# Noise Monitoring Assessment

Teven Quarry, Teven, NSW
Quarter 2 Ending June 2019.

Prepared for: Holcim (Australia) Pty Ltd
July 2019
MAC180611-06RP4

Muller Acoustic Consulting

# *Document Information*

## Noise Monitoring Assessment

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## Quarter 2 Ending June 2019

**Prepared for: Holcim (Australia) Pty Ltd**

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| Document ID | Status | Date | Prepared By | Signed | Reviewed By | Signed |
|---|---|---|---|---|---|---|
| MAC180611-06RP4 | Final | 9 July 2019 | Robin Heaton |  | Rod Linnett |  |

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# 1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Teven Quarry (the 'quarry'), Teven, NSW.

The monitoring has been conducted in accordance with the Teven Noise Management Plan and in general accordance with relevant conditions outlined in the Development Consent (ref: SSD 6422); at five representative monitoring locations. This assessment has been undertaken during quarterly period ending June 2019, and forms part of the noise monitoring program for the quarry.

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Department of Planning and Environment, Development Consent (SSD 6422), 2015; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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# 2 Noise Criteria

Schedule 3 of the Teven Quarry Development Consent (2015), outlines the applicable noise criteria for residential receivers surrounding the quarry site.

**Table 1** reproduces relevant criteria for each of the receivers as outlined in the quarry's Development Consent.

**Table 1 Noise Criteria**

| Location[1] | Quarry Operations | |
|---|---|---|
| | Period: Day | Period: Evening |
| | 7am – 6pm | 6pm – 10pm |
| | dB $LA_{eq(15min)}$ | dB $LA_{eq(15min)}$ |
| R3, R4, R13, R15, R16, R17, R18, R20 | 38 | 35 |
| All other receivers | 37 | 35 |

Note 1: Receiver locations are shown in Figure 1.

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# 3 Methodology

## 3.1 Locality

The quarry is located in Teven, NSW approximately 7km west of Ballina, NSW. Receivers in the locality surrounding the quarry are primarily rural residential. The surroundings of the quarry include bushland and farming pastures. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1.**

## 3.2 Noise Monitoring Locations

Five monitoring locations have been selected as part of the NMA in accordance with the NMP. The selected monitoring locations are presented in **Table 2** along with the noise sensitive receivers they represent.

**Table 2 Monitoring Locations (MGA56)**

| Location | Nearest Receiver | Easting, m | Northing, m |
|---|---|---|---|
| N1 | R7 | 547017 | 6810098 |
| N2 | R3/R4 | 548877 | 6810290 |
| N3 | R2 | 548642 | 6810801 |
| N4 | R10 | 547729 | 6810226 |
| N5 | R15 | 547793 | 6808998 |

## 3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise and the NPI. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Monday 17 June 2019 and Tuesday 18 June 2019. Acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

As per the Noise Management Plan, two daytime measurements were conducted at each monitoring location. It is noted that the quarry was not operating during the evening period although two measurements were conducted at each monitoring location.

Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source.

Extraneous noise sources were excluded from the analysis to determine the $LA_{eq(15min)}$ noise contribution for comparison against the relevant criteria. Where the quarry was inaudible, the contribution is estimated to be at least 10dB below the ambient noise level.


