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Traffic Noise Intrusion Assessment Proposed Residential Development (rezoning)

Lot 1 DP 811699 Military Road
Port Kembla, NSW 2505

Prepared for:-

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TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY.....	4
2. SITE AND PROPOSED DEVELOPMENT DESCRIPTION	5
3. NOISE CRITERIA.....	7
3.1 Clause 102 - State Environment Planning Policy (Infrastructure) 2007	7
4. MEASURED NOISE LEVELS	8
5. FUTURE INDUSTRIAL NOISE LEVELS.....	9
5.1 Noise Policy for Industry 2017.....	9
5.2 Project Noise Trigger Levels – Future Industry	11
5.3 Discussion and Assessment	11
6. NOISE MODELLING AND RECOMMENDED ACOUSTICAL TREATMENT.....	12
6.1 Noise Modelling Methodology	12
6.2 Building Construction Recommendations.....	12
6.2.1 Closest dwellings to Military Road.....	12
6.2.2 Centre Site dwellings.....	13
6.2.3 Furthest dwellings from Military Road and the Port	13
6.2.4 Discussion.....	14
6.3 Mechanical Ventilation Requirements.....	14
7. CONCLUSION	15

1. INTRODUCTION AND SUMMARY

Harwood Acoustics was requested by MMJ Real Estate Pty Ltd, on behalf of Mr Olly Vujic, to carry out a Traffic and Industrial Noise Intrusion Assessment at Lot 1 DP811699 Military Road, Port Kembla, NSW (the Site).

The Site was previously home to the Port Kembla Public School and the gateway application seeks to have the land rezoned to residential. Notwithstanding, it is noted that various forms of residential development are permitted within the current business zone.

The Site is located on the north eastern side of Military Road between Marne Street to the south east and Electrolytic Street to the north and east. Opposite Military Road to the west are a mix of residential and commercial premises, to the east and south are residential premises and to the north is the Port and associated industrial facilities.

The location of the Site and surrounding area is shown in Figure 1.

Should the planning proposal for re-zoning the land be successful it is proposed to construct a residential development on the Site comprising a combination of residential flat buildings, terrace style buildings and small lot residences as shown in Figure 2.

Given the proximity of the Site to the Industrial Premises and Military Road, Council has requested that a Traffic and Industrial Noise Intrusion Assessment accompany the application.

The assessment is required to demonstrate that any future dwellings located on the Site are able to comply with the internal noise level criteria set by Clause 102 of the State Environment Planning Policy (Infrastructure) 2007 (SEPP). These are 35 dBA (L_{eq}) inside bedrooms between 10 pm and 7 am and 40 dBA (L_{eq}) inside all habitable spaces at any time.

The assessment is therefore undertaken in accordance with the NSW Department of Planning and Environment's document 'Development Near Rail Corridors and Busy Roads – Interim Guidelines 2008'.

A combination of unattended and attended noise measurements have been used to establish typical current Traffic and Industrial noise levels across the entire Site. External noise levels range between 61 and 52 dBA $L_{eq, 15 \text{ hour}}$ during the day and between 55 and 46 dBA $L_{eq, 9 \text{ hour}}$ during the night, at the closest and furthest future dwellings to Military Road respectively.

The measured external noise levels have therefore been used to determine the potential for compliance with the internal noise limits in typical future dwellings. An assessment of the potential noise intrusion from road traffic and industry into a selection of potential future dwellings on the Site has been undertaken based on typical living room and bedroom sizes.

Acoustical treatment will be required for future dwellings in close proximity to Military Road and the northern end of the Site overlooking the Port. Acoustical treatment will not be onerous and examples are given in Section 6 of this Report.

Consideration has also been given to the potential noise from future industries that may arise in the Port, near to the Site. It should be incumbent on any future industry to comply with the requirements of the NSW EPA's Noise Policy for Industry 2017 at the nearest residential receptors to the industrial premises.

The level of noise emission from any future industrial premises or expansions within the Port will not increase the construction requirements for future dwellings providing the new premises comply with the EPA's Noise policy for Industry 2017 as should be required.

2. SITE AND PROPOSED DEVELOPMENT DESCRIPTION

The subject Site is located at Lot 1 DP811699 Military Road, Port Kembla, NSW and was previously home to the Port Kembla Public School.

The Site is located on the north eastern side of Military Road between Marne Street to the south east and Electrolytic Street to the north and east. Opposite Military Road to the west are a mix of residential and commercial premises, to the east and south are residential premises and to the north is the Port and associated industrial facilities.

The location of the Site and surrounding area is shown in Figure 1.



Figure 1. Location Plan – Lot 1 DP811699 Military Road, Port Kembla, NSW

(source: NSW Government Spatial Information Exchange ©2017)

The gateway application seeks to have the land rezoned to residential, comprising a combination of residential flat buildings, terrace style (townhouse) buildings and small lot residences as shown in Figure 2.



Figure 2. Proposed Site Development and Context (source: MMJ Real Estate Pty Ltd)



Figure 3. Noise Measurement Locations (Lot 1 Military Rd, Port Kembla, NSW)

3. NOISE CRITERIA

3.1 Clause 102 - State Environment Planning Policy (Infrastructure) 2007

Clause 102 of the State Environment Planning policy states:-

“102 Impact of road noise or vibration on non-rail development

(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by rail noise or vibration:

- (a) a building for residential use,*
- (b) a place of public worship,*
- (c) a hospital,*
- (d) an educational establishment or child care centre.*

(2) Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.

