PACIFIC HIGHWAY UPGRADE
OXLEY HIGHWAY TO KEMPSEY
NOISE & VIBRATION WORKING PAPER

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PREPARED FOR

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2 EXISTING AMBIENT NOISE ENVIRONMENT

2.1 Noise catchment areas

All locations potentially affected by the Proposal are included in the noise assessment. Each location is identified by a unique number. It is important to note that not all identified locations are residences. The identified residences would be further validated during the detailed design phase. For ease of reference, specific areas of the Proposal have been grouped together into noise catchment areas (NCAs). The figures in Appendix D and Appendix E show all location identification numbers as well as the various noise catchment areas. Table 2-1 describes the location of each noise catchment area (shown in Figures 2-1a and 2-1b).

Table 2-1 Noise catchment areas

Noise catchment area	Location
NCA01	North of Old Coast Road (western side).
NCA02	Kundabung Road to Kemps Road (eastern side).
NCA03	Pipers Creek to Beams Road (western side).
NCA04	Area north of Kundabung and across Ravenswood Road (eastern side).
NCA05	Upper Smiths Creek Road to Pipers Creek (western side).
NCA06	Smiths Creek to Upper Smiths Creek Road (western side).
NCA07	Kundabung area (eastern side).
NCA08	Mingaletta Road to Upper Smiths Creek Road (western side).
NCA09	Wharf Road area (eastern side).
NCA10	Mingaletta Road area (eastern side).
NCA11	Northern end of Cooperabung Drive (western side).
NCA12	Cooperabung Hill area (eastern side).
NCA13	Southern end of Cooperabung Drive (western side).
NCA14	Cooperabung Creek area (eastern side).
NCA15	East of Telegraph Point (western side of bypass).
NCA16	Pembrooke Road to Telegraph Point (western side of bypass).
NCA17	Bill Hill Road to Pembrooke Road (western side of bypass).
NCA18	Maria River area (eastern side of bypass).
NCA19	Glen Ewan Road area (western side).
NCA20	Fernbank Creek to Blackmans Point Road (eastern side).
NCA21	Oxley Highway interchange to Sancrox Road area (western side).
NCA22	Oxley Highway interchange to Fernbank Creek (eastern side).

