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Environmental Noise Impact Assessment Shoalhaven Starches - Proposed Use of Former Paper Mill Site

340 Bolong Road,

Bomaderry, NSW 2541

Prepared for:-

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TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY 4
2. SITE AND DEVELOPMENT DESCRIPTION 5
2.1 Site Description 5
2.2 Description of Proposal 6
3. NOISE CRITERIA 7
3.1 NSW Environment Protection Authority Advice 7
3.2 NSW EPA's Noise Policy for Industry 2017 7
3.2.1 Introduction 7
3.2.2 Project Noise Trigger Level 8
3.2.3 Project Intrusiveness Noise Level 9
3.2.4 Amenity Noise Levels and Project Amenity Noise Levels 10
3.2.5 Assessment Locations 12
3.3 Measured Background Noise Levels 13
3.4 Project Specific Noise Goals 14
4. CORRECTIONS FOR ANNOYING CHARACTERISTICS 15
5. STORAGE FACILITY NOISE EMISSION 15
5.1 Source Noise Levels 16
5.2 Noise Level Predictions 16
5.2.1 Modelling Equations 16
5.2.2 Predicted Noise Levels 16
6. NOISE MITIGATION MEASURES 17
6.1 Broadband Reversing Alarms 17
7. CONCLUSION 18

1. INTRODUCTION AND SUMMARY

Shoalhaven Starches Pty Ltd is part of the Manildra Group of companies and their existing facility is located on the southern side of Bolong Road, Bomaderry, NSW, on the northern side of the Shoalhaven River. The facility produces a range of products including starch, gluten, glucose, ethanol and stock feed.

In 2009 Shoalhaven Starches received Project Approval from the Minister for Planning for the Shoalhaven Starches Expansion Project (SSEP), reference 06_0228. The SSEP included approval to increase ethanol production from 126 million litres per year to 300 million litres per year, which includes a small portion of beverage grade ethanol. To accomplish the increase in ethanol production, a series of plant upgrades and input in throughout of materials, principally flour and grain was required.

Further along Bolong Road to the east of the facility is the former Australian Paper Mill site which Shoalhaven Starches has recently acquired.

Shoalhaven Starches now proposes to modify the approval of the SSEP to incorporate the use of the former Paper Mill site for:-

- Storage of finished product and engineering plant within the existing buildings on site;
- Storage of syrups in the existing storage tanks;
- The use of external areas on site to lay down plant and materials that are to be used in construction of approved products on the Shoalhaven Starches factory site as well as temporary and overflow shipping container storage;
- The use of existing administration buildings for office staff.

It is a requirement of the NSW Department of Planning and Environment that an Environmental Noise Impact Assessment is prepared to address the potential for noise impact arising from the use of the Site for these purposes.

The area surrounding the Site is a mix of industrial, rural and residential properties with the nearest residences located toward the east along Bolong Road, north west on Hanigans Lane, south west on Pig (Burraga) Island and further south in Terara.

Shoalhaven Starches operates their existing facility under Environment Protection Licence 883 issued by the NSW Environment Protection Authority (EPA). However, the activities to be undertaken at the former Paper Mill site (the Site) will not be scheduled under the licence as advised by the EPA. Consequently, this noise assessment is carried out in accordance with the NSW EPA's Noise Policy for Industry 2017 (the Policy) which replaced the Industrial Noise Policy 2000 in October 2017.

Noise sources associated with the use of the Site are minimal and will include operation of a container forklift and truck movements during day time hours only. There will be no construction works associated with the modification given the Site and structures to be utilised are existing.

Project noise trigger levels have been established in accordance with the Policy and the most stringent is the intrusiveness noise trigger level of **40 dBA** ($L_{eq,\ 15\ minute}$) during the day at the nearest residences to the Site.

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.

In this instance calculations show that the level of noise emission from the use of the Site during day time hours is below the project noise trigger levels at all receptor locations without the need for mitigation measures other than the removal of a tonal reversing alarm from the forklift as outlined in Section 6 of this report.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The former Australian Paper Mill site is located at 340 Bolong Road, Bomaderry, NSW (Site).