(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:

- (a) in any bedroom in the building-35 dB(A) at any time between 10.00 pm and 7.00 am,*
- (b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)-40 dB(A) at any time.”*

The NSW Department of Planning published the “Development Near Rail Corridors and Busy Roads – Interim Guidelines” in 2008 (the Guidelines). The Guidelines refer to the internal noise limits set by Clause 102 and in addition, states:-

“If internal noise levels with windows or doors open exceed the criteria by more than 10 dB, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia”.

An assessment of whether or not the ‘trigger’ levels for the need for natural ventilation are exceeded, is undertaken in Section 5.3 of this report.

4. MEASURED NOISE LEVELS

The author visited the Site to undertake noise surveys during 29 January, 2 February and 7 February 2018.

It was not deemed secure to leave noise logging equipment on the actual Site unattended for extended periods for long-term noise monitoring.

A noise logger was therefore placed at 111 Military Road, at the corner with Third Avenue, opposite the Site as shown in Figure 3 to measure traffic and industrial noise levels between 2 February and 7 February 2018. A noise logger was also placed at the north western end of the Site, also shown in Figure 3 on 29 and 30 January.

Attended measurements were then taken at various locations across the Site during peak traffic flows and whilst the industrial premises in the Port were operating.

Subjectively noise levels in close proximity to Military Road were dominated by passing traffic and in lulls of traffic an underlying industrial “hum” is clearly audible. Toward the south east corner of the Site surf noise from the North Beach could be heard.

The instrumentation used during the noise surveys is shown in the attached Appendix A.

Noise measurements have been used to establish the day time and night time traffic / industrial noise levels at the various locations shown in Table 1.

Table 1 **Leq Traffic Noise Levels – Various locations across the Site**

Traffic Noise Levels	dBA	Sound Pressure Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Closest to Military Road and northern end of the Site									
Daytime L _{eq} , 15 hr	61	68	64	57	54	56	55	51	44
Night-time L _{eq} , 9 hr	55	62	58	51	48	50	49	45	38
Centre of the Site									
Daytime L _{eq} , 15 hr	58	65	61	54	51	53	52	48	41
Night-time L _{eq} , 9 hr	52	59	55	48	45	47	46	42	35
North eastern side of the Site (Reservoir Street)									
Daytime L _{eq} , 15 hr	52	59	55	48	45	47	46	42	35
Night-time L _{eq} , 9 hr	46	53	49	42	39	41	40	36	29

External noise levels include road traffic on Military Road as well as industrial noise from the Port. The results are necessarily a "snapshot" of the noise levels on the particular days of the survey. Noise levels can vary with time due to different weather conditions, traffic flows, etc. However, during the noise survey conditions were thought to be indicative of the area.

The required traffic and industrial noise reduction is as follows:

Nearest future dwellings to Military Road

- (61 – 40 =) 21 dB for all Living areas; and
- (55 – 35 =) 20 dB for all sleeping areas

Centre of the Site

- (58 – 40 =) 18 dB for all Living areas; and
- (52 – 35 =) 17 dB for all sleeping areas

Furthest dwellings from Military Road and industry

- (52 – 40 =) 12 dB for all Living areas; and
- (46 – 35 =) 11 dB for all sleeping areas

5. FUTURE INDUSTRIAL NOISE LEVELS

It is a requirement of Wollongong City Council that consideration is given to the potential increase in noise levels at the Site as a result of industrial expansion in the Port.

This Section considers the likely increase in future noise levels as a result of new industry.

It is incumbent on any future industry to comply with the relevant regulations relating to noise emission. That is currently, the NSW EPA's Noise Policy for Industry 2017.

This section provides a summary of the establishment of Noise Trigger Levels in accordance with the Policy. Full details of the criteria can be seen in Appendix C.

5.1 Noise Policy for Industry 2017

The NSW Environment Protection Authority (EPA) published the NSW Noise Policy for Industry in October 2017 (the Policy). This Policy has now replaced the Industrial Noise Policy (INP) 2000.

This policy sets out the NSW Environment Protection Authority's (EPA's) requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

The **project noise trigger level** is the lower (that is, the more stringent) value of the project **intrusiveness noise level** and project **amenity noise level**.

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the **L_{Aeq} descriptor**), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold.

The background noise levels measured during the survey at 111 Military Road, Port Kembla, are shown in Table 2 below.

Table 2 Rating Background Levels – 111 Military Road, Port Kembla

Time of Day	Rating Background Level (L ₉₀)	Existing Ambient Noise Levels (L _{eq})
Day (7 am to 6 pm)	44 dBA	61 dBA
Evening (6 pm to 10 pm)	40 dBA	62 dBA
Night (10 pm to 7 am)	39 dBA	55 dBA

To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise levels within an area from **all** industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. (EPA Table 2.2 is replicated in Table 3 below).

