RAPT CONSULTING

Acoustic Assessment – 127 New England Highway Lochinvar, NSW

Prepared for
Perception Planning

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Relationships Attention Professional Trust

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Table of Contents

Table Index

Figure Index

1. Introduction

1.1 Background

RAPT Consulting has been engaged to undertake an acoustic assessment for Perception Planning to inform a Development Application (DA) for a proposed 1 into 3 lot subdivision at 127 New England Highway Lochinvar.

Based on information provided, it is understood an outcome from the Pre-DA meeting for the project, Council advised that an Acoustic Report would be required to provide guidance regarding a future dwelling fronting the New England Highway.

An indicative site layout is site layout is shown in Figure 1-1.

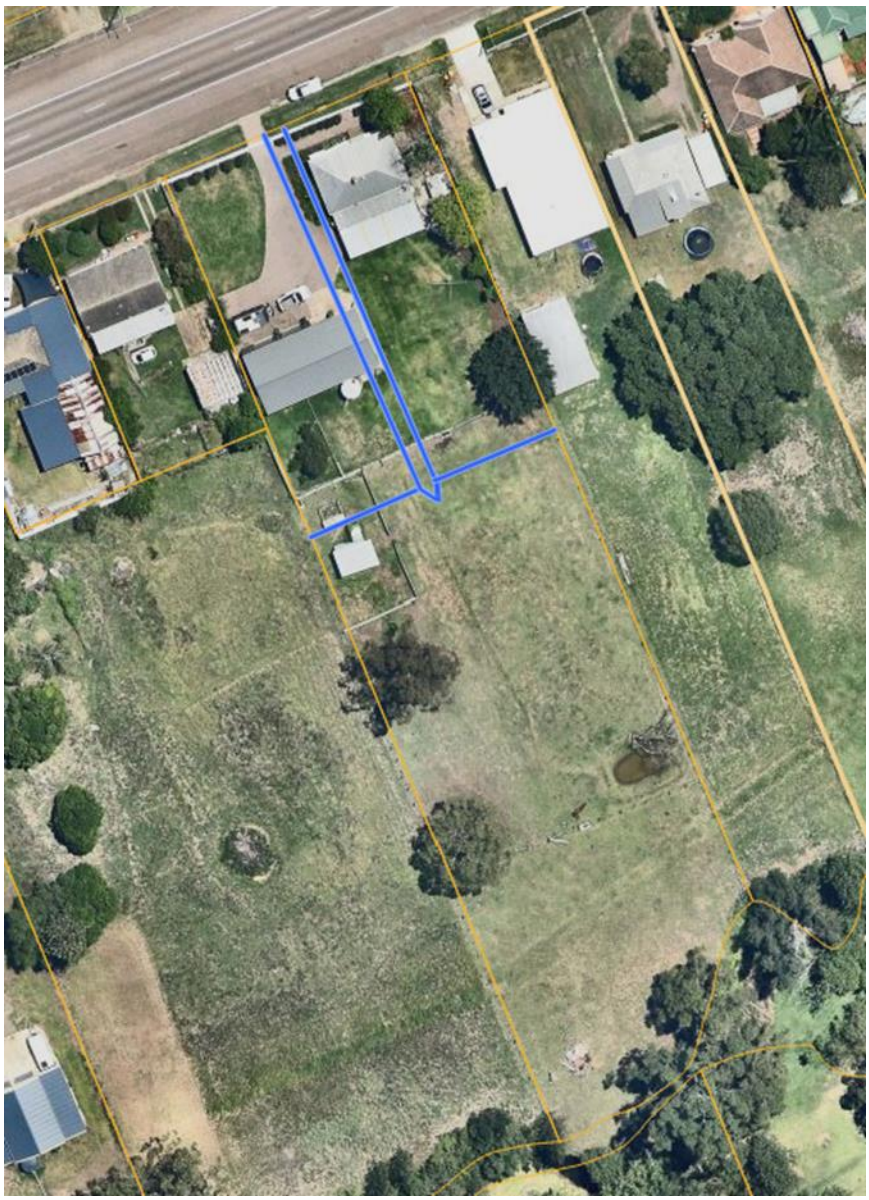


Figure 1-1 Indicative Site layout

1.2 Limitations

The purpose of the report is to provide an independent acoustic assessment for the proposal.

