ACOUSTICS AND AIR

PROPOSED HOLIDAY INN EXPRESS KING STREET, NEWCASTLE

DEVELOPMENT APPLICATION NOISE ASSESSMENT

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PREPARED FOR

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C/ - TACTICAL GROUP
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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

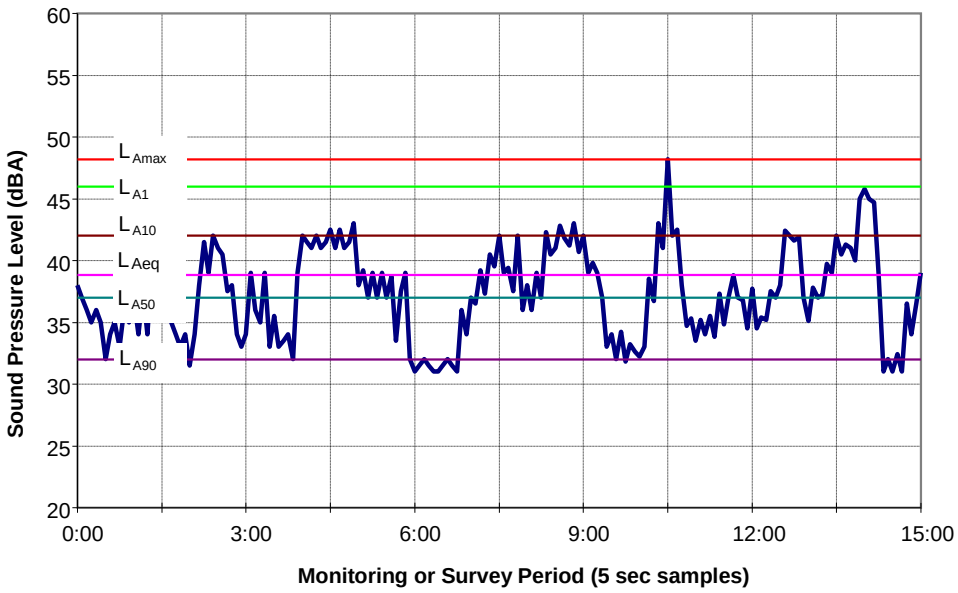
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

Wilkinson Murray has been engaged by Tactical Group to conduct a Development Application noise assessment of the proposed Holiday Inn Express (HIEX) hotel development at King Street, Newcastle. The site is currently occupied by caryard.

The scope of the noise assessment involves:

- Ambient noise measurements,
- Review of mechanical services noise emission, and;
- Review of internal acoustic amenity of future residents of the development.

The following sections of this assessment detail the methodology, assessment criteria, results and acoustical recommendations.

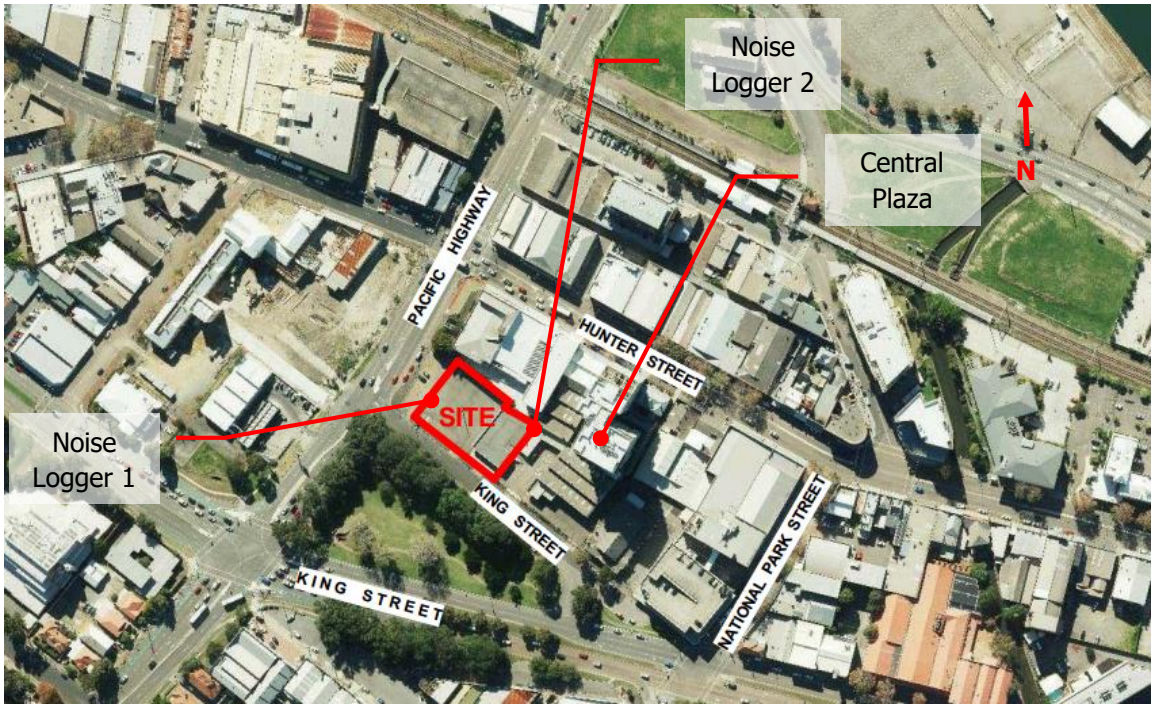
2 SITE DESCRIPTION & PROPOSAL

The site is located in a commercial area at 500 King Street, Newcastle. The proposed development consists of:

- Ground level reception, retail facilities and back of house areas;
- Level 1 and 2 car parking;
- Levels 3-7 hotel accommodation; and
- Level 8 plant area.