Figure 2-1a Noise catchment areas

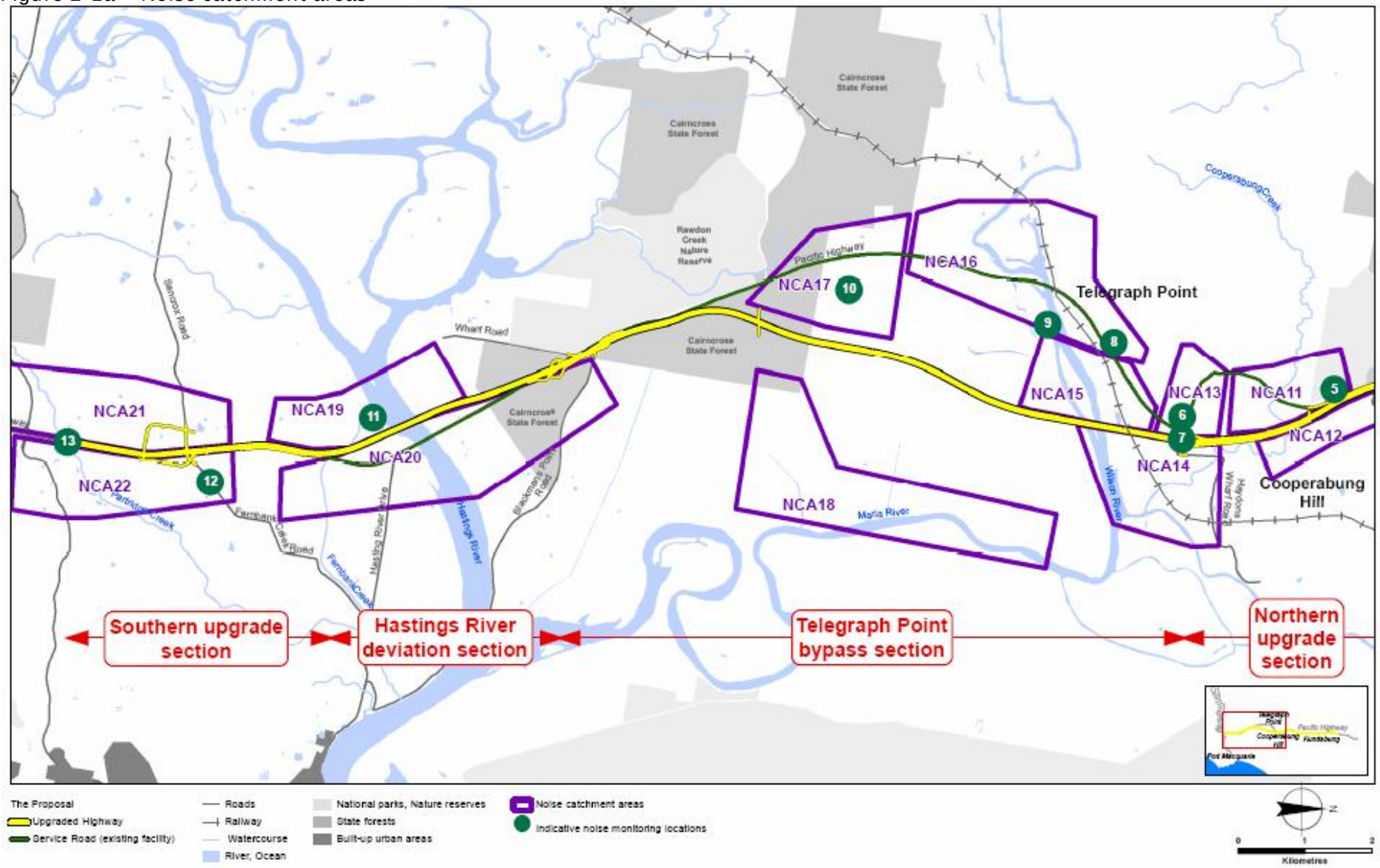
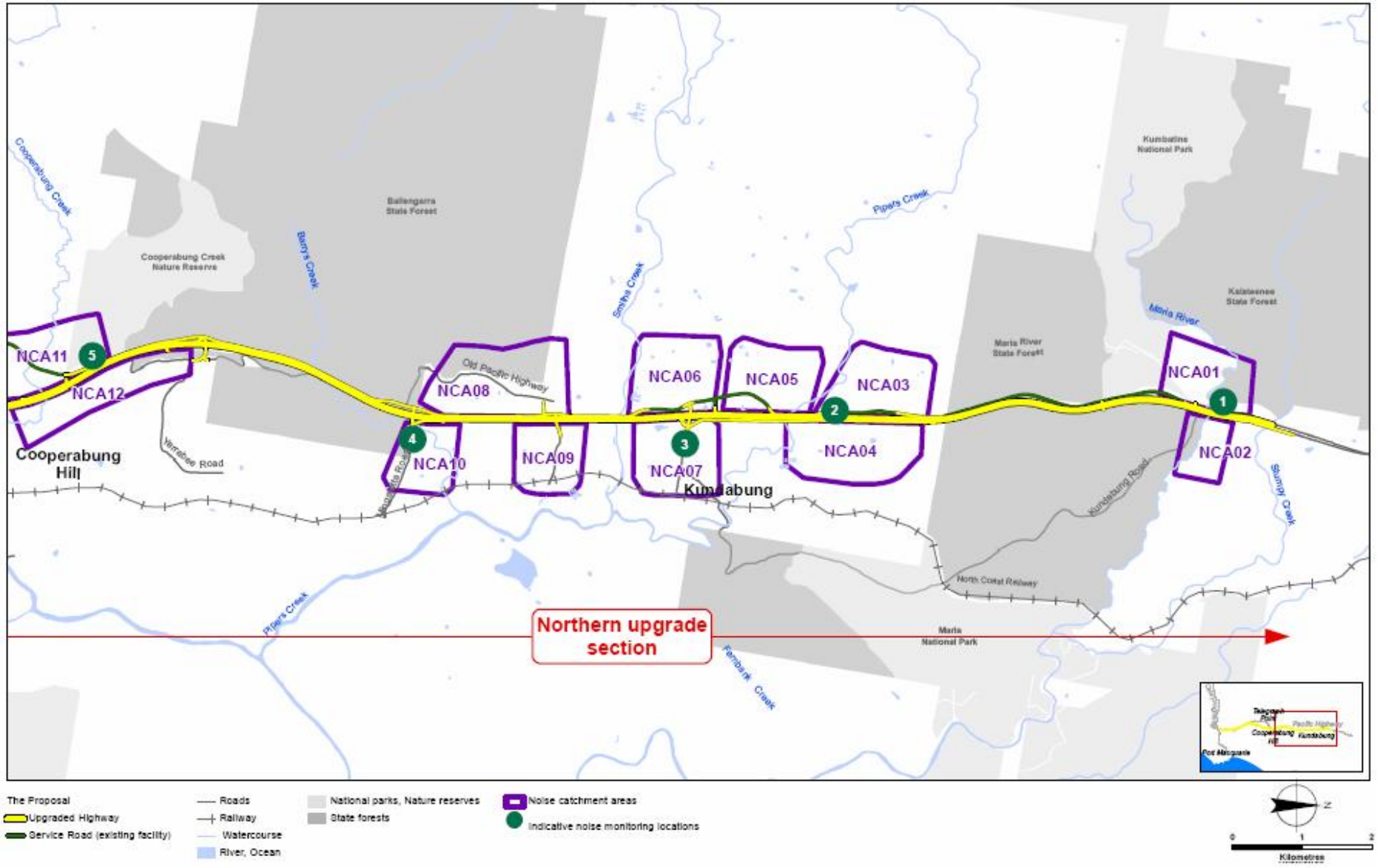


