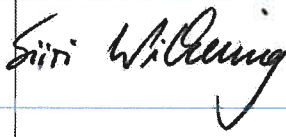

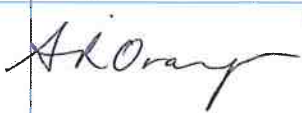


Noise Monitoring Plan (NMP)


Noise Monitoring Plan (NMP) Revision History

Revision N°	Prepared By	Description	Date
1.0	Siiri Wilkening (Marshall Day Acoustics)	Draft for review	13 March 2013
2.0	Siiri Wilkening (Marshall Day Acoustics)	Revision following meeting with M Hunt	2 April 2013
3.0	Siiri Wilkening (Marshall Day Acoustics)	Amended Document Acceptance Table	3 April 2013

Document Acceptance

Action	Name	Signed	Date
Prepared by	Siiri Wilkening/ (Marshall Day Acoustics)		April 2013
Reviewed by	James Whitlock/Anna Lewis		April 2013
Approved by	Alan Orange Alliance Project Manager		April 2013
on behalf of	M2PP Alliance		

Council Review

Action	Name	Signed	Date
Reviewed by	Malcolm Hunt		April 2013

Certification

Action	Name	Signed	Date
Regulatory Manager Approval	Andrew Guerin		26 August 2013
on behalf of	Kāpiti Coast District Council		

Table of Contents

- 1 Purpose..... 3**
- 2 Notice of Requirement Conditions 3**
- 3 Noise Monitoring Requirements..... 4**
 - 3.1 General 4
 - 3.2 Instrumentation 4
 - 3.3 Adjustments..... 4
- 4 Noise Monitoring Locations..... 5**
- 5 Timing and Frequency 5**
- 6 Contingency Monitoring..... 5**
- 7 Use of Survey Results 6**
- 8 Reporting..... 6**

1 Purpose

The purpose of this Noise Monitoring Plan (NMP) is to fulfil the requirements of the MacKays to Peka Peka Expressway designation condition DC.49.

This NMP confirms the locations, frequency and methodology of the operational noise monitoring.

The NMP ensures that the pre-construction noise level survey results encompass a sufficient distribution of locations along the alignment, e.g. low and high noise areas, areas where the Expressway will result in significant changes in noise level and where structural mitigation will be used to reduce noise levels.

The NMP also ensure that the post-construction noise level survey results are suitable for calibration and verification of the computer noise model.

Section 3 below outlines the frequency and methodology and Section 4 details the locations of the operational noise monitoring.

2 Notice of Requirement Conditions

This NMP has been prepared to fulfil the requirements of Designation Condition DC.49 of the MacKay's to Peka Peka Expressway Project, which states:

- a) ... *The Noise Monitoring Plan shall address the following:*
 - i) *The number and location of monitoring sites, including requirements that:*
 - A. *no more than 40% of monitoring sites shall be sites currently experiencing a moderate to high ambient sound level (i.e. more than 50 dB L_{Aeq(24h)}) from existing sources; and*
 - B. *at least 40% of monitoring sites shall be sites currently experiencing a low ambient sound level (≤ 50 dB L_{Aeq(24h)}) but with a predicted significant increase in noise level due to the operation of the Project, and where mitigation of this noise relies on proposed barriers or bunds as identified in the Structural Noise Mitigation plans in the Traffic Noise Assessment, Technical Report 15;*
 - ii) *The timing and frequency of surveys. This will include a requirement that ambient sound level data from Technical Report 17 "Pre-Construction Sound Level Survey" shall only be used where the data has been collected not more than 24 months prior to the preparation of the Monitoring Plan, and shall only be data collected at "long term" sites;*
 - iii) *Methods and standards to be followed. This will include methods used to identify and remove measurement results for time periods affected by sound associated with any temporary events or activities (such as noise from construction activities), and during periods where wind speeds exceed 5 m/s or the rainfall rate exceeds 6 mm/hour; and*
 - iv) *Timeframes for reporting to the Council.*
- b) *The results of the noise level monitoring undertaken in accordance with Condition DC.49(a) above shall be used to verify the computer noise model of the Detailed Mitigation Options. A report describing the findings of the*

verification shall be provided to the Manager within one month of the final monitoring being completed.

3 Noise Monitoring Requirements

3.1 General

Operational noise monitoring shall be undertaken in accordance with this NMP. Post-construction monitoring shall only commence once the Manager's written certification of the NMP has been received.