# FIGURE 1

## LOCALITY PLAN

REF: MAC180611-06

0 150m

KEY

N1 RECEIVER LOCATION

SITE LOCATION

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*Imagery Source : nearmaps

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# 4 Results

## 4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N1 are presented in **Table 3**.

**Table 3 Operator-Attended Noise Survey Results – Location N1**

| Date | Time (hrs) | Descriptor (dBA re 20 µPa) | | | Meteorology | Description and SPL, dBA |
|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | |
| 18/06/2019 | 08:15 (Day) | 84 | 60 | 46 | WD: NW<br>WS: 2.4m/s<br>Rain: Nil | Wind in Trees 48-54<br>Passing Traffic 60-84<br>Birds 50-67<br>Quarry Inaudible |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | <36 |
| 18/06/2019 | 08:30 (Day) | 69 | 50 | 46 | WD: NW<br>WS: 2.2m/s<br>Rain: Nil | Wind in Trees 48-54<br>Birds 50-62<br>Passing Traffic 50-69<br>Quarry Inaudible |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | <36 |
| 17/06/2019 | 21:20 (Evening) | 60 | 41 | 39 | WD: NW<br>WS: 1.2m/s<br>Rain: Nil | Wind in trees 39-60<br>Distant Traffic 30-40 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |
| 17/06/2019 | 21:35 (Evening) | 56 | 39 | 38 | WD: NW<br>WS: 1.4m/s<br>Rain: Nil | Wind in trees 38-40<br>Distant traffic 35-36<br>Insects 30-38 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

## 4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N2 are presented in **Table 4**.

**Table 4 Operator-Attended Noise Survey Results – Location N2**

| Date | Time (hrs) | Descriptor (dBA re 20 µPa) | | | Meteorology | Description and SPL, dBA |
|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | |
| 18/06/2019 | 10:15 (Day) | 89 | 69 | 40 | WD: NW<br>WS: 0.3m/s<br>Rain: Nil | Birds 40-52<br>Passing Traffic 40-89<br>Quarry Operations 35-38 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 36 |
| 18/06/2019 | 10:30 (Day) | 91 | 69 | 39 | WD: NW<br>WS: 0.2m/s<br>Rain: Nil | Passing Traffic 58-91<br>Birds 40-57<br>Quarry Operations 34-37 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 35 |
| 17/06/2019 | 19:34 (Evening) | 88 | 64 | 47 | WD: N<br>WS: 0.4m/s<br>Rain: Nil | Frogs 50-55<br>Traffic 45-88<br>Aircraft 55-60 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |
| 17/06/2019 | 19:49 (Evening) | 60 | 49 | 39 | WD: N<br>WS: 0.1m/s<br>Rain: Nil | Frogs 50-55<br>Traffic 40-60<br>Aircraft 46-51 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

## 4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N3 are presented in **Table 5**.

**Table 5 Operator-Attended Noise Survey Results – Location N3**

| Date | Time (hrs) | Descriptor (dBA re 20 µPa) | | | Meteorology | Description and SPL, dBA |
|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | |
| 18/06/2019 | 10:54 (Day) | 60 | 36 | 30 | WD: NW<br>WS: 0.2m/s<br>Rain: Nil | Wind in Crops 33-40<br>Birds 42-45<br>Quarry Operations 30-36 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 33 |
| 18/06/2019 | 11:10 (Day) | 58 | 37 | 30 | WD: NW<br>WS: 0.2m/s<br>Rain: Nil | Quarry Operations 30-35<br>Winds in Crops 35-37<br>Aircraft 35-38 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 33 |
| 17/06/2019 | 19:00 (Evening) | 71 | 51 | 35 | WD: N<br>WS: 0.0m/s<br>Rain: Nil | Traffic 34-37<br>Insects 34-38<br>Dog Bark 40-50<br>Aircraft 40-71 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |
| 17/06/2019 | 19:15 (Evening) | 57 | 38 | 35 | WD: N<br>WS: 0.1m/s<br>Rain: Nil | Traffic 30-37<br>Insects 32-35<br>Birds 37-45<br>Aircraft 40-57 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