Table 3 Amenity Noise Levels (EPA Table 2.2)

Receiver	Noise Amenity Area	Time of Day	L _{Aeq} , dBA
(see Table 2.3 to determine which residential receiver category applies)			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – internal	All	Noisiest 1-hour period when in use	35 (see notes for table)
Hospital ward internal external	All	Noisiest 1-hour	35
		Noisiest 1-hour	50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5 dB(A) to recommended noise amenity area

The recommended amenity noise level from Table 2.2 represents the **total** industrial noise level from all sources (new and proposed) that is sought to be achieved using feasible and reasonable controls.

The approach of deriving the project amenity noise level resulting from a new development on the basis of the recommended amenity noise level minus 5 dB is based on a receiver not being impacted by more than three to four individual industrial noise sources.

Where an existing cluster of industry, for example, an industrial estate or **port area**, is undergoing redevelopment and/or expansion and the development constitutes a single premises addition or expansion, with no other redevelopment planned in the foreseeable future, the project amenity noise level approach procedure in [EPA Section 2.4] can be applied.

However, where a greenfield or redevelopment of an existing cluster of industry consisting of multiple new noise-generating premises is proposed, the approach for determining the project amenity noise level in Section 2.4 is not applicable and the approach below should be applied.

Equation 1: New multiple premises or redevelopment of existing clusters of industry

Individual project amenity noise level = $10\text{Log} (10^{(ANL - 5 \text{ dB}/10)/N})$

where:

ANL = relevant recommended amenity noise level from Table 2.2

N = number of proposed additional premises.

5.2 Project Noise Trigger Levels – Future Industry

When all the above factors are considered the most relevant criteria for any future new industrial premises or expansions are as follows:-

Intrusiveness

- (44 + 5 =) **49 dBA** $L_{eq, 15 \text{ minute}}$ during the day;
- (40 + 5 =) **45 dBA** $L_{eq, 15 \text{ minute}}$ during the evening;
- (39 + 5 =) **44 dBA** $L_{eq, 15 \text{ minute}}$ during the night;

Amenity

- **55 dBA** $L_{eq, \text{period}}$ during the day;
- **45 dBA** $L_{eq, \text{period}}$ during the evening; and
- **40 dBA** $L_{eq, \text{period}}$ at night.

The amenity criteria derive from the recommended amenity levels for urban receptors minus 5 dB.

These criteria are to be met at the residential dwellings within the proposed development Site by future industrial premises or expansions within the Port.

5.3 Discussion and Assessment

This assessment addresses the potential for compliance with Clause 102 of SEPP Infrastructure 2007 at (or within) any potential future residential dwellings on the Site and uses the existing measured noise levels to determine the potential for compliance.

The existing external noise levels from current industry and traffic on Military Road range between 61 and 52 dBA during the day and 52 and 46 dBA at night, across the Site.

The acceptable noise limits outlined in Section 5.2 for any future new or expanded industry within the Port are lower than the existing traffic and industrial noise levels currently measured at the Site.

As such, providing any future new or expanded industries within the Port meet the noise limits outlined in Section 5.2, the external noise levels at future dwellings across the Site will be no higher than the existing levels measured and used in this assessment.

Consequently, any recommendations made and implemented with regard to construction methods and materials will be suitable for any future new industry also, providing that any new industries comply with the Noise Policy for Industry 2017 as should be required.

6. NOISE MODELLING AND RECOMMENDED ACOUSTICAL TREATMENT

6.1 Noise Modelling Methodology

Design and layout of any potential future dwellings are indicative at this stage and will comprise unit blocks, townhouses and small lot housing.

For the purpose of modelling and assessment we have assumed typical living areas and bedrooms for each type of dwelling, as follows:-

- Bedroom, carpeted – 4 metres x 5 metres x 2.7 metres with one window (2100 mm x 1800 mm) and one glazed sliding door (2400 mm x 2100 mm) facing Military Road or the Port; and
- Open plan Living / Dining / Kitchen, timber or tile flooring – 6 metres x 7 metres x 2.7 metres with sliding glass door (2400 mm x 2100 mm) and two windows (1800 mm x 2100 mm each) all facing Military Road or the Port.

The internal noise level can be calculated using the formula: -

$$L_{p2} = L_{p1} - R_w + 10 \log_{10} (S/A) - K + 6 \text{ dB}$$

Where:

L_{p1} is the external freeway noise level;

R_w is the weighted sound reduction index of the partition;

S is the area of the partition (e.g. wall, roof, window or glazed door);

A is the acoustic absorption of the room;

K is an angle of view correction.

6.2 Building Construction Recommendations

The level of traffic and industrial noise intrusion has been calculated through the roof, floor, walls, glazed doors and windows.

The required internal noise levels set by Clause 102 of the SEPP (Infrastructure) 2007 can be met using the following construction methods and materials.

The following are examples only for dwellings located within each of the areas specified in Table 1 of this Report. This is for the purpose of determining the potential type of construction that may be required in order to satisfy the requirements of the SEPP Clause 102.

Individual assessments for certain properties may be required once the subdivision is created prior to the issue of Construction Certificates for each dwelling.

6.2.1 Closest dwellings to Military Road

Walls

- External walls may be of brick veneer or other masonry construction; or
- Cement composite external cladding, for example Hardies 'Scyon', 'Linea', 'Stria', or equivalent; and

- Internal plasterboard wall lining may be of standard 13 mm thick plasterboard construction with standard thermal insulation in the external wall cavity.