It is not the intention of the assessment to cover every element of the acoustic environment, but rather to conduct the assessment with consideration to the prescribed work scope.

The findings of the noise assessment represent the findings apparent at the date and time of the assessment undertaken. It is the nature of environmental assessments that all variations in environmental conditions cannot be assessed and all uncertainty concerning the conditions of the ambient environment cannot be eliminated. Professional judgement must be exercised in the investigation and interpretation of observations.

In conducting this assessment and preparing the report, current guidelines for noise and vibration were referred to. This work has been conducted in good faith with RAPT Consulting's understanding of the client's brief and the generally accepted consulting practice.

No other warranty, expressed or implied, is made as to the information and professional advice included in this report. It is not intended for other parties or other uses.

2. Existing Environment

2.1 Background and Ambient Noise

To establish background and ambient noise levels, noise monitoring was undertaken by RAPT Consulting from 18 April to 24 April 2024 at the site and approximate location where the nearest façade fronting the New England Highway will be.

Site observations noted the location was considered indicative of the local ambient noise environment and this site also presented as relatively secure location whereby minimising the risk of theft or vandalism to the monitoring equipment. During site visits it was noted that local traffic, distant road traffic, the north coast railway and natural wildlife primarily described the ambient noise environment and is indicative of an sub-urban noise environment.

The monitoring location is shown in Figure 2-1.

Figure 2-1 Noise Monitoring Location.

Monitoring was undertaken using a RION NL-43 noise logger with Type 2 Precision. These loggers are capable of measuring continuous sound pressure levels and are able to record L_{Amin}, L_{A90}, L_{A10}, L_{Amax} and L_{Aeq} noise descriptors. The instrument was programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes for the entire monitoring period.

The noise surveys were conducted with consideration to the procedures described in Australian Standard AS 1055:2018, “Acoustics – Description and Measurement of

Environmental Noise" and the NSW Noise Policy for Industry (NPfI). Calibration was checked before and after each measurement and no significant drift occurred. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics – Sound level meters – Specifications.

The L_{A90} descriptor is used to measure the background noise level. This descriptor represents the noise level that is exceeded for 90 percent of the time over a relevant period of measurement. In line with the procedures described in the EPA's NPfI, the assessment background level (ABL) is established by determining the lowest tenth-percentile level of the L_{A90} noise data acquired over each period of interest. The background noise level or rating background level (RBL) representing the day, evening and night-time assessment periods is based on the median of individual ABL's determined over the entire monitoring duration. The RBL is representative of the average minimum background sound level, or simply the background level.

The L_{Aeq} is the equivalent continuous noise level which would have the same total acoustic energy over the measurement period as the varying noise actually measured, so it is in effect an energy average.

Weather information for the unattended noise logging was obtained from the Bureau of Meteorology Port Macquarie AWS for the monitoring period and any data adversely affected by rain, wind (more than 5 m/s as per NPfI) or extraneous noise were discarded.

Table 7 of the NSW EPA Road Noise Policy provides guidance on the application of a façade correction factor. Due to the monitoring location being within 3.5 metres of a wall that could reflect sound, a façade correction factor has not been added to the measurements.

The RBL and ambient LAeq levels are provided in Table 2-2 below.