Noise monitoring shall be undertaken in accordance with the requirements of Section 5 of New Zealand Standard NZS6806:2010. This Section references New Zealand Standard NZS 6801. This means that it shall be undertaken:

- By, or under direct supervision of, a suitably qualified and experienced acoustician
- When road surfaces are dry
- During times of typical traffic volumes (e.g. not during school holidays, major road works, major accidents)
- At locations where measured noise levels will be controlled by road traffic noise (e.g. avoiding locations in the vicinity of active construction sites or industrial sites)
- During times when weather conditions are appropriate for environmental noise surveys (i.e. excluding times with wind speeds above 5 m/s and/or with rainfall exceeding 6 mm/h)
- Over a minimum contiguous period of 24 hours
- At a height of 1.2 to 1.5m above ground
- In line with the façade of a PPF
- At least 3 metres from any reflecting surface

3.2 Instrumentation

Instrumentation to be used for the survey shall be (in accordance with NZS6801:2008):

- A sound level meter or noise logger which complies with the relevant IEC specification, preferably type or class 1 (but at least type or class 2)
- Calibrated to the requirements of NZS6801:2008, Section 5.2

3.3 Adjustments

If measurements cannot be undertaken in accordance with 3.1 above, then measured levels will need to be adjusted by a suitably qualified acoustician. Adjustments may be made for:

- Influence of adverse weather conditions, specifically wind speeds above 5 m/s and rainfall of more than 6mm/h – by excluding these time periods from the calculated overall 24-hour noise level
- Influence of reflecting surfaces (e.g. buildings, fences) – by calculating the reflection contribution and subtracting this from the result
- Distance to the road edge (if surveys cannot be undertaken in line with the relevant façade) – by calculating the distance attenuation and adding/subtracting this from the result
- Change in traffic volume compared with the Design Year – by calculating the noise level correction due to the difference in traffic volumes at the measurement time

compared with the design year, and adding this to the result. For this to be calculated, traffic volume counts must be performed during the noise level survey

- Observed extraneous noise sources (e.g. lawnmower, harvesting machines) – if the duration of these activities can be determined with certainty, e.g. by being recorded by the resident, then these periods should be excluded from the calculated overall 24-hour noise level

Any adjustments applied must be documented (refer Section 8 below).

4 Noise Monitoring Locations

In accordance with DC.49(a)(i), monitoring shall be undertaken at sites that fulfil the following requirements:

- No more than 40% of the sites shall currently (pre-construction) experience noise levels above 50 dB $L_{Aeq(24h)}$
- At least 40% of the sites shall currently (pre-construction) experience noise levels at or below 50 dB $L_{Aeq(24h)}$, receive significant increase in noise level due to the Expressway operation and rely on barriers/bunds as identified in the Structural Noise Mitigation Plans of Technical Report 15.

The above requirements ensure that a broad distribution of noise level survey locations is chosen. These locations would include low noise areas (away from existing noise sources) and high noise areas (close to local roads and SH1), those predicted to experience significant increases in noise level (e.g. in low noise areas and close to the Expressway alignment) and those where structural mitigation is used to reduce Expressway noise levels.

Pre-construction noise level surveys will be tested against these criteria to ensure that the requirements are fulfilled, and the results reported (refer Section 8 below).

Post-construction noise level survey locations shall be discussed with Council at least 6 months prior to monitoring occurring.

5 Timing and Frequency

Noise levels shall be measured at the following times:

- Pre-construction ambient noise levels: prior to construction commencing in the vicinity (this includes construction that may affect the measured noise levels)
- Post-construction traffic noise levels: 2-3 years following the opening of the Expressway, as a minimum, at the same positions measured in the pre-construction survey
- At those locations where the post-construction survey result is within 1 dB of the upper end of the relevant Criteria Category (refer Technical Report 15, Appendix B), a further post-construction survey shall be undertaken 8-10 years following the opening of the Expressway

6 Contingency Monitoring

Post-construction noise monitoring may be undertaken as a contingency at locations in addition to the pre-construction monitoring location.

This may be offered in the event of reasonable complaints, particular sensitivity of a location or other unforeseen circumstances. Should any additional monitoring be offered, this will be discussed with Council prior to implementation.

7 Use of Survey Results

The pre-construction survey results shall be used to confirm the noise effects of the project. This can be done by comparing pre- and post-construction noise survey results and assessing the noise level change against the categories of Technical Report 15, Table 6-2.

Pre-construction survey results shall also be tested against the requirements of DC.49(a)(i) described in Section 4 above.

The post-construction survey results shall be used to calibrate and verify the computer noise model of the completed Expressway.

Traffic noise levels ($L_{Aeq(24h)}$) shall be predicted for each measurement location and compared with the measured level. If the difference between the measured and predicted noise levels is more than 2 decibels, the computer noise model shall be reviewed and revised for accuracy.

This process shall be documented and reported (refer Section 8 below).

8 Reporting

A report describing the monitoring results shall be prepared for each of the three monitoring rounds as follows:

- Pre-construction: monitoring results and comparison against the distribution requirements of DC.49(a)(i) and (ii)
- Post-construction (2-3 years following opening of the road): monitoring results and any findings from the computer noise analysis
- If required, post-construction (8-10 years following opening of the road): monitoring results and any findings from the computer noise analysis

The reports shall be submitted to Council within one month of completion.

Reporting of noise monitoring results shall include the following information:

- Instrumentation used for the survey, including manufacturer, type, serial number and confirmation that equipment held a current calibration certificate at the time of measurement
- Measurement details, including start and end date and time, and notes of controlling noise sources
- Location of the survey, including height of microphone, distance from road (for post-construction surveys), ground cover (e.g. grass, concrete), topography, any intervening structures between source and microphone where appropriate
- Meteorological conditions during measurement, including wind, rain, other conditions that may affect noise propagation, and weather station from where the weather data was obtained
- Adjustments, including for weather, reflection, traffic volume change and any other adjustments made