The surrounding area is a mix of industrial, rural and residential properties with the nearest residences located toward the east along Bolong Road, north west on Hanigans Lane, south west on Pig (Burraga) Island and further south in Terara.

The Site, surrounding area and nearest residential receptor locations are shown in Figure 1 below and as follows:-

R1 – 390 Bolong Road, Bomaderry (circa 570 metres)

R2 – Pig (Burraga) Island (circa 750 metres)

R3 – 39 Hanigans Lane, Bomaderry (circa 760 metres)

R4 – 1 Bryant Street, Terara (circa 1200 metres)

Figure 1. Location Plan – Former Paper Mill Site, Bomaderry, NSW

(source: NSW Government Spatial Information Exchange © 2017)

2.2 Description of Proposal

In 2009 Shoalhaven Starches received Project Approval from the Minister for Planning for the Shoalhaven Starches Expansion Project (SSEP), reference 06_0228. The SSEP included approval to increase ethanol production from 126 million litres per year to 300 million litres per year, which includes a small portion of beverage grade ethanol.

Shoalhaven Starches now proposes to modify the approval of the SSEP to incorporate the use of the former Paper Mill site at 340 Bolong Road, Bomaderry for:-

- Storage of finished product and engineering plant within the existing buildings on site;
- Storage of syrups in the existing storage tanks;
- The use of external areas on site to lay down plant and materials that are to be used in construction of approved products on the Shoalhaven Starches factory site as well as temporary and overflow shipping container storage;
- The use of existing administration buildings for office staff.

Noise sources associated with the proposal will be minimal and include the operation of a container forklift and truck movements occurring in the outdoor storage areas. The layout and proposed use of the Site is shown in Figure 2.

Noise producing activity will occur at the Site will between the day time hours of 7 am and 6 pm Monday to Saturday and 8 am and 6 pm on Sundays and Public Holidays only.