## 4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N4 are presented in **Table 6**.

**Table 6 Operator-Attended Noise Survey Results – Location N4**

| Date | Time (hrs) | Descriptor (dBA re 20 µPa) | | | Meteorology | Description and SPL, dBA |
|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | |
| 18/06/2019 | 09:38 (Day) | 86 | 63 | 46 | WD: NW<br>WS: 0.1m/s<br>Rain: Nil | Quarry Fixed Plant 38-46<br>Passing Traffic 50-86 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 41 |
| 18/06/2019 | 09:53 (Day) | 79 | 61 | 46 | WD: NW<br>WS: 0.1m/s<br>Rain: Nil | Passing Traffic 44-79<br>Quarry Fixed Plant 38-47 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 41 |
| 17/06/2019 | 20:06 (Evening) | 68 | 38 | 31 | WD: N<br>WS: 0.1m/s<br>Rain: Nil | Insects 30-34<br>Aircraft 40-52<br>Birds 40-68<br>Distant Traffic 30-35 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |
| 17/06/2019 | 20:22 (Evening) | 58 | 37 | 31 | WD: N<br>WS: 0.2m/s<br>Rain: Nil | Insects 30-34<br>Traffic 29-42<br>Birds 45-58<br>Aircraft 40-42 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

## 4.5 Assessment Results - Location N5

The monitored noise level contributions and observed meteorological conditions for each day and evening survey period at location N5 are presented in **Table 7**.

**Table 7 Operator-Attended Noise Survey Results – Location N5**

| Date | Time (hrs) | Descriptor (dBA re 20 µPa) | | | Meteorology | Description and SPL, dBA |
|---|---|---|---|---|---|---|
| | | $L_{Amax}$ | $L_{Aeq}$ | $L_{A90}$ | | |
| 18/06/2019 | 08:57 (Day) | 88 | 64 | 44 | WD: NW<br>WS: 1.5m/s<br>Rain: Nil | Passing Traffic 50-86<br>Tractor in Field 35-46<br>Birds 45-56<br>Quarry Operations 30-40 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 35 |
| 18/06/2019 | 09:17 (Day) | 86 | 59 | 43 | WD: NW<br>WS: 1.3m/s<br>Rain: Nil | Wind in Trees 40-44<br>Tractor in Field 37-46<br>Aircraft 50-68<br>Birds 50-74<br>Passing Traffic 70-86<br>Quarry Operations 31-38 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | 35 |
| 17/06/2019 | 20:39 (Evening) | 87 | 59 | 35 | WD: N<br>WS: 0.4m/s<br>Rain: Nil | Frogs 30-40<br>Traffic 35-42<br>Passing Traffic 80-87 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |
| 17/06/2019 | 20:55 (Evening) | 80 | 52 | 36 | WD: N<br>WS: 0.3m/s<br>Rain: Nil | Passing Traffic 35-80<br>Wind in Trees 30-34<br>Insects 30-33<br>Birds 32-43 |
| Teven Quarry $L_{Aeq(15min)}$ Contribution | | | | | | Quarry not operational |

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

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# 5 Noise Compliance Assessment

The compliance assessment for each residential receiver (R2, R3/R4, R7, R10 and R15) are presented in **Table 8** and **Table 9** for day and evening assessment periods respectively.

**Table 8 Daytime Noise Compliance Assessment**

| Receiver No. | Monitoring Location | Quarry Noise Contribution | Quarry Noise Criteria | Compliant |
|---|---|---|---|---|
| | | dB $L_{Aeq(15min)}$ | dB $L_{Aeq(15min)}$ | |
| R2 | N3 | 33 | 37 | ✓ |
| R3/R4 | N2 | 36 | 38 | ✓ |
| R7 | N1 | <36 | 37 | ✓ |
| R10 | N4 | 41 | 37 | X |
| R15 | N5 | 35 | 38 | ✓ |

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

**Table 9 Evening Noise Compliance Assessment**

| Receiver No. | Monitoring Location | Quarry Noise Contribution | Quarry Noise Criteria | Compliant |
|---|---|---|---|---|
| | | dB $L_{Aeq(15min)}$ | dB $L_{Aeq(15min)}$ | |
| R2 | N3 | Quarry Not Operational | 35 | ✓ |
| R3/R4 | N2 | Quarry Not Operational | 35 | ✓ |
| R7 | N1 | Quarry Not Operational | 35 | ✓ |
| R10 | N4 | Quarry Not Operational | 35 | ✓ |
| R15 | N5 | Quarry Not Operational | 35 | ✓ |

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

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# 6 Discussion

## 6.1 Discussion of Results - Location N1

Quarry noise emissions were inaudible during the two daytime noise measurements conducted on Tuesday 18 June 2019, therefore satisfying the daytime noise limits. The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non quarry noise sources observed during the measurements included insects, birds, wind in trees, aircraft pass-by, local and distant traffic.