Ceiling and Roof System

- Concrete tile or metal deck roof with minimum 13 mm thick fire rated or sound rated plasterboard ceiling below the living area ceilings and thermal insulation in the ceiling cavity.

Windows and Glazed Doors

- Windows and glazed doors may be fixed, sliding, awning, casement or double hung style in aluminium or timber frames;
- Windows in the living areas will require glazing with a minimum weighted sound reduction index (R_w) 32 – e.g. 6.38 mm thick laminated glass; and
- Windows in the bedroom will require glazing with a minimum weighted sound reduction index (R_w) 29 – e.g. 5 mm thick float glass.

6.2.2 Centre Site dwellings

Walls

- External walls may be of brick veneer or other masonry construction; or
- Cement composite external cladding; and
- Internal plasterboard wall lining may be of standard 13 mm thick plasterboard construction with standard thermal insulation in the external wall cavity.

Ceiling and Roof System

- Concrete tile or metal deck roof with minimum 13 mm thick fire rated or sound rated plasterboard ceiling below the living area ceilings and thermal insulation in the ceiling cavity.

Windows and Glazed Doors

- Windows and glazed doors may be fixed, sliding, awning, casement or double hung style in aluminium or timber frames;
- Windows to living areas and bedrooms will require glazing with a minimum weighted sound reduction index (R_w) 29 – e.g. 5 mm thick float glass.

6.2.3 Furthest dwellings from Military Road and the Port

Walls

- External walls may be of brick veneer or other masonry construction; or
- Cement composite external cladding; and
- Internal plasterboard wall lining may be of standard 13 mm thick plasterboard construction with standard thermal insulation in the external wall cavity.

Ceiling and Roof System

- Concrete tile or metal deck roof with minimum 10 mm standard plasterboard ceiling below the living area ceilings and thermal insulation in the ceiling cavity.

Windows and Glazed Doors

- Windows and glazed doors may be fixed, sliding, awning, casement or double hung style in aluminium or timber frames;
- Windows may be of standard thickness glazing with a minimum weighted sound reduction index (R_w) 24 – e.g. 4 mm thick float glass.

6.2.4 Discussion

It can be seen that some dwellings across the Site will require varying degrees of acoustical treatment to ensure that the internal noise limits set by Clause 102 of the SEPP (Infrastructure) 2007 can be met.

The extent of acoustical treatment will depend on several factors including the size of rooms, portion of glazing, orientation of glazing, type of floor coverings, acoustical shielding from other buildings and boundary fences.

In any event, for even the closest dwellings to Military Road, the construction methods and materials required to ensure the internal noise limits set by Clause 102 will not be onerous.

6.3 Mechanical Ventilation Requirements

The NSW Department of Planning's document Development near Rail Corridors and Busy Roads – Interim Guideline 2008 states:-

“If internal noise levels with windows or doors open exceed the criteria by more than 10dB, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.”

The external noise level from road traffic at the closest façade of the nearest future dwelling to Military Road is 61 dBA in the day and 55 dBA at night.

A reduction of up to 10 dB from outside to inside is typically achieved with the windows/doors open. This results in an internal noise level of 51 dBA during the day and 45 dBA during the night.

As detailed in Section 3.2, the internal assessment trigger level for the requirement for natural ventilation is 10 dB above the acceptable internal noise level when the windows or doors are partially open. This results in trigger levels of $(40 + 10 =) 50$ dBA (day time) and $(35 + 10 =) 45$ dBA (night time).

The predicted level of 51 dBA at the closest dwellings to Military Road is potentially above the trigger level in living areas during the day only.

Living areas fronting Military Road may be required to be ventilated in accordance with the Building Code of Australia.

A final assessment of individual dwellings will be required prior to the issue of a Construction Certificate.

7. CONCLUSION

A traffic and industrial noise intrusion assessment has been undertaken for a proposed residential development, subject to land rezoning, at Lot 1 Military Road, Port Kembla, NSW.

Traffic and industrial noise levels across the Site range between 61 and 52 dBA $L_{eq, 15 \text{ hour}}$ during the day and from 55 to 46 dBA $L_{eq, 9 \text{ hour}}$ during the night.

These measured noise levels have been used to determine the potential for compliance with the noise limits set by Clause 102 of the SEPP Infrastructure 2007.

Internal noise level recommendations set by Clause 102 of SEPP (Infrastructure) 2007 can be achieved for any future residences based on typical constructions outlined in Section 6 of this report. The construction measures are not considered onerous and many dwellings on the Site may be of standard construction.

The level of noise emission from any future industrial premises or expansions within the Port will not increase the construction requirements for future dwellings providing the new premises comply with the EPA's Noise policy for Industry 2017 as should be required.

Therefore, from an acoustical impact perspective, there is no reason why future residential development could not be considered for the subject site.