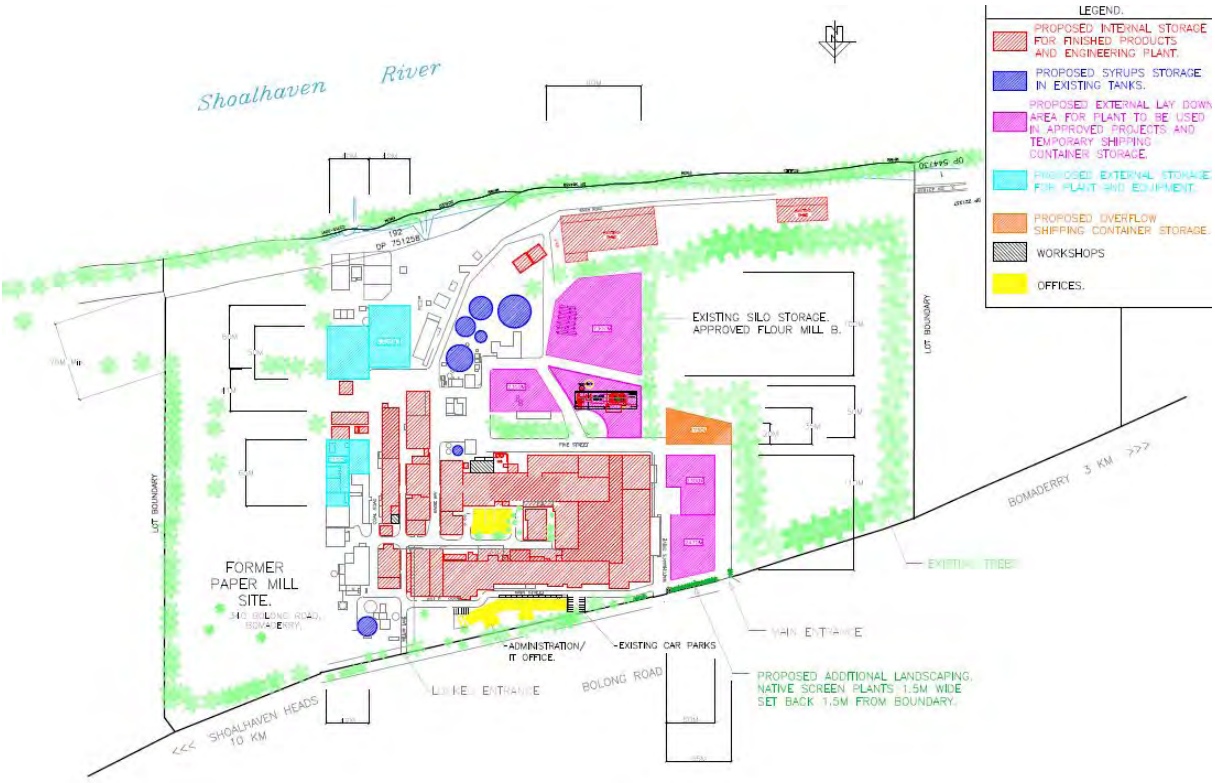


Figure 2. Proposed Layout – Former Paper Mill Site, Bomaderry, NSW

(source: Manildra Group Project 6416, drawing MN6416-001)

3. NOISE CRITERIA

This section outlines the noise guidelines applicable to this proposal and establishes the project specific noise goals.

3.1 NSW Environment Protection Authority Advice

The NSW EPA has advised that the activities undertaken at the Site being 340 Bolong Road will not be scheduled under Shoalhaven Starches existing Environment Protection Licence 883. Consequently, this Environmental Noise Impact Assessment is to be carried out in accordance with current guidelines.

These are detailed below.

3.2 NSW EPA's Noise Policy for Industry 2017

3.2.1 Introduction

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

Land-use planning processes provide the first and most effective and efficient mechanism to avoid noise-related land-use conflicts. The Noise Policy for Industry should be used as a reference to assist strategic land-use planning functions by planning authorities.

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 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.

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

When new industry is being proposed or existing industry is being upgraded, redeveloped or needs review, attention needs to be paid to controlling noise. The Noise Policy for Industry is designed to assist industry and authorities 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).

3.2.2 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 particular industrial development.

The project noise trigger level provides a benchmark or objective for assessing a proposal or site. <u>It is not intended for use as a mandatory requirement</u>. 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 trigger level is tailored for each specific circumstance to take into account a range of factors that may affect the level of impact, including:

- the receiver's background noise environment
- the time of day of the activity
- the character of the noise
- the type of receiver and nature of the area.

The scientific literature indicates that both the increase in noise level above background levels (that is, intrusiveness of a source), as well as the absolute level of noise are important factors in how a community will respond to noise from industrial sources. The project noise trigger level established in the Policy addresses each of these components of noise impact.

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 project intrusiveness noise level aims to protect against significant changes in noise levels, whilst the project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses.

Applying the most stringent requirement as the project noise trigger level ensures that both intrusive noise is limited and amenity is protected and that no single industry can unacceptably change the noise level of an area.

3.2.3 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.

To account for the temporal variation of background noise levels, the method outlined in Fact Sheet A is required for determining the background noise level or rating background noise level (RBL) to be used in the assessment. 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 intrusiveness noise level is determined as follows:

$L_{Aeq,\ 15\ minute}$ *= rating background noise level + 5 dB*

Where:

$L_{Aeq,\ 15\ minute}$	*Represents the equivalent continuous energy average A-weighted sound pressure level of the source over 15 minutes.*

And:

Rating background	*Represents the background level to be used for assessment purposes, as determined by the method outlined in Fact Sheets A and B.*

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 1 below.

Table 1 Minimum assumed RBLs and project intrusive 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**

The objective of carrying out long-term background noise monitoring at a location is to determine existing background noise levels that are indicative of levels during the entire year. However, the RBL for evening or night periods calculated from long-term unattended background noise monitoring can sometimes be higher than the RBL for the daytime period. This situation can arise due to increased noise from, for example, insects or frogs during the evening and night in the warmer months, or due to temperature inversion conditions during winter.

In some rural situations, the RBL may be the same for the day, evening and night. In these cases, it is recognised that excursions of noise above the project intrusiveness noise level during the day would not usually have the same impact as they would during the evening or night. This is due to the more sensitive nature of activities likely to be disturbed at night (for example, sleep and relaxation).