## 6.2 Discussion of Results - Location N2

Quarry emissions were audible during the two daytime measurements on Tuesday 18 June 2019 however satisfied the relevant daytime and evening noise limits. Audible noise sources included processing plant and truck movements.

The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Extraneous sources measured include traffic, wind in trees, birds, local residential noise, insects and aircraft pass-by.

## 6.3 Discussion of Results - Location N3

Quarry noise emissions were audible during the two daytime measurements conducted on Tuesday 18 June 2019. Processing plant and truck movements were audible during the two daytime measurements with a measured contribution of 33dBA, therefore satisfying the daytime criteria.

The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non-quarrying noise sources observed during the measurements included insects, wind in crops, aircraft pass-by, local residential noise and traffic.

## 6.4 Discussion of Results - Location N4

Quarry noise emissions were audible during the two daytime measurements conducted on Tuesday 18 June 2019. Processing plant, in particular screens, were audible during the two daytime measurements with contributions ranging between 38dBA and 47dBA. The overall contribution was quantified as 41dBA at the dwelling at 108 Stokers Lane for both the first and second daytime measurements which is above the applicable daytime criteria of 37dBA.

Following discussion with quarry management, it is noted that changes were recently made to the processing plant and that the plant was being run at half load during the survey. This will allow the screen to shake excessively and material to rattle more on the screens.

It is recommended that the screens be checked for faults and to operate at full load to reduce noise emissions.

The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Non-quarrying sources observed during the measurements included local and distant traffic, birds, wind in trees, insects and aircraft pass-bys.

## 6.5 Discussion of Results - Location N5

Quarry noise emissions were audible during the two daytime measurements conducted on Tuesday 18 June 2019, however satisfied the daytime criteria of 38dBA with a quarry contribution of 35dBA.

The quarry was not operational during the evening period which satisfied the relevant evening noise limits, however background measurements were completed as per the requirements of the EPL.

Local traffic was the dominant source audible throughout the survey at this location. Other non-quarrying sources including traffic, birds, industrial noise, insects and aircraft pass-by all audible during the June 2019 monitoring period.

# 7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Holcim (Australia) Pty Ltd at the Teven Quarry, Teven, NSW. The assessment was completed to determine the quarry's compliance with the relevant criteria outlined in their Development Consent for relevant surrounding residential receivers during Quarter 2, period ending June 2019.

Attended noise measurements were undertaken on Monday 17 June 2019 and Tuesday 18 June 2019 at representative monitoring locations with quarry noise contributions compared against the relevant criteria. The assessment has identified that noise emissions generated by Teven Quarry comply with relevant noise criteria specified in the Development Consent at all assessed residential receivers, with the exception of R3/R4 during the daytime period which had a noise contribution of 41dBA for both the daytime measurements at the location.

Next quarterly assessment will validate any exceedance from the processing plant at R3/R4.

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# Appendix A - Glossary of Terms