Table 2-1 Background and Ambient Noise Monitoring Results

Descriptor	127 New England Highway Noise Level dB(A)	Time Interval
$L_{A90(11hr)}$	53	7:00am - 6:00pm
$L_{A90(4hr)}$	37	6:00pm – 10:00pm
$L_{A90(9hr)}$	33	10:00pm – 7:00am
$L_{Aeq(11hr)}$	67.3	7:00am - 6:00pm
$L_{Aeq(4hr)}$	62.7	6:00pm - 10:00pm
$L_{Aeq(9hr)}$	63.4	10:00pm – 7:00am
$L_{Aeq(15hr)}$	66.4	7:00am - 10:00pm

3. Guidelines

3.1 Development Near Rail Corridors and Busy Roads

The Department of Planning Guideline "Development near Rail Corridors and Busy Roads – Interim Guideline" (Guideline) Section 3.5 of the guideline specifies the internal noise criteria outlined in Table 3-1 Below.

Table 3-1 Internal Noise Level Goals

Type of Occupancy	Noise Level	Time Period
Sleeping areas / Bedrooms	*35dB(A) Windows Closed	Night 10:00pm to 7:00am
Other Habitable Rooms (excluding garages, kitchens bathrooms and Hallways)	40dB(A) Windows Closed	Any Time

Note 1 Whilst not specified in the ISEPP, daytime criteria for bedrooms are set to 40dB(A), as per the other habitable rooms.

The guidelines outlined above originated from the Rail Infrastructure Corporation (RIC) publication Consideration of Rail Noise and Vibration in the Planning Process" (2003) where it is specific that the criteria apply with windows and doors closed. If noise levels with windows or doors open exceed these criteria by more than 10 dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire.

As noise modelling is undertaken for external locations, the above criteria and guidelines have been used to establish equivalent external noise criteria. This external noise criterion is used to determine which building facades may require specific acoustic treatment to meet the requirements of the Guideline. The NSW Environmental Noise Management Manual specifies that standard window glazing of a building will typically attenuate the external noise levels by at least 20dB(A) with the windows closed and 10 dB(A) with the windows open (allowing for natural ventilation). External goals have been calculated on the basis of nominal 10dB(A) reduction through an open window to a free-field position. Windows open to 5% of floor area in accordance with the BCA 2011 requirements. Table 3-2 provides road and rail traffic noise criteria for a new residential development.

Table 3-2 Road and Rail Traffic Noise Criteria for a New Residential Development

Room	Location	Day 7am-10pm $L_{eq(15hr)}$ dB(A)	Night 10pm-7am $L_{eq(9hr)}$ dB(A)
Other Habitable Rooms (excluding	Internal, Windows Closed	40	40

Room	Location	Day 7am-10pm $L_{eq(15hr)}$ dB(A)	Night 10pm-7am $L_{eq(9hr)}$ dB(A)
garages, kitchens bathrooms and Hallways)	Internal, Windows Open	50	50
	External Free-Field (Allowing for Open Windows)	60	60
Sleeping areas / Bedrooms	Internal, Windows Closed	40	35
	Internal, Windows Open	50	45
	External Free-Field (Allowing for Open Windows)	60	55

4. Acoustic Assessment

The NSW Environmental Noise Management Manual specifies that standard window glazing of a building will typically attenuate the external noise levels by at least 20dB(A) with the windows closed and 10 dB(A) with the windows open (allowing for natural ventilation). This means that an external noise level of 60 Leq dB(A) during the day and 55 Leq dB(A) night would result in compliance with the internal noise level goals outlined in Table 3-1 and 3-2.

The predicted internal noise levels for standard façade glazing are presented in Table 4-1 based on the noise monitoring results.

Table 4-1 Internal Noise Goal Comparison

Type of Occupancy	Recorded Ambient Noise Level	Internal Noise Level	Noise Goal Level	Time Period
Sleeping areas / Bedrooms	63.4 dB(A)	43.4 dB(A)	35dB(A) Windows Closed	Night 10:00pm to 7:00am
Other Habitable Rooms (excluding garages, kitchens bathrooms and Hallways)	66.4 dB(A)	46.4 dB(A)	40dB(A) Windows Closed	Any Time

The predicted internal noise levels particularly for the closest facades to the New England Highway indicate internal noise goals may be exceeded for both habitable rooms and bedrooms. With this in mind, it is recommended mitigation measures during building design should be implemented. Additionally, it is recommended the design of the ventilation for these rooms should be such that occupants can leave windows closed if they desire.

