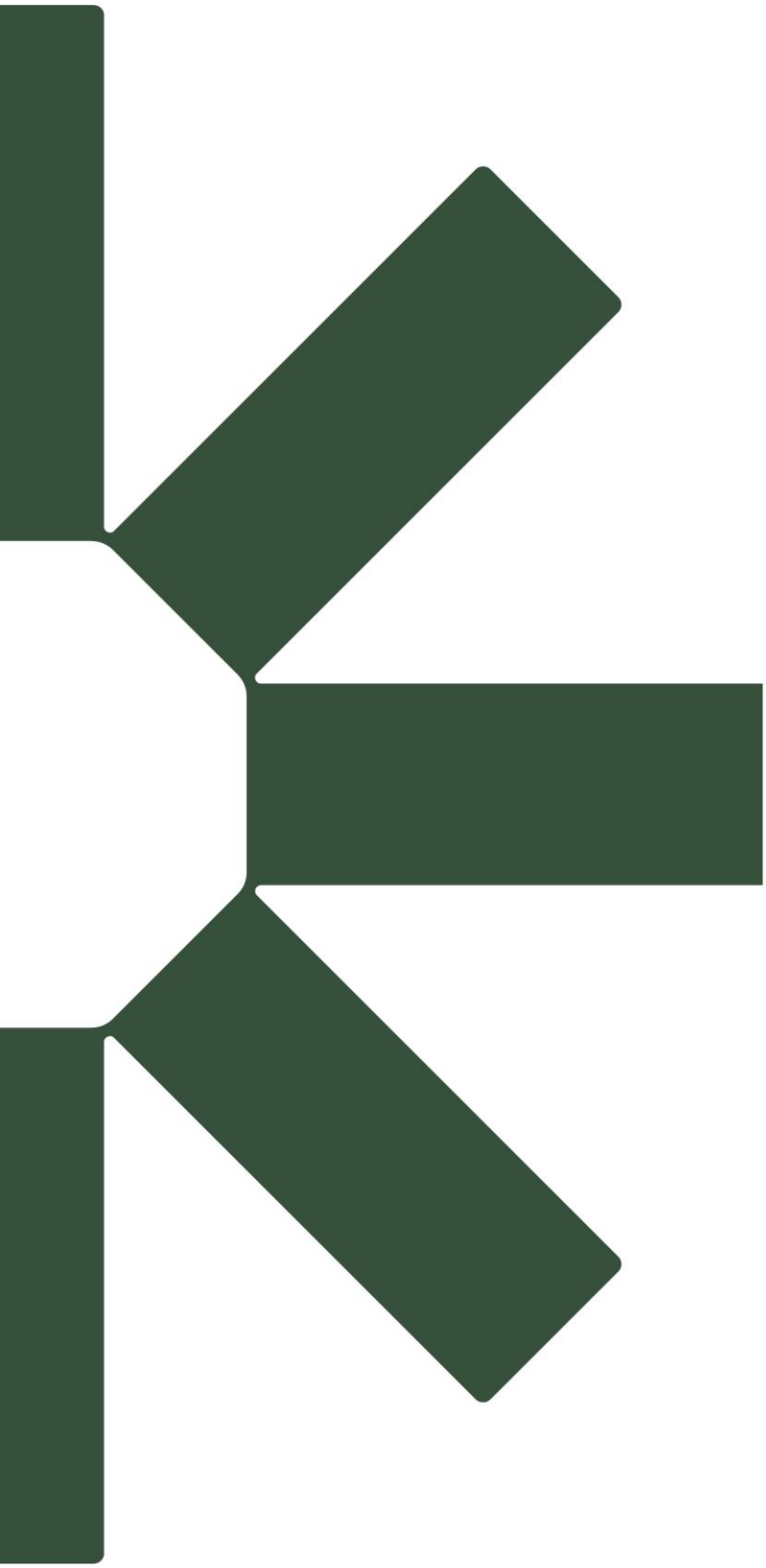
The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.




### 6. Annoying Noise (Special Audible Characteristics)

A louder noise would generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.



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