The site location is shown on Figure 2-1.

Figure 2-1 Site Location



The site is surrounded by commercial and industrial buildings. The nearest residences are Central Plaza residential apartment blocks to the north-east on Hunter Street at a distance of 25m from the eastern site boundary.

Figure 2-2 shows the proposed development from King Street.

Figure 2-2 Proposed Development looking from Hunter Street

The proposed hotel will operate on a 24-hour, 7-days a week basis.

3 NOISE MEASUREMENTS

3.1 Existing Ambient Noise Levels

Unattended noise monitoring was conducted at two locations, as shown in Figure 2-1 being:

- Location 1 Western boundary of the site.
- Location 2 Northern boundary of site.

The noise monitoring was conducted between 3 and 10 May 2016 using two ARL EL316 noise loggers set to A-weighted, fast response, continuously monitoring each 15-minute period. This equipment is capable of monitoring and storing noise various level descriptors for later detailed analysis. From the background noise levels (L_{A90}) the Rating Background Levels (RBL's) were determined using methodology as recommended by the *INP*. The EPA considers the RBLs to represent the background noise level. The equipment calibration was checked before and after the survey and no significant drift was noted.

Table 3-1 summarises the results, for daytime, evening and night time periods as defined in the *INP*. The summary values are:

Table 3-1 Measured Background (RBL) Noise Levels

Time Period[1]	Noise Levels (dBA)	
	Location 1	Location 2
Daytime (7am-6pm)	53	49
Evening (6pm-10pm)	50	45
Night Time (10pm-7am)	41	40

Note: 1. Daytime 7.00am–6.00am; Evening 6.00pm–10.00pm; Night 10.00pm-7.00am.

The two descriptors are defined below:

- **$L_{Aeq,Period}$** – The overall L_{Aeq} noise level measured over the assessment period; and,
- **RBL** – Rating Background Level is a measure of typical background noise levels which are used in determining noise criteria.

In addition, L_{Aeq} traffic noise descriptors were determined for the western boundary of the site as follows:

- Day $L_{Aeq(15hr)}$ 61dBA
- Night $L_{Aeq(9hr)}$ 57dBA

Results of noise logging are presented in Appendix A.

4 NOISE CRITERIA

Applicable noise criteria have been derived based on the following plans and guidelines:

- EPA's *Noise Guide for Local Government*. (Noise emissions from the site).
- NSW State Environmental Planning Policy (Infrastructure) 2007 – (iSEPP).

4.1 Site Noise Emission Noise Criteria

To assist council in assessing noise from developments the EPA has prepared the *Noise Guide for Local Government (NGLG)*. Within this document local councils are encouraged to develop noise policies which specify intrusive noise level criteria using appropriate noise level descriptors.

The *NGLG* recommends that council's develop an intrusiveness criterion that limits the permissible level of noise from mechanical plant at residential premises to no more than the background noise plus 5dBA when measured over a 15-minute period ($L_{Aeq\ (15min)}$).

The time periods for which intrusive criteria are applied is defined in the *INP*. The different time periods are daytime (7.00am-6.00pm), evening (6.00pm-10.00pm) and night time (10.00pm-7.00am).

The background level is the Rating Background Noise Level (RBL) which is determined from measurement of L_{A90} noise levels, in the absence of noise from the source.

Table 4-1 shows the relevant intrusiveness noise criteria for this assessment to extend the operating hours through the night time period. This is based on noise logging at Location 2, which is nearest the Crown Plaza residential building.

Table 4-1 Intrusiveness Noise Criteria – All Sources

Time Period[1]	RBL	Intrusiveness Criterion $L_{Aeq,15min}$
Daytime	49	54
Evening	45	50
Night Time	40	45

Note: 1. Daytime 7.00am–6.00am; Evening 6.00pm–10.00pm; Night 10.00pm-7.00am.

4.2 Traffic Noise Intrusion

The NSW State Environmental Planning Policy (Infrastructure) 2007 – (iSEPP) recommends assessment for traffic noise intrusion when a property is adjacent to a road that has between 20,000 and 40,000 vehicles on an average day.

The non mandatory noise objectives are that the following L_{Aeq} levels should not exceed:

(a) in any bedroom in the building – 35 dB(A) at any time between 10pm and 7am,

(b) Anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time.

The Interim Guideline 2008 that has been prepared by the NSW Department of Planning also provides additional information regarding the above noise criteria. In particular, it clarifies the parameter to be used for day and night. During the night, an $L_{Aeq(9hr)}$ is to be used and for the day, $L_{Aeq(15hr)}$.