4.1 Mitigation Measures

Based on the monitoring results, windows with direct line of sight to traffic, sleeping area / bedroom would need to attenuate at least 29dB(A) of the traffic noise (63.4 calculated - 35 acceptable). The façade of any living areas would need to attenuate at least 27 dB(A) (66.4 – 40). Figure 4-1 is a reproduction of Figure B2 from the Guideline showing a typical situation of a dwelling adjacent to a busy road. The figure gives traffic noise loss for 3 construction specifications A-C.

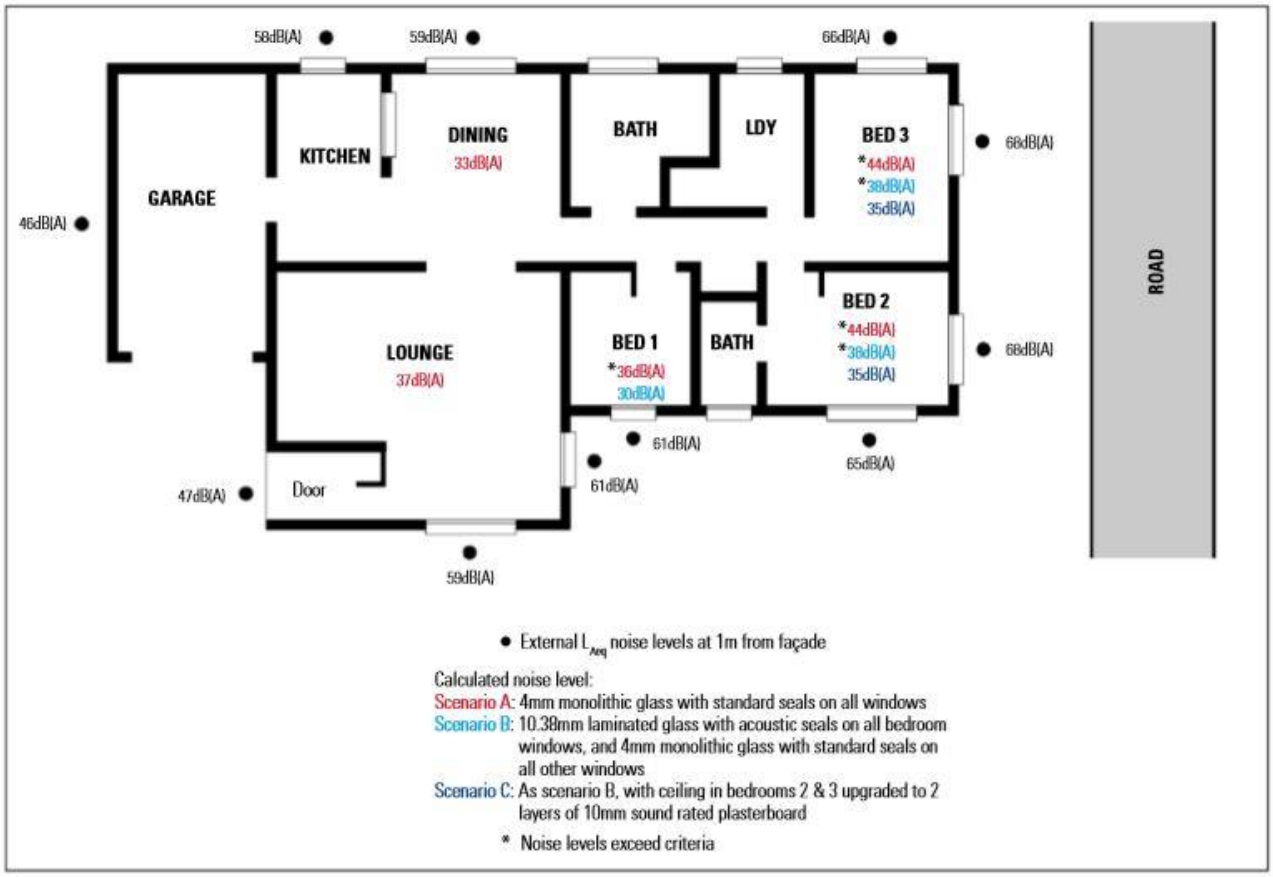


Figure 4-1 Traffic Noise Reduction for Different Construction Materials

Specification A

Windows	standard 4mm monolithic glass with standard weather seals on all windows	(Rw 25)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	tiled roof and standard plasterboard ceiling with insulation	(Rw 43)
Floor	concrete slab	

Note: 'Rw' is the weighted sound reduction index of a building element

Figure 4-2 Specification A

Specification B

Windows	10.38mm laminated glass with acoustic seals on all bedroom windows, standard 4mm monolithic glass with standard seals on all other windows	(Rw 35)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	tiled roof and standard plasterboard ceiling with insulation	(Rw 43)
Floor	concrete slab	

Note: 'Rw' is the weighted sound reduction index of a building element

Figure 4-3 Specification B

Specification C

Windows	10.38mm laminated glass with acoustic seals on all bedroom windows, standard 4mm monolithic glass with standard seals on all other windows	(Rw 35)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	as per Specification B, except the single layer of standard plasterboard ceiling is replaced with a double-layer of 10mm sound-rated plasterboard ceiling	(Rw 52)
Floor	concrete slab	

Note: 'Rw' is the weighted sound reduction index of a building element

Figure 4-4 Specification C

Figure 4-1 shows a traffic noise level of 68 dB(A) at windows directly facing a busy road. The figure shows that this noise may be reduced from 24dB(A) to 33 dB(A) by the sound transmission loss associated with construction specification A – C.

The above relates to facades with a full line of sight to the traffic. Figure 4-1 also shows windows which are on facades perpendicular to the road. The noise impacting on these windows is consequently shielded from 50% of the traffic noise by the building structure, and noise levels are 2-3 dB below the traffic noise level for windows which have direct line of sight to the traffic. Figure 4-1 also demonstrates that as the distance from the road increases resulting noise levels at other windows shown in the figure decrease as well.