In determining project noise trigger levels from RBLs, the community's expectations also need to be considered. The community generally expects greater control of noise during the more sensitive evening and night-time periods than during the less sensitive daytime period.

Therefore, in determining project noise trigger levels for a particular development, it is generally recommended that the project intrusiveness noise level for evening be set at no greater than the project intrusiveness noise level for daytime. The project intrusiveness noise level for night-time should be no greater than the project intrusiveness noise level for day or evening. Alternative approaches to these recommendations may be adopted if appropriately justified.

3.2.4 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. (Table 2.2 is replicated in Table 2 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 have been selected on the basis of studies that relate industrial noise to annoyance in communities (Miedema and Voss, 2004). They have been subjectively scaled to reflect the perceived differential expectations and ambient noise environments of rural, suburban and urban communities for residential receivers. They are based on protecting the majority of the community (90%) from being highly annoyed by industrial noise.

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 2 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 Evening Night	50 45 40
	Suburban	Day Evening Night	55 45 40
	Urban	Day Evening Night	60 50 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 Noisiest 1-hour	 35 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 – see Table 2.3
- suburban residential – see Table 2.3
- urban residential – see Table 2.3
- 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 (further explanation on how this category applies is outlined in Section 2.7)
- 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, however that is not the case in this instance.

3.2.5 Assessment Locations

For a **residence**, the project noise trigger level 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.

For multi-storey residential buildings (greater than two storeys) where a ground floor assessment location is deemed to be unrepresentative of the exposure of upper stories, the assessment may be undertaken at a representative elevation and closer than 3 metres to a reflective surface, as agreed with the regulator. However, the assessed/measured noise level is to be suitably adjusted to reflect a 'free field' (that is, nominally no reflective signals) assessment/measurement location.

In assessing amenity noise levels at **commercial or industrial** premises, the noise level is to be assessed at the reasonably most-affected point on or within the property boundary. Again, this requirement should not be read to infer that the noise level only applies at the 'reasonably worst-affected location'.

Where internal amenity noise levels are specified, they refer to the noise level at the centre of the habitable room that is most exposed to the noise and apply with windows opened sufficiently to provide adequate ventilation, except where alternative means of ventilation complying with the Building Code of Australia are provided. In cases where gaining internal access for monitoring is difficult, then external noise levels 10 dB(A) above the internal levels apply.

In assessing amenity noise levels at passive and active recreational areas, the noise level is to be assessed at the most-affected point within the area that is reasonably expected to be used by people, for example, picnic areas or walking tracks.

3.3 Measured Background Noise Levels

In order to establish the project specific intrusiveness noise level (see Section 3.2.3 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 (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.

Background noise levels need to be determined before intrusive noise can be assessed. The background noise levels to be measured are those that are present at the time of the noise assessment and without the subject development operating. For the assessment of modifications to existing premises, the noise from the existing premises should be excluded from background noise measurements. The exception is where the premises has been operating for a significant period of time and is considered a normal part of the acoustic environment; it may be included in the background noise assessment under the following circumstances:

- the development must have been operating for a period in excess of 10 years in the assessment period/s being considered and is considered a normal part of the acoustic environment; and,
- the development must be operating in accordance with noise limits and requirements imposed in a consent or licence and/or be applying best practice.

Where a project intrusiveness noise level has been derived in this way, the derived level applies for a period of 10 years to avoid continuous incremental increases in intrusiveness noise levels. This approach is consistent with the purpose of the intrusiveness noise level to limit significant change in the acoustic environment. The project amenity noise level will moderate against background noise creep.

When assessing a new development, it is important to undertake sufficient monitoring of background noise to allow intrusive noise to be assessed adequately. However, when assessing noise levels in response to complaints, the background noise level during the period of the complaint is of interest, and monitoring over a shorter length of time may be appropriate.

There are two procedures for determining background noise: the long-term method to be used at the planning and approval stage, and the short-term method for complaint and compliance assessment purposes.

The long-term method involves a two-step process to determine the rating background noise level. The short-term method involves only one step.

In this instance the long-term method has been used and a noise logger was placed at 390 Bolong Road, Bomaderry shown as receptor R1 in Figure 1.

Background noise levels were measured between Thursday 23 November and Thursday 30 November 2017. This location is considered representative of all residential receptors in the vicinity of the site.

