Noise and Sound Services

Mechanical Plant Noise Assessment

At :-

Clonnys at Clontarf
Sandy Bay Road,
Clontarf
NSW 2093

June 2019

Report No. nss 23051 – Final

Prepared by:-

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C O N T E N T S

1. INTRODUCTION

Noise and Sound Services was requested by Clonnys at Clontarf, Sandy Bay Road, Clontarf, to carry out a noise assessment of the existing mechanical plant at their café and kiosk located at Clontarf Reserve, Clonnys at Clontarf, are looking to activate a DA to make some modifications to the building. They are in the process of submitting a Section 4.5 to Council to slightly modify the plans. They do not intend to make any changes to the kitchen or cooking areas and will leave the existing exhaust fan (situated on the roof) as is.

The purpose of the assessment is to provide an independent and accurate assessment of the noise levels of the outdoor mechanical plant at the nearest neighbouring boundaries to the site, in accordance with the requirements of Northern Beaches Council development consent conditions and the NSW Protection of the Environment Operations Act 1997. Where applicable, this report is prepared in accordance with the NSW Government's *Noise Policy for Industry in 2017.*

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

This section describes the location of the site and provides a description of the neighbouring properties, as shown in Figure 1 below.

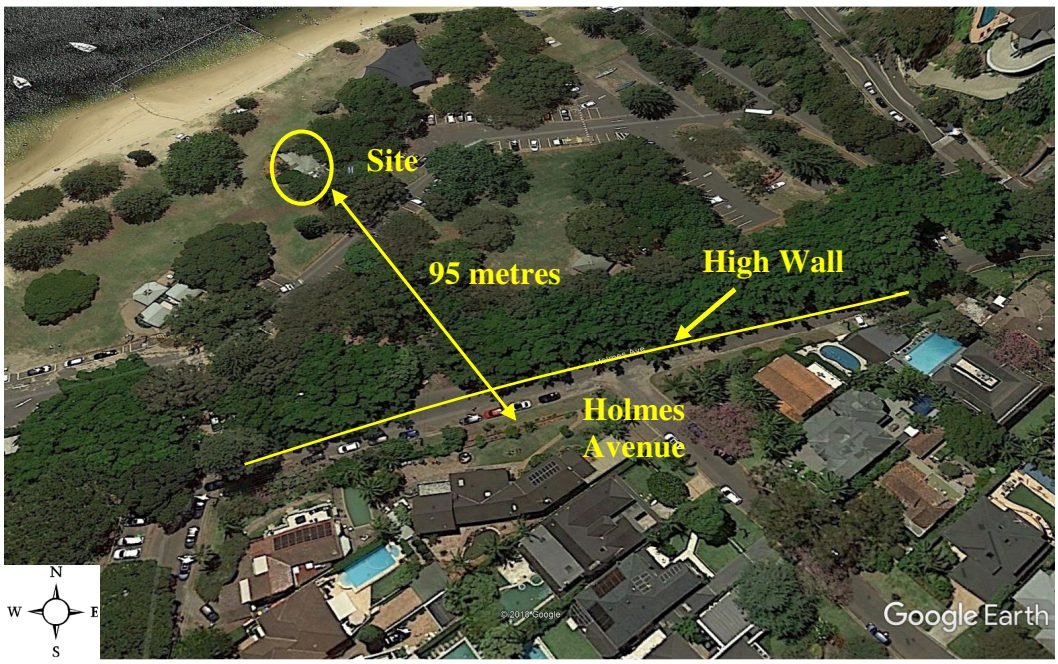

Figure 1. Site Plan. Dimensions are Approximate.
Source: Google Earth.

The café and kiosk, Clonnys at Clontarf, Sandy Bay Road, Clontarf is in the Clontarf Reserve. The nearest residential premises are in Holmes Avenue, Clontarf, which is approximately 95 metres from the café and kiosk. In addition there is a concrete wall approximately 2.5 metres high between the café/ kiosk and the nearest residential premises.

Figure 2. Photograph of the Wall between the Café and the Nearest Residential Premises.

2.2 Development Description

The proposed development consists of a cosmetic upgrade to the café and a cover to the outside eating area. No changes will be made to the kitchen or cooking areas or any mechanical plant. If future installation of air conditioning is required this will be addressed at a later stage. The hours of operation are Monday to Friday 9:00 am to 3:00 pm and Saturday to Sunday 8:00 am to 4:30 pm.

3. NOISE CRITERIA

This section provides details of Council noise conditions for mechanical plant and NSW State Act for offensive noise.

3.1 Northern Beaches Council Condition

The Northern Beaches Council Condition 12 (2NL05) states:-

"Mechanical plant situated on the roof area of the premises must be acoustically treated to ensure noise emissions are not audible at the nearest residential premises. Details are to be submitted to the Council /Accredited Certifier prior to the issue of the Construction Certificate.