The recommendations are generally applicable to the facades of the development that front the streets. facades further removed will be, by definition, more distant from the traffic noise and may be shielded, or at least partially shielded, from the traffic noise by the intervening structure and other buildings closer to the road.

Ventilation Requirements

The Guideline also qualifies that if internal noise levels with windows and doors open sufficiently to provide adequate ventilation exceed the criteria by more than 10 dB(A) the design of the ventilation of these rooms should be such that occupants can leave windows closed, if they so desire, while meeting the ventilation requirements of the Building Code of Australia. This equates to an internal noise level, with windows open, of 45 dB(A) Leq during the night and 50 dB(A) Leq during the day.

It is recommended that the project be designed such that ventilation requirements are satisfied with consideration to the Building Code of Australia for occupants of all units may leave their windows closed if they so desire.

Building Treatments

Figure 4-5 provides acoustic performance of building elements taken from Appendix C of the Guideline.

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50

Figure 4-5 Categories of Noise Control Treatments

Acoustically speaking, windows are usually the weakest parts of a facade. An open or acoustically ineffective window will adversely compromise the effect of an otherwise acoustically effective facade. Proper installation is critical to the effectiveness of noise attenuation of windows and other building elements. Therefore, given the measured exterior noise levels associated with the project, it is recommended that as a minimum, Category 3 of noise control treatment be utilised for building envelope particularly for facades facing street frontages in the design of this development.

It is also recommended building layouts be examined for example locating sleeping areas away from road frontages where practicable. Examples of category 3 building types are shown in Figure 4-6. Other options exist provided the right reduction index (Rw) is satisfied.