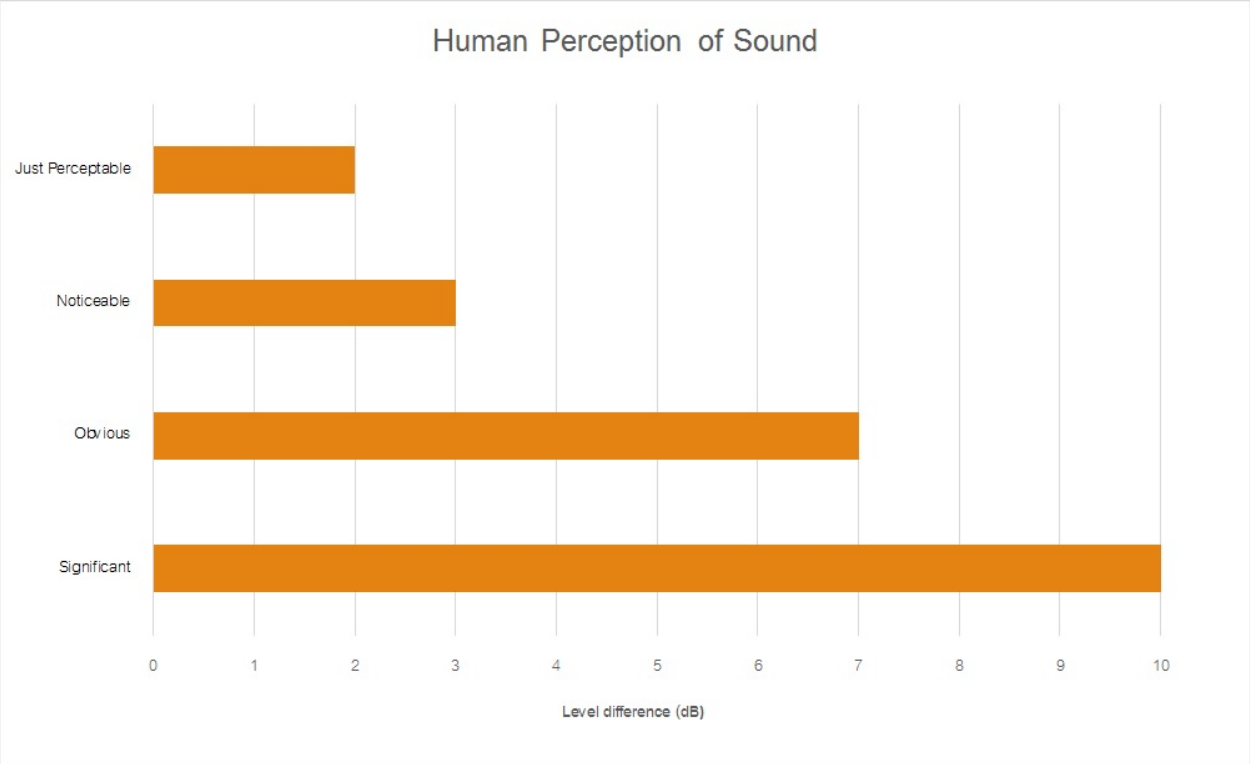
**Table A1** provides a number of technical terms have been used in this report.

| Table A1 Glossary of Terms | |
|---|---|
| Term | Description |
| 1/3 Octave | Single octave bands divided into three parts |
| Octave | A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit. |
| ABL | Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels. |
| Adverse Weather | Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter). |
| Ambient Noise | The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant. |
| A Weighting | A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise. |
| dBA | Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear. |
| dB(Z), dB(L) | Decibels Linear or decibels Z-weighted. |
| Hertz (Hz) | The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz. |
| LA10 | A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels. |
| LA90 | Commonly referred to as the background noise, this is the level exceeded 90 % of the time. |
| LAeq | The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period. |
| LAmax | The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval. |
| RBL | The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's. |
| Sound power level (LW) | This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by :<br>= 10.log10 (W/Wo)<br>Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts. |

Table A2 provides a list of common noise sources and their typical sound level.

| Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA | |
|---|---|
| Source | Typical Sound Level |
| Threshold of pain | 140 |
| Jet engine | 130 |
| Hydraulic hammer | 120 |
| Chainsaw | 110 |
| Industrial workshop | 100 |
| Lawn-mower (operator position) | 90 |
| Heavy traffic (footpath) | 80 |
| Elevated speech | 70 |
| Typical conversation | 60 |
| Ambient suburban environment | 40 |
| Ambient rural environment | 30 |
| Bedroom (night with windows closed) | 20 |
| Threshold of hearing | 0 |

Figure A1 – Human Perception of Sound



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