Council may require the owner or occupier to the premised to engage the services of a suitably qualified professional to undertake an acoustic assessment of the premises in the event concerns regarding the emission of "offensive noise" are raised and/or justifier by Council".

3.2 Protection of the Environment Operations Act 1997

Offensive noise is defined in the NSW Protection of the Environment Operations Act 1997 (POEO Act) as being noise:-

'a) that, by reason is of its level, nature, character or quality, or the time at which it is made, or other circumstances:
- *i. Is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
- *ii. interferes unreasonably with (or is likely to Interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*

b) that, is of a level, nature, character or quality prescribed by the regulations or that is made at a time or in other circumstances, prescribed by the regulations.'

The NSW Government, also state that social surveys have indicated that noise from any particular source will be audible to many people in the community when that noise exceeds the background level by more than 5 decibels (dB). The noise may have characteristics which are pleasant or unpleasant to the listener. The 5 dB over background criterion is primarily aimed at industrial or commercial machine noise or domestic machine noise such as air conditioners.

Technically the rating background is found from the noise level that is present for 90% of the time of the measurement periods (usually 15 minutes each) and this is known as the $L_{AF90,\ 15\ minute.}$ Where the rating background noise level is found to be less than 30 dBA for the evening and night periods, then it is set to 30 dBA; where it is found to be less than 35 dBA for the daytime period, then it is set to **35 dBA**. For the short-term assessment method, the rating background noise level is simply the lowest measured $L_{AF90,\ 15\ minute}$ level. See Appendix A below for a description of the technical terms.

The source noise is found from the average of the sound energy (again usually 15 minutes samples), which is known as the $L_{Aeq,\ 15\ minute.}$

4. NOISE MEASUREMENTS

Three types of noise producing mechanical plant were identified during at the site visit on Wednesday 19th June 2019. These are a kitchen extractor fan, a compressor and a vending machine. The instrumentation, procedure and results are described below.

4.1 Noise Monitoring Procedure

Free field noise monitoring was carried out on Wednesday 19 June 2019. The acoustical measurements were carried out in accordance with Australian Standards AS 1055, '*Acoustics –Description and Measurement of Environmental Noise'*, (1997).

4.2 Instrumentation

The instrumentation used during the attended noise source survey consisted of a Brüel and Kjær sound level meter model 2250 (serial no. 3011239). This meter conforms to Australian Standard AS IEC 61672.1-2004 : '*Electroacoustics - Sound level meters – Specifications*' as a class 1 precision sound level meter and has an accuracy suitable for both field and laboratory use. The calibration of the meter was checked before and after the measurement period with a Brüel and Kjær acoustical calibrator model 4231 (serial no. 3011545). No significant system drift occurred over the measurement period.

The sound level meter was checked, adjusted and aligned to conform to the Brüel and Kjær factory specifications and issued with conformance certificates within the last 24 months as required by the regulations. The internal test equipment used is traceable to the National Measurement Laboratory at C.S.I.R.O., Lindfield, NSW, Australia. The calibrator was checked, adjusted and aligned to conform to the Brüel and Kjær factory specifications and issued with conformance certificates within the last 12 months as required by the regulations. The internal test equipment used is traceable to the National Measurement Laboratory at C.S.I.R.O., Lindfield, NSW, Australia. Existing ambient noise levels have been measured continuously for a period of at least 7 days of good weather prior to operation of any equipment. The following sections describe the measurement procedure, instrumentation and results.

4.3 Noise Measurement Results

4.3.1 Roof top kitchen Exhaust Fan

The noise level ($L_{Aeq,\ 15\ minute}$) of the roof top kitchen exhaust fan (see Figure 3 below) was found to be 51 dBA at the roof edge (and height). The roof edge was approximately 3 metres from the fan.

Figure 3. Photograph of the Roof Top Kitchen Exhaust Fan.

4.3.2 Compressor

The noise level ($L_{Aeq,\ 15\ minute}$) of the compressor (see Figure 4 below) was found to be 54 dBA at approximately 4 metres from the compressor.

Figure 4. Photograph of the Compressor

4.3.3 Vending Machine

The noise level ($L_{Aeq,\ 15\ minute}$) of the vending machine (see Figure 5 below) was found to be 52 dBA at approximately 3 metres from the machine.

Figure 5. Photograph of the Vending Machine.

4.3.4 Background Noise Level

Using the short-term assessment method, as recommended in the NSW Government's Noise Policy for Industry – 2017 (NPfI), the measured rating background noise level at the nearest residential property boundary in Holmes Avenue was 40 dBA. However, it is accepted that this could be lower on other occasions. In line with NPfI if it was found to be less than 35 dBA for the daytime period, then it is set to **35 dBA.** See Appendix B below for a full description of the NPfI.