Matthew Harwood, MAAS

Principal Acoustic Consultant



Attachments:-

Appendix A – Noise Measurement Instrumentation

Appendix B – Long-term Noise Survey Results

Appendix C – Noise Policy for Industry 2017 Noise Trigger Levels

Noise Survey Instrumentation	Appendix A
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The instrumentation used during the noise survey consisted of the following

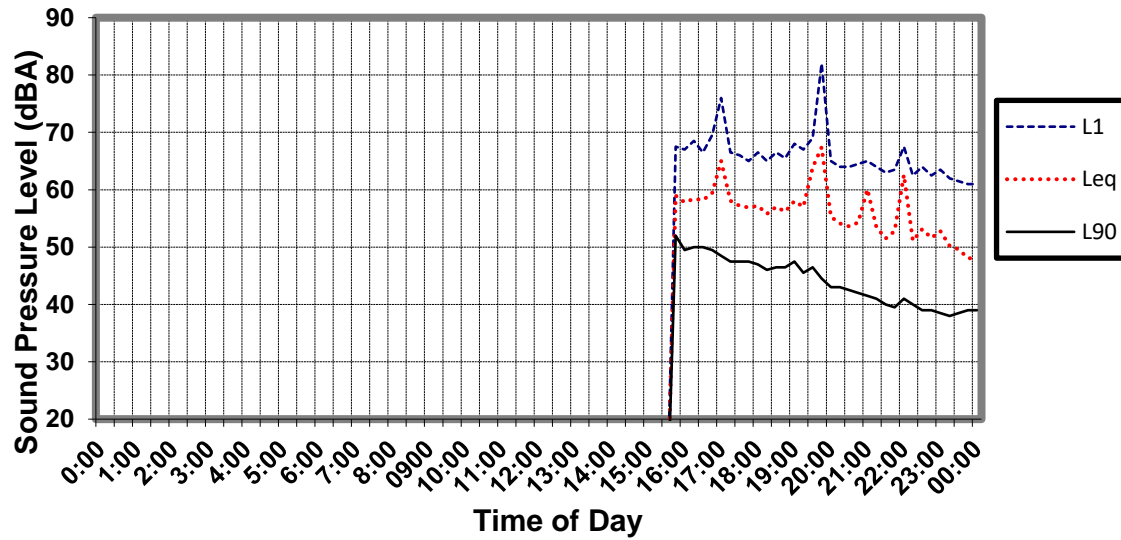
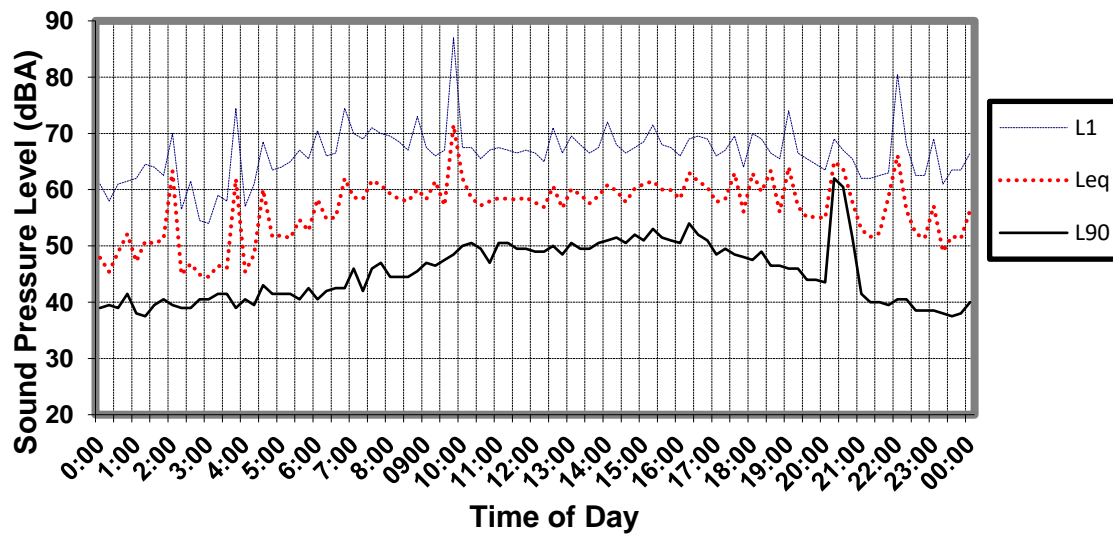
Description	Model No.	Serial No.
Svantek Sound Level Meter	957	15395
Svantek Acoustical Calibrator	SV 34A	58762
Infobyte Noise Logger (Type 2)	iM4	104
Condenser Microphone 0.5" diameter	MK 250	104