Category No.	Building Element	Standard Constructions	sample
3	**Windows/Sliding Doors**	Openable with minimum 6.38mm laminated glass and full perimeter acoustic seals	
	Frontage Facade	**Brick Veneer Construction:** 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 1 layer of 13mm sound-rated plasterboard fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	45mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	Concrete slab floor on ground	

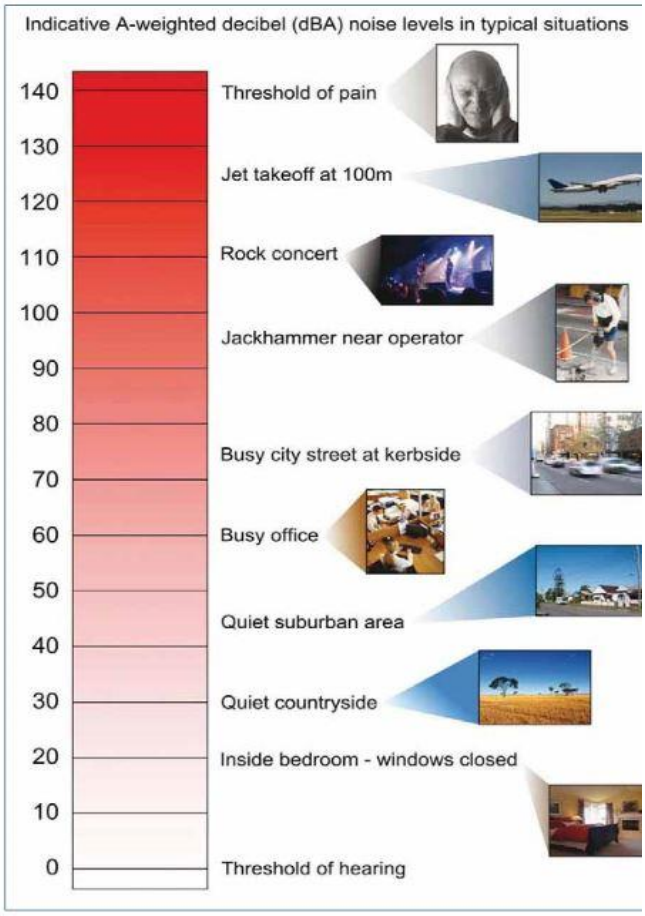
Figure 4-6 Category 3 Building Element Examples

5. Conclusion

This acoustic assessment has been undertaken to inform a Development Application (DA) to for a proposed 1 into 3 lot subdivision at 127 New England Highway Lochinvar.

Based on the monitoring results inclusive of road traffic, natural sounds and cumulative ambient noise environment and the information provided regarding the development, it is expected compliance with established noise goals can be achieved provided design measures similar to what has been outlined in Section 4.1 of this report are investigated and implemented.

Glossary of Acoustic Terms

Term	Definition
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics. The picture below indicates typical noise levels from common noise sources. 
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A10(period)}$	The sound pressure level that is exceeded for 10% of the measurement period.
$L_{A90(period)}$	The sound pressure level that is exceeded for 90% of the measurement period.
L_{Amax}	The maximum sound level recorded during the measurement period.
Noise sensitive receiver	An area or place potentially affected by noise which includes:

	A residential dwelling. An educational institution, library, childcare centre or kindergarten. A hospital, surgery or other medical institution. An active (e.g. sports field, golf course) or passive (e.g. national park) recreational area. Commercial or industrial premises. A place of worship.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
Feasible and Reasonable (Noise Policy for Industry Definition)	**Feasible** mitigation measure is a noise mitigation measure that can be engineered and is practical to build and/or implement, given project constraints such as safety, maintenance and reliability requirements. Selecting **Reasonable** measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the mitigation measure. To make a judgement, consider the following: Noise impacts Noise mitigation benefits Cost effectiveness of noise mitigation Community views.
Sound power level (SWL)	The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in dB(A).