4.4 Noise Goals

The noise goal ($L_{Aeq,\ 15\ minute}$) for on-site mechanical plant at neighbouring residential boundaries is 40 dBA (i.e. 35 dBA plus 5 dB day). It is important to note that this noise goal applies to the combination of all on-site mechanical plant alone and not to the combination of ambient noise (such as road traffic) and on-site mechanical plant.

5. CALCULATIONS AND ASSESSMENT

The mechanical plant was inaudible and not measureable at the nearest residential properties. However the noise level can be calculated from a source noise has been modelled using the International Standard ISO 9613-2 (1996(E)) '*Acoustic – Attenuation of sound during propagation outdoors Part 2 General method of calculation'*. The main noise reduction (attenuation) is due distance, know as geometric divergence A_{div}. This is found for the formula:-

$$A_{div} = 20\ log_{10}\ (p_1/p_2)$$

Where p_1 is the distance from the noise source to the receiver (i.e. 95 metres in this case) and p2 is the distance from the noise source to the measurement position (i.e. 3 or 4 metres in this case). Hence A_{div} is at least 27 dB *(*from 20 $\log_{10}$ (95/4).

The total mechanical plant noise at the nearest residential properties is:-

- Roof top kitchen Exhaust Fan – 21 dBA (from 51 dBA - 20 $\log_{10}$ (95/3).
- Compressor – 26 dBA (from 54 dBA - 20 $\log_{10}$ (95/4).
- Vending Machine – 22 dBA (from 52 dBA - 20 $\log_{10}$ (95/3).

- Total **28 dBA** (from $28 = 10 \log_{10} (10^{(21/10)} + 10^{(26/10)} + 10^{(22/10)})$).

In addition the 2.5 metres high concrete wall would be expected to reduce the level by at least 10 dB to a level of 18 dBA at the nearest residential properties.

6. FUTURE MECHANICAL PLANT

If an air conditioner of suitable size for the café is to be fitted in the future this will also meet all of the noise criteria due the large distance to the nearest residential premises and the concrete wall.

7. CONCLUSION

It is concluded that, all of the mechanical plant and equipment operating together, as given in this report, were not audible at the nearest residential premises as required by the Northern Beaches Council Condition 12 (2NL05). Therefore they cannot be regarded as offensive noise as defined in the NSW Protection of the Environment Operations Act 1997. In addition, the objective noise goals for mechanical plant as given in the the NSW Government's Noise Policy for Industry – 2017 are fully met.

Date	Prepared by:	Status
19th June 2019	Ken Scannell MSc MAAS	Draft
Date	**Prepared by:**	**Status**
20th June 2019	Ken Scannell MSc MAAS	Final

Important Note. *All products and materials suggested by 'Noise and Sound Services' are selected for their acoustical properties only. All other properties such as air flows, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, grout or tile cracking, loading, shrinkage, ventilation etc are outside of 'Noise and Sound Services' field of expertise and* ***must be*** *checked with the supplier or suitably qualified specialist before purchase.*

APPENDIX A– GLOSSARY OF TECHNICAL TERMS

Decibel (dB) – The logarithmic ratio of any two quantities and relates to the flow of energy (power). Unit less ratio of acoustic measurement related to power, pressure and/or intensity. Expressed in dB, relative to standard reference levels.

Ambient Sound – The all-encompassing sound associated with that environment being a composite of sounds from many sources, near and far.

Background Noise Level ($L_{AF90,\ T}$) – A statistical parameter used for assessments of constantly varying noise levels. The L_{A90} is the 'A' frequency weighted, 'Fast' time weighted, noise level that is exceeded for 90 % of the measurement period, 'T'. The measurement period is normally 15 minutes. The background noise is therefore the lowest noise level that occurs for 1.5 minutes in any 15 minute period.

'A' Frequency Weighting – The most widely used sound level frequency filter is the A scale, which roughly corresponds to the inverse of the 40 dB (at 1 kHz) equal-loudness curve. Using this filter, the sound level meter is less sensitive to very high and, in particular, very low frequencies. Sound pressure level measurements made with this filter are commonly expressed as **dBA.**

Energy Average Noise Level ($L_{Aeq,\ T}$) – The L_{Aeq} noise level is also known as the equivalent continuous sound pressure level. This is the 'A' frequency weighted logarithmic average of the sound energy of the measurement time 'T'. When measured over a 15 minute time period the symbol $L_{Aeq,\ 15\ minute}$ is used. This is the standard descriptor used for source noise measurements and ambient noise measurements.

Sound Pressure Level (L_{pA}) – 20 times the logarithm to the base 10 of the ratio of the r.m.s. 'A' frequency weighted sound pressure to 20 micropascals.