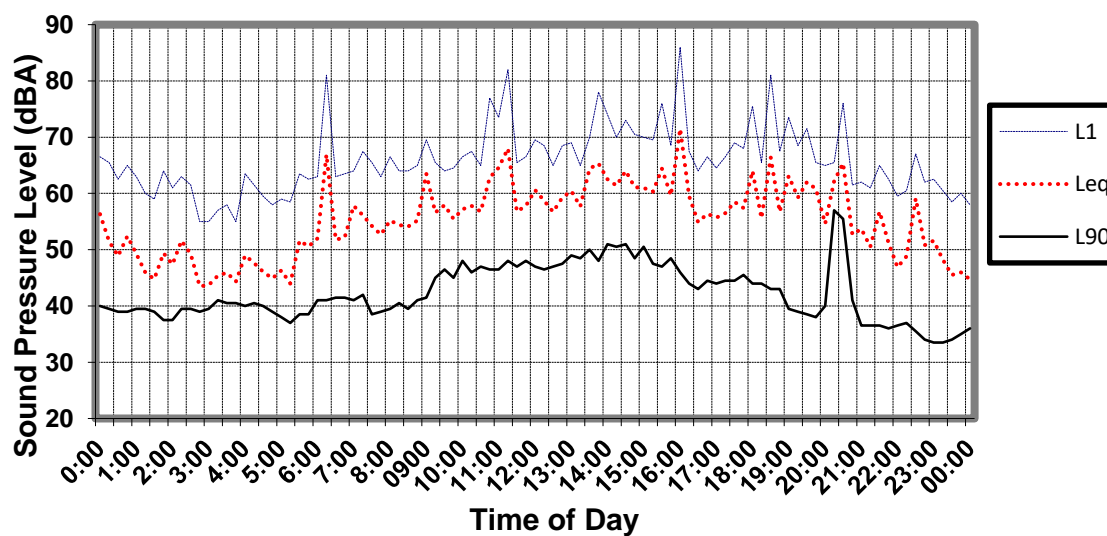
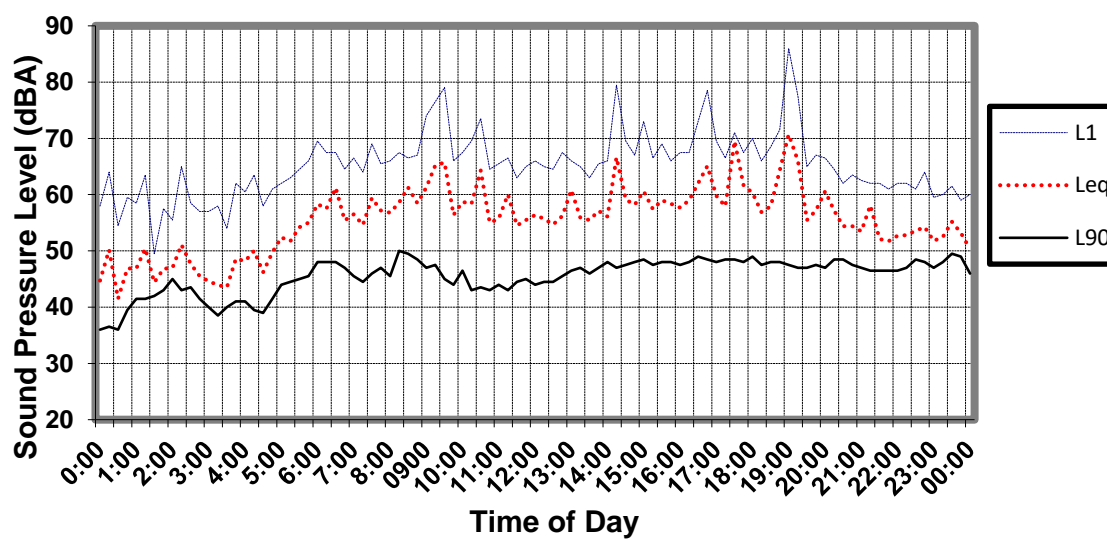
The sound level meter conforms to Australian Standards AS IEC 61672.1-2004: 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter. The infobyte noise logger # 104 conforms to Australian Standard AS 1259 as Type 2 sound level meters.

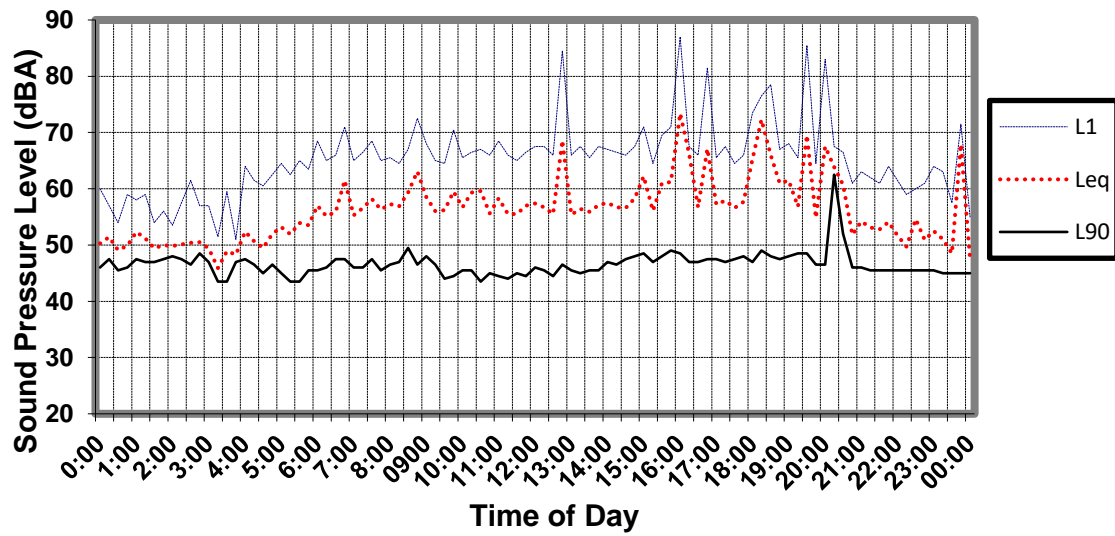
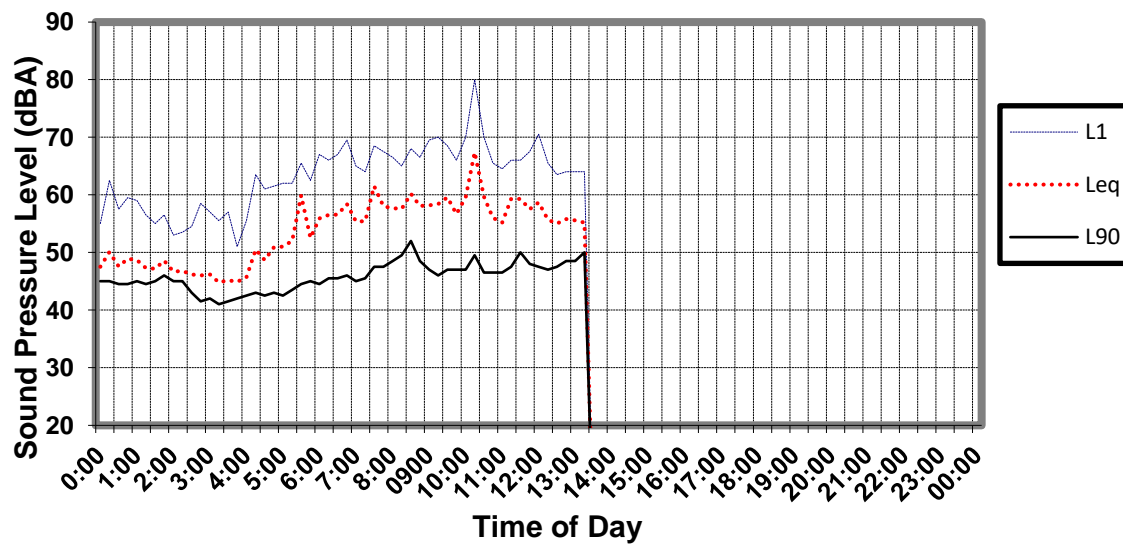
The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates as required by the regulations.