Figure 2-1b Noise catchment areas



2.2 Monitoring locations

To define the existing noise environment in potentially affected receiver areas, ambient noise surveys were undertaken for seven days across a two week period between Saturday, 9 December and Saturday, 23 December 2006. Ten sites were surveyed to assess the level of existing traffic noise. A further three sites were chosen to measure background noise at representative locations potentially affected by long-term construction works. The sites are listed in Table 2-2 and shown in Figures 2-1a and 2-1b.

The sites represent locations that could potentially experience operational or construction noise impacts, or both. The location of the sites was designed to allow the validation of the predictive noise model for existing conditions as well as derive relevant noise criteria for the Proposal.

Monitoring at Sites 6 and 8 were carried out across a two week period in order to allow cross-checking of any traffic noise changes from the two different weeks. This is particularly relevant since the second monitoring week overlapped with school holidays. Holiday periods have the potential to have increased traffic volumes. A marginal 1 dB(A) difference was established between the two weeks (for both daytime $L_{Aeq,\ 15hr}$ and night time $L_{Aeq,\ 9hr}$) which confirms no major traffic volume shift occurred between them.

Table 2-2 Noise monitoring sites

Site	Noise catchment area	Location	Purpose
1	NCA01	81 Scrubby Creek Road	Model validation and derivation of operational traffic noise criteria.
2	NCA03	100 Ravenswood Road, Kundabung	Model validation and derivation of operational traffic noise criteria.
3	NCA07	35 Kundabung Road, Kundabung	Model validation at great distance from existing highway.
4	NCA10	Lot 1, Mingaletta Road, Kundabung	Derivation of construction noise criteria.
5	NCA11	890 Cooperabung Drive, Telegraph Point	Model validation and derivation of operational traffic noise criteria.
6	NCA13	3 Wyndell Close, Telegraph Point	Model validation and derivation of operational traffic noise criteria.
7	NCA13	1 Haydons Wharf Road, Telegraph Point	Model validation and derivation of operational traffic noise criteria.
8	NCA16	5 Cooperabung Drive, Telegraph Point	Model validation and derivation of operational traffic noise criteria.
9	NCA16	16 Hacks Ferry Road, Telegraph Point	Derivation of construction noise criteria.
10	NCA17	77 Moorside Drive, Telegrah Point	Derivation of construction noise criteria.
11	NCA20	15 Glen Ewan Road	Model validation and derivation of operational traffic noise criteria.
12	NCA22	Cassegrain Winery, 764 Fernbank Creek Road	Model validation and derivation of operational traffic noise criteria.
13	NCA21	South of Billabong Koala Park	Model validation and derivation of operational traffic noise criteria.

2.3 Monitoring and analysis procedures

Noise monitoring was undertaken with consideration to Australian Standard *AS1055.1 - 1997, Acoustics – Description and measurement of environmental noise – Part 1: General Procedures*.

The unattended noise monitoring equipment used for these measurements consisted of an environmental noise logger set to A-Weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later analysis. The equipment calibration was checked before and after the survey and no significant drift occurred.

The performance specifications of the unattended noise monitoring equipment used complied with International Standard *AS IEC 61672.1 - 2002, Electroacoustics - Sound Level Meters - Part 1: Specifications*.

The logger determines $L_{A1,}$ $L_{A10,}$ L_{A90} and L_{Aeq} levels of the existing noise environment. The $L_{A1,}$ L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample time respectively. The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional passby of a heavy vehicle. The L_{A90} level is normally taken as the background noise level. The L_{Aeq} level is the equivalent continuous sound level and has the same sound energy over the sampling period as the actual noise environment with its fluctuating sound levels. While the L_{A10} has in the past been used as a descriptor for traffic noise, the L_{Aeq} is now the standard descriptor for traffic noise in NSW.

To describe background noise levels, the measure currently recommended in NSW is the Rating Background Level (RBL) based on the L_{A90} as defined in the NSW Department of Environment, Climate Change and Water (DECCW) *NSW Industrial Noise Policy* (INP) (EPA 2000). A glossary of terms is provided in Appendix A.

Meteorological data for the relevant periods was obtained from the nearest weather station at Telegraph Point. Periods in which it was likely to be raining, or when wind speeds exceeded 5 metres per second at microphone height, were excluded from analysis, in accordance with principles agreed by the NSW DECCW.