APPENDIX B - NSW NOISE POLICY FOR INDUSTRY (2017)

The assessment procedure for industrial and commercial noise sources given in the Noise Policy for Industry (2017) has two components:-

- **Controlling intrusive noise impacts; and**
- **Maintaining noise level amenity;**

Both components are taken into account when determining a project noise trigger level. 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. The project noise trigger level reflects the most stringent noise level requirement.

Intrusive Noise Impacts

The NSW Government in their Noise Policy for Industry (2017) states that:- '*The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the LAeq 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 perception of noise and its level of offensiveness depend greatly on the broader situation within which it occurs. Noise that might intrude into a resting or sleeping place may be found offensive whereas the same noise occurring in a market place or noisy working area may pass unnoticed. The concept of *'background + 5 dB'* derives from this consideration.

The Noise Policy for Industry defines the background noise level as *'the underlying level of noise present in ambient noise, generally excluding the noise source under investigation, when extraneous noise is removed'*.

'*Sound levels contributing to background levels can include sound from nearby traffic, birds, insects, animals, machinery and similar sources, if these sounds are a normal feature of the location. The background noise level is represented by the* $L_{AF90,\ 15\ min}$ *descriptor when undertaking short-term monitoring.'*

The Rating Background Level is used for assessment purposes. This is the single-figure background noise level derived from monitoring over a representative period of time, typically one full week. The outcome of this approach aims to ensure that the intrusiveness noise level is being met for at least 90% of the time periods over which annoyance reactions can occur (taken to be periods of 15 minutes).

The Noise Policy for Industry applies minimum assumed RBLs which result in minimum intrusiveness noise levels as follows:

TABLE B1: MINIMUM ASSUMED RBLS AND PROJECT INTRUSIVENESS LEVELS

Time of Day	Minimum assumed RBLs	Minimum intrusiveness noise levels – $L_{Aeq,\ 15\ min}$
Day	35	40
Evening	30	35
Night	30	35

Protecting Noise Amenity

In the Industrial Noise Policy it is stated that *'To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level 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.'

The relevant part of the NSW Government's recommended levels are given in Table B2 below.

TABLE B2: AMENITY NOISE LEVELS

Receiver	**Noise amenity area**	**Time of day**	**Recommended amenity noise level - $L_{Aeq,}$ dB(A)**
Residential	Rural	Day Evening Night	50 45 40
	Suburban	Day Evening Night	55 45 40
	Urban	Day Evening Night	60 50 45
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface – residential receiver only	All	All	Plus 5 dB to recommended amenity noise level

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.

Where a receiver is affected by existing levels of industrial noise, a project amenity noise level applies for each new source of industrial noise. The project amenity noise level is then equal to the recommended amenity noise level minus 5 dB.

In cases where transport noise, road traffic noise in particular, may be high enough to make noise from an industrial source effectively inaudible, even though the L_{Aeq} noise level from that industrial noise source may exceed the project amenity noise level, the project amenity noise level may be derived from the $L_{Aeq, period (traffic)}$ minus 15 dB (other conditions may be applicable).

Modifying Factor Adjustments

Where a noise source contains certain characteristics, such as tonality, intermittency, irregularity or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same sound pressure level. A correction should be applied to both the intrusive and the

amenity measurement before a comparison is made with the criteria. An abbreviated version of the correction factors is shown in Table B3 below:-

TABLE B3 – MODIFYING FACTOR CORRECTIONS

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band or narrow band analysis	Level of one third octave band exceeds the level of the adjacent bands by 5 dB or more (500-10000 Hz)	+ 5 dB	Narrow band frequency analysis may be required to precisely detect occurrence
Low Frequency Noise	Measurement of C-weighted and A-weighted level	Measure/assess C and A-weighted levels over same time period. Correction to be applied if the difference between the two is 15 dB or more	+ 5 dB	C-weighted is designed to be more responsive to low frequency noise
Intermittent Noise	Subjectively Assessed	Level varies by more than 5 dB and the intermittent nature of the noise is clearly audible	+ 5 dB	Adjustment to be applied for night time only
Duration	Single event noise 1.5 min to 2.5 hr	One event in any assessment period	0 to 20 dB(A)	Conditional on duration
Maximum adjustment		Where two or more modifying factors are indicated	10 dB(A)	Excludes duration correction

Note: Tonal noise - Level of one third octave band exceeds the level of the adjacent bands on both sides by 5 dB or more if the centre frequency of the band containing the tone is in the range 500-10000 Hz; 8 dB or more if the centre frequency of the band containing the tone is in the range 160 to 400 Hz; or 15 dB or more if the centre frequency of the band containing the tone is in the range 25-125 Hz.