Noise Survey Results

Appendix B

Friday February 2nd 2018Saturday February 3rd 2018

Sunday February 4th 2018**Monday February 5th 2018**

Tuesday February 6th 2018**Wednesday February 7th 2018**

NSW EPA's Noise Policy for Industry 2017 Criteria**Appendix C**

This Appendix outlines the noise guidelines that would be applicable to any future industries established within the Port and establishes the project specific noise goals.

C.1 NSW EPA's Noise Policy for Industry 2017*C.1.1 Introduction*

The NSW Environment Protection Authority (EPA) published the NSW Noise Policy for Industry in October 2017 (the Policy). This Policy has now replaced the Industrial Noise Policy (INP) 2000.

This policy sets out the NSW Environment Protection Authority's (EPA's) requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

Annoyance caused by noise is partly due to acoustic factors and partly due to other factors including the personal and social outlook of individuals (Guski, 1999).

The reaction to noise varies widely from individual to individual. Because of this it is not possible to adopt noise levels that will guarantee that no one will experience an impact.

The noise levels in this policy should not be interpreted to mean that industrial noise will be inaudible, or that all members of the community will find the noise acceptable.

The Noise Policy for Industry is designed to assist industry and authorities to ensure that potential noise impacts associated with industrial projects are managed effectively.

The purpose of the policy is to ensure noise impacts associated with particular industrial developments are evaluated and managed in a consistent and transparent manner. It provides noise levels for assessing the potential impact of noise from industry and includes a framework for considering feasible and reasonable noise mitigation measures.

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Protection of the Environment Operations Act 1997* (POEO Act) require that authorities examine and take into account matters affecting the environment when making decisions about development and activities.

The policy also provides a procedure for the development of appropriate and achievable statutory noise limits and operational requirements for development consents and environment protection licences.

The objectives of the policy are to:

- provide the noise levels that are used to assess both change in noise level and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified;
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, taking into account the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

C.1.2 Project Noise Trigger Level

Section 2 of the Noise Policy for Industry 2017 sets out the procedure to determine the **project noise trigger levels** relevant to a particular industrial development.

The project noise trigger level provides a benchmark or objective for assessing a proposal or site. It is not intended for use as a mandatory requirement. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community, and so ‘trigger’ a management response; for example, further investigation of mitigation measures.

The project noise trigger level, feasible and reasonable mitigation, and consideration of residual noise impacts are used together to assess noise impact and manage the noise from a proposal or site. It is the combination of these elements that is designed to ensure that acceptable noise outcomes are determined by decision makers.

The **project noise trigger level** is the lower (that is, the more stringent) value of the project **intrusiveness noise level** and project **amenity noise level**.

C.1.3 Project Intrusiveness Noise Level

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the **L_{Aeq} descriptor**), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.

The intrusiveness noise level is determined as follows:

$$L_{Aeq, 15 \text{ minute}} = \text{rating background noise level (RBL)} + 5 \text{ dB}$$

Where:

<i>L_{Aeq, 15 minute}</i>	<i>Represents the equivalent continuous energy average A-weighted sound pressure level of the source over 15 minutes.</i>
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And:

<i>Rating background noise level</i>	<i>Represents the background level to be used for assessment purposes, as determined by the method outlined in Fact Sheets A and B.</i>
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Intrusiveness noise levels are not used directly as regulatory limits. They are used in combination with the amenity noise level to assess the potential impact of noise, assess reasonable and feasible mitigation options and subsequently determine achievable noise requirements.

