

NZTA Noise monitoring requirements

1. Introduction

Noise measurements are often performed during the environmental assessments of projects, to verify any modelling of existing road-traffic noise, and to quantify the existing environment. The NZTA requires that measurements be technically robust, and performed and reported in a consistent manner.

This document outlines the requirements for unattended monitoring, and should be read in conjunction with section 5.2 of NZS 6806:2010.

2. Locations

The number and location of monitoring points should be agreed with the NZTA prior to commencement of monitoring. The NZTA will provide contact details for all selected locations, however the acoustics specialist will be responsible for arranging access.

3. Procedure

The noise monitoring must comply with the following requirements:

- All measurements must be conducted in general accordance with NZS 6801:2008.
- For long-term measurements, noise logging must be continuous for a period of at least seven consecutive days. The duration of logging must be sufficient to meet the analysis requirements detailed in Section 6. The loggers must record the $L_{Aeq(15 \text{ min})}$ in each 15 minute period during the logging at each location.
- Attended short-term measurements should be for at least 15 minutes and any extraneous sounds should be excluded by pausing the measurement. Unattended short-term measurements must record the $L_{Aeq(15 \text{ min})}$ in each 15 minute period during the logging at each location, and be performed for at least 3 hours.
- Microphones must be at least 3.5 metres from any reflecting surface at the side of the PPF facing the state highway. If this is not practicable, microphones must be at a façade location 1 metre from a façade facing the state highway. All microphones must be 1.5 metres above the relevant floor level.
- Measurements must not be during school or public holidays.

4. Additional data

Weather conditions must be recorded during the survey period and included with the noise data records. The meteorological data can be from a representative permanent monitoring station and does not need to be recorded at each microphone location.

The daily traffic, percentage heavy vehicles and average vehicle speeds / posted speed limit must be included with the noise data records. If a traffic survey is not being performed at the same time as the noise survey, the nearest permanent count station in a representative location can be used. The following adjustment is required to adjust between the representative location and the noise measurement location:

$$Q_{\text{noise location}} = Q_{\text{count station}} + (AADT_{\text{noise location, nominated year}} - AADT_{\text{count station, nominated year}})$$

Q – total traffic volume over 24 hour period

5. Audio

While not mandatory, the recording of audio can be useful to identify noise sources, and in particular to assist in deciding whether to exclude data points. Audio recordings for this purpose must be at a sampling rate sufficient to identify noise sources when listening. A suggested minimum sample rate is 10 kHz.

If audio is to be post-processed to determine overall or octave band levels, it must be calibrated, and of a sufficiently high sample rate. It is suggested that 44 kHz is used as a minimum sample rate to allow the range of human hearing (20 Hz – 20 kHz) to be used.

6. Analysis

Data must be analysed to produce an $L_{Aeq(24h)}$ at each location using the following process:

- Data points during rain or average wind speeds greater than 5 m/s must be excluded or reasons provided as to why they should be included.
- Data points during upwind conditions (3–5 m/s) must be excluded. Upwind is defined as the wind direction being $\pm 90^\circ$ of the direction between house and the closest point on the alignment.
- Abnormally high data points, indicated by high L_{AFmax} and/or centile levels must be excluded if they cannot be attributed to state highway road-traffic sources through listening to the audio recordings (if available).
- Excluded data points must be replaced by a linear interpolation of the surrounding points. If more than 5 hours during the day or 3 hours at night is excluded, then the day's measurement must be discarded. A minimum of two days' data including at least one weekday must be included in the analysis.
- Noise levels measured at a façade must be converted to free-field levels using a -2.5 dB correction. Only free-field levels are to be presented in reports and data files.
- To determine the $L_{Aeq(24h)}$ from short-term measurements, the temporal profiles of nearby long-term measurements may be used, or alternatively the 'Shortened measurement procedure' from the Calculation of Road Traffic Noise (CRTN) may be used.
- Values for the $L_{Aeq(24h)}$ must be corrected to the AADT for the nominated 'existing' year or forecasted 'design year' for the project. The $L_{Aeq(24h, nominated\ year)}$ must be calculated for each valid day, by correcting for traffic conditions. The final reported $L_{Aeq(24h)}$ must be the energy average of all valid days. The correction for traffic conditions must be determined for each day as follows:

$$L_{Aeq(24h, nominated\ year)} = L_{Aeq(24h, measured)} + \text{Correction (1)} + \text{Correction (2)}$$

$$\text{Correction (1)} = 10 \log (Q_{nominated\ year\ AADT} / Q_{measurement\ date})$$

$$\text{Correction (2)} = 10 \log ((1 + 5p_{nominated\ year\ AADT/V}) / (1 + 5p_{measurement\ date/V}))$$

Q – total traffic volume over 24 hour period

V – mean traffic speed (km/h)

p – percentage of heavy vehicles

7. Report

A noise measurement report detailing all matters listed above and presenting all results must be prepared. The report must include:

- Details of excluded data points and the analysis.
- Photographs showing each measurement location from at least two angles.
- A concise summary table of the $L_{Aeq(24h, \text{design year})}$ at each location.
- An estimate of the measurement uncertainty calculated in accordance with the method specified in NZS 6801:2008.

8. Data

A summary of the monitoring results and raw measurement data (including meteorology and traffic) must be provided using the NZTA template format. (www.acoustics.nzta.govt.nz/monitoring-prediction-assessment/road-traffic-noise-measurements). Instructions are provided in the template, however the following table provides a summary of the required and optional parameters which are to be reported. The completed templates and noise monitoring report must be uploaded to the project page of the Transport Noise website (www.acoustics.nzta.govt.nz/project).

Summary data – available parameters

Required parameters	Optional parameters
Easting and northing, based on NZ Transverse Mercator projection	Street address
$L_{Aeq(24h)}$ free-field	Centile levels (L_{A10} / L_{A90})
Horizontal distance from edge of nearest traffic lane	Comment on noise source
Start date and time	Description of any screening
Measurement duration	Ground cover description and percentage of absorbent ground
	Traffic count (vehicles / heavies)
	Posted speed limit
	Road surface and chip size
	Road surface condition description and NAASRA
	Description of weather

Logger data – available parameters

Required parameters	Optional parameters
Start date and time	L _{AFmax}
Measurement duration (t)	L _{A10(t)}
L _{Aeq(t)}	L _{A90(t)}
	Traffic count / heavy vehicles (daily)
	Wind speed
	Wind direction
	Temperature
	Pressure
	Relative humidity
	Rainfall