Further review of the data was performed to exclude sources of extraneous noise. These sources are not always identifiable; however those 15 minute periods in which the L_{Aeq} level is significantly higher than the L_{A10} level and corresponds to an unusually high maximum level are unlikely to be ‘normal’ traffic noise and have therefore been excluded from the statistical analysis of logger data.

Photos of each site location are included in Appendix B.

2.4 Detailed site justification and review of monitoring results

Table 2-3 describes why each site was chosen and provides a review of the noise environment at each of the locations based on logger results, together with site observations.

Table 2-3 Noise monitoring site justification and review of noise environment

Site	Site justification	Review of noise environment
1	Monitoring location relatively close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.
2	Monitoring location relatively close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Local traffic on Ravenswood Road as well as natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.
3	Monitoring location at great distance from existing highway but close enough for traffic noise to be slightly audible. Therefore, site considered appropriate for measuring distant traffic noise and calibrating the noise model.	Traffic noise slightly audible during day and night time. Farming equipment in sheds nearby and natural noise sources such as insects, birds and rustling foliage may be audible at time.
4	Monitoring location relatively distant from existing highway where levels are not affected by traffic noise. Therefore, site considered appropriate for measuring background (L_{A90}) noise levels used to establish construction noise criteria.	Noise environment dominated by natural noise sources such as insects, birds and rustling foliage which masked distant highway traffic noise for most of the time. Local traffic on driveway and pool pumps nearby may be audible but generally did not affect L_{A90} levels. When obvious, extraneous noises were excluded from calculation of L_{A90} levels.
5	Monitoring location relatively close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.
6	Monitoring location close enough to existing highway for traffic to dominate noise environment during night time and most of the day. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during night time and most of the day. Farming equipment in sheds nearby and natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.
7	Monitoring location relatively close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Domestic animals within premises and natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.
8	Monitoring location relatively close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Local traffic on Cooperabung Drive and natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.

Site	Site justification	Review of noise environment
9	Monitoring location relatively distant from existing highway where levels are not affected by traffic noise. In addition, location situated close to proposed Telegraph Point bypass where construction noise impact is likely. Therefore, site considered appropriate for measuring background (L_{A90}) noise levels used to establish construction noise criteria.	Noise environment dominated by natural noise sources such as insects, birds and rustling foliage which masked distant highway traffic noise for most of the time. Local traffic on driveways, pool pumps and boats nearby may be audible but generally did not affect L_{A90} levels. When obvious, extraneous noises were excluded from calculation of L_{A90} levels.
10	Monitoring location relatively distant from existing highway where levels are not affected by traffic noise. In addition, location situated close to proposed Telegraph Point bypass where construction noise impact is likely. Therefore, site considered appropriate for measuring background (L_{A90}) noise levels used to establish construction noise criteria.	Noise environment dominated by natural noise sources such as insects, birds and rustling foliage which masked distant highway traffic noise for most of the time. Local traffic on driveways, pool pumps and other equipment nearby may be audible but generally did not affect L_{A90} levels. When obvious, extraneous noises were excluded from calculation of L_{A90} levels.
11	Monitoring location relatively close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Local traffic on Glen Ewan Road and natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.
12	Monitoring location close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Noises associated with the winery restaurant and natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.
13	Monitoring location very close to existing highway where the noise environment is dominated by traffic noise. Therefore, site considered appropriate for measuring traffic noise and calibrating the noise model.	Noise environment dominated by traffic noise during day and night time. Natural noise sources such as insects, birds and rustling foliage may be audible but generally did not affect L_{Aeq} levels.

2.5 Summary of monitoring results

The results of the noise survey are summarised in Table 2-4 and are shown in graphical form in Appendix B.

Table 2-4 Summary of monitoring results

Site	Monitoring period (December 2006)	Day $L_{eq, 15hr}$ (dB(A))	Night $L_{eq, 9hr}$ (dB(A))	Rating background level (RBL) (dB(A))		
				Day	Evening	Night
1	15 – 23	58	56	47	47	46
2	15 – 23	56	55	43	43	41
3	15 – 22	52	50.5	36	38	36
4	15 – 23	55	49	36	36	36
5	15 – 23	63.5	63	51	47	43
6	9 – 16	53.5	51	43	43	43
7	15 – 19	58	57.5	47	45	43
8	9 – 23	63.5	61	51	46	43
9	15 – 23	54	48	39	39	39
10	15 – 23	55	51	36	40	39
11	15 – 23	61.5	56	47	47	42
12	15 – 22	58.5	58	49	44	42
13	15 – 23	64	62.5	51	44	40

All measured noise levels were consistent with the anticipated results for site locations in relation to the existing highway. For sites 4, 9 and 10 where measured levels were not affected by highway traffic noise, the background levels are consistent with those typical of rural areas.