Minimum assumed RBLs are applied in the Policy and these result in minimum intrusiveness noise levels. These are shown in Table 2.1 in the Policy and are replicated in Table C1 below.

Table C1 Minimum assumed RBLs and project intrusiveness noise levels (EPA Table 2.1)

Time of Day	Minimum Assumed Rating Background Level dBA	Minimum Project Intrusive Noise Level (L_{eq} , 15 minute, dBA)
Day (7 am to 6 pm)	35	40
Evening (6 pm to 10 pm)	30	35
Night (10 pm to 7 am)	30	35

C.1.4 Amenity Noise Levels and Project Amenity Noise Levels

To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise levels within an area from **all** industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. (EPA Table 2.2 is replicated in Table C2 below).

The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.

The recommended amenity noise levels represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for noise from a **single** industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a **project amenity noise level** applies for each new source of industrial noise as follows:

Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB

Amenity noise levels are not used directly as regulatory limits. They are used in combination with the project intrusiveness noise level to assess the potential impact of noise, assess reasonable and feasible mitigation options, and subsequently determine achievable noise requirements.

Table C2 Amenity Noise Levels (EPA Table 2.2)

Receiver	Noise Amenity Area	Time of Day	L _{Aeq} , dBA
(see Table 2.3 to determine which residential receiver category applies)			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – internal	All	Noisiest 1-hour period when in use	35 (see notes for table)
Hospital ward	All	Noisiest 1-hour	35
		Noisiest 1-hour	50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5 dB(A) to recommended noise amenity area

Notes: The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration.

The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as follows:

- rural residential
- suburban residential
- urban residential
- industrial interface – an area that is in close proximity to existing industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5 dB or an area defined in a planning instrument. Beyond this region the amenity noise level for the applicable category applies. This category may be used only for existing situations.
- commercial – commercial activities being undertaken in a planning zone that allows commercial land uses
- industrial – an area defined as an industrial zone on a local environment plan; for isolated residences within an industrial zone the industrial amenity level would usually apply.

Time of day is defined as follows:

- day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
- evening – the period from 6 pm to 10 pm
- night – the remaining periods.

(These periods may be varied where appropriate, for example, see A3 in Fact Sheet A.) In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable L_{Aeq} noise level may be increased to 40 dB $L_{Aeq}(1hr)$.

The recommended amenity noise level from Table 2.2 represents the **total** industrial noise level from all sources (new and proposed) that is sought to be achieved using feasible and reasonable controls.

The approach of deriving the project amenity noise level resulting from a new development on the basis of the recommended amenity noise level minus 5 dB is based on a receiver not being impacted by more than three to four individual industrial noise sources.

Where this is not the case, the Policy provides an additional assessment approach.

C.1.5 Assessment Locations

For a **residence**, the project noise trigger levels are to be assessed at the reasonably most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the reasonably most-affected point within 30 metres of the residence, but not closer than 3 metres to a reflective surface and at a height of between 1.2–1.5 metres above ground level. This should not be read to infer that the project noise trigger level (or a limit in a statutory document) applies only at the reasonably most-affected location.

C.2 Measured Background Noise Levels

In order to establish the project specific intrusiveness noise level (see Section 3.1.3 of this Report), it is necessary to determine the background noise levels in the vicinity of all potentially affected residential receptors.

The background noise level is defined by the EPA as ‘the underlying level of noise present in ambient noise, generally excluding the noise source under investigation, when extraneous noise is removed’.

The background noise level is represented by the $L_{AF90, 15min}$ descriptor when undertaking short-term monitoring. In comparison, the rating background noise level (RBL) (as defined in Section A1.2 of the Policy) is the single-figure background noise level derived from monitoring over a representative period of time, typically one full week.

The rating background noise level is used for assessment purposes.

In this instance, a noise logger was placed at 111 Military Road shown in Figure 1, to measure background noise levels between Friday 2 and Wednesday 7 February 2018.

This location is considered representative of all future residential receptors across the proposed Site.

Table C3 Rating Background Levels – 111 Military Road, Port Kembla

Time of Day	Rating Background Level (L ₉₀)	Existing Ambient Noise Levels (L _{eq})
Day (7 am to 6 pm)	44 dBA	61 dBA
Evening (6 pm to 10 pm)	40 dBA	62 dBA
Night (10 pm to 7 am)	39 dBA	55 dBA

C.5 Project Noise Trigger Levels

When all the above factors are considered the most relevant criteria for any future new industrial premises or expansions are as follows:-

Intrusiveness

- (44 + 5 =) **49 dBA** L_{eq, 15 minute} during the day;
- (40 + 5 =) **45 dBA** L_{eq, 15 minute} during the evening;
- (39 + 5 =) **44 dBA** L_{eq, 15 minute} during the night;

Amenity

- **55 dBA** L_{eq, period} during the day;
- **45 dBA** L_{eq, period} during the evening; and
- **40 dBA** L_{eq, period} at night.

The amenity criteria derive from the recommended amenity levels for urban receptors minus 5 dB.

These criteria are to be met at the residential dwellings within the proposed development Site by future industrial premises or expansions within the Port.