Therefore, assessment is based on the above requirements with respect the day and night periods of the Interim Guideline 2008.

5 DISCUSSION / ASSESSMENT

5.1 Mechanical Noise Emissions

No details of mechanical plant have been determined at this early stage of the project. Likely sources of mechanical noise from the proposed development will be the air-conditioning and ventilation plant located on the roof, Level 1 and 2 carpark fan ventilation shafts and possibly some pumps in the roof.

A preliminary prediction has been conducted based on untreated typical noise levels of a roof chiller (Sound Power Level 91dBA) and a carpark exhaust fan (Sound Power Level 88dBA).

5.2 Existing Residences to the North East of the Proposed Site

The following Table 5-1 presents indicative noise levels at the nearest existing residences located to the North East of the site based on plant being located at the centre of the roof.

Table 5-1 Preliminary Prediction of Plant Noise at Existing residences – dBA

Plant	Sound Power Level	Distance Attenuation at 70m	Directivity / Shielding	Result	Night Criterion
Carpark Exhaust Fan	88	45	10	33	45
Roof Chiller	91	45	0	46	45

It is noted that potential noise from untreated plant are predicted to only slightly exceed the night noise objective established for this project.

5.3 Future Residences to the East of the Site

It is understood that there is a current proposal with council for the erection of a 14 storey seniors housing development (DA2016/ 00654) directly adjacent to the proposed hotel lot. These will be located approximately 30 metres from the centre of the Hotel site where plant is likely to be located.

The following Table 5-1Table 5-2 presents indicative noise levels at the nearest future residences located to the N East of the site.

Table 5-2 Preliminary Prediction of Plant Noise at Future residences – dBA

Plant	Sound Power Level	Distance Attenuation at 30m	Directivity / Shielding	Result	Night Criterion
Carpark Exhaust Fan	88	38	5	45	45
Roof Chiller	91	38	0	53	45

It is noted that potential noise from untreated plant at future residences overlooking the site are predicted to exceed the night noise objective established for this project by a magnitude of up to 8 dBA.

5.4 Mechanical Noise Mitigation.

At the detailed design stage the assessment of actual plant selection will be conducted to ensure that compliance with established noise criteria will be achieved. Indicative treatments that can be adopted in the detailed design stage process include:

- Selection of low noise chillers with variable speed drives on fan. This allows the units to run at low speed when the heat loads at night are lower. Reductions of 10 dBA can be expected.
- Installation of noise barriers on the eastern side of the site – Reductions of 5 dBA can be expected.
- Location of larger plant away from the future residences. Reductions of 3 dBA can be expected.
- Carbon Monoxide sensors on carpark exhaust fans along with variable speed drives. Reductions of 10 dBA can be expected
- Installation of silencers on fans. Reductions of 15 dBA can be expected

The above options indicate that compliance can be readily achieved by the application of the above standard engineering noise controls.

The selection and location of mechanical plant should be assessed with respect to established noise criteria at the detailed design stage of the project. The exact details of noise controls can be detailed and incorporated into the development to ensure the acoustic amenity of nearby existing and future residences is protected.

5.5 Traffic Noise Intrusion

The proposed development will not generate significant traffic volumes. Therefore, no appreciable increase in traffic noise is predicted at any surrounding residences. It is also noted that the carpark entrance is located on King Street opposite the park. As such, there will be no noticeable increase in traffic noise levels associated with the operation of the Hotel.

In the case of traffic noise intrusion into future guest suites, a reduction of 20dBA can be expected across closed standard 4mm glazing. Therefore, internal noise levels of 41dBA and 37dBA for the day and night periods respectively could be expected.

This means that the adoption of slightly thicker glazing, such as 6mm glass, will result in compliance with the internal noise objectives. The exact construction of the facade will be determined at the detail design stage of the project taking into account these findings and the non mandatory internal noise objectives of the Infrastructure SEPP.

5.6 Noise Transfer between Habitable Areas of the Hotel

The details of wall and floor constructions that meet the requirements of the BCA will be determined in the detail design stage of the project. Potential measures that can be adopted include:

- Masonry and / or plasterboard walls with acoustic insulation;
- Concrete floor slabs with suspended ceiling and insulation in cavities; and
- Acoustic treatment of waste water pipework.

6 CONCLUSION

An acoustic assessment has been undertaken for the Development Application for the proposed HIEX development at King Street, Newcastle.

The following findings have been determined:

- Site-specific noise emission criteria have been established for the residential building to the north-east of the site and future residences to the east. It is noted that mechanical services and plant have not been selected; however, it is envisaged that standard engineering noise control can and will be implemented at detailed design stage to meet established noise criteria.
- Noise from traffic generated from the development will not adversely impact on any residential development in the area whilst a good level of acoustic amenity within suites can be achieved by using glazing that is consistent with commercial design.

Internal noise isolation requirements in accordance with the BCA will be achieved by adopting appropriate constructions.

APPENDIX A

NOISE MEASUREMENT RESULTS