The results of the background noise survey are shown in the attached Appendix B and summarised in Table 3 below.

Details of instrumentation used during the noise survey can be seen in the attached Appendix A.

Table 3 Rating Background Levels – 390 Bolong Road, Bomaderry

Time of Day	Rating Background Level (L_{90})	Existing Ambient Noise Levels (L_{eq})
Day (7 am to 6 pm)	**35 dBA**	**47 dBA**
Evening (6 pm to 10 pm)	**37 dBA**	**49 dBA**
Night (10 pm to 7 am)	**34 dBA**	**42 dBA**

In determining project noise trigger levels for a particular development, it is generally recommended that the project intrusiveness noise level for evening be set at no greater than the project intrusiveness noise level for daytime.

It can be seen from Table 3 that the evening time rating background noise level is higher than in the day, due most likely to insect noise. The rating background noise level for the evening would generally be set to that of that day time in accordance with the Policy. In this instance it is not particularly relevant given the operating hours of the Site being day time hours only.

The rating background level in the day is 35 dBA ($L_{90,\ 15\ minute}$) and this level is equal to the minimum assumed day time background noise level (see Table 1 in Section 3.2.3). As such this level is used to establish project specific intrusiveness trigger levels at all residential receptors in proximity to the Site.

3.4 Project Specific Noise Goals

The most relevant noise trigger levels are as follows:-

All residential receptors

- *(35 + 5 dB =)* ***40 dBA*** *($L_{eq,\ 15\ minute}$) during the day (between 7 am and 6 pm)*

4. CORRECTIONS FOR ANNOYING CHARACTERISTICS

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 noise level. On the other hand, some sources may cause less annoyance where only a single event occurs for a limited duration. This section outlines the correction factors to be applied to the source noise level at the receiver before comparison with the project noise trigger levels specified in Section 2, to account for the additional annoyance caused by these modifying factors.

The modifying factor corrections should be applied having regard to:

- the contribution noise level from the premises when assessed/measured at a receiver location, and
- the nature of the noise source and its characteristics (as set out in this fact sheet).

Table C1 sets out the corrections to be applied. The corrections specified for tonal, intermittent and low-frequency noise are to be added to the measured or predicted noise levels at the receiver before comparison with the project noise trigger levels. The adjustments for duration are to be applied to the criterion.

Table C1 is replicated in Appendix C.

Given the distance to the closest residential receptors, the predicted noise levels are not expected to exhibit modifying factors requiring adjustment.

However, as a precaution, recommendations are made in Section 6 of this Report to ensure that there are no tonal reversing alarms used on mobile plant.

5. STORAGE FACILITY NOISE EMISSION

5.1 Source Noise Levels

The only sources of noise associated with the use of Site for storing plant, equipment and materials are the operation of a container forklift and truck movements.

Table 4 below provides a schedule of overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, of noise sources associated with proposed modification. These are derived from previously measured noise levels taken at Shoalhaven Starches existing facility.

Table 4 L_{10} Sound Power Levels – Plant and Equipment

Description	$L_{eq,\ 15\ minute}$ Sound Power Level (dBA)
32 tonne forklift movement	**104**
Truck movement on site	**100**

5.2 Noise Level Predictions

5.2.1 Modelling Equations

For all outdoor noise sources, the external noise level at each receptor has been calculated from the formula:-

$$L_{eq} = L_w + Dc - A$$

Where:

- L_w is the sound power level of the noise source;
- Dc is directivity correction; and
- A is the attenuation that occurs during the propagation from source to receiver.

The term A in the equation includes attenuation from geometric divergence (distance loss), atmospheric absorption, ground absorption, barrier effects and miscellaneous other effects.

This model derives from the International Standard ISO 9613-2 (1996(E)) *'Acoustic – Attenuation of sound during propagation outdoors Part 2 General method of calculation'*.

The method described in the Standard is general in the sense that it may be applied to a wide variety of noise sources, and covers the major mechanism of sound attenuation. The method allows for propagation conditions with the wind blowing from the source to the receiver.

5.2.2 Predicted Noise Levels

Predicted noise levels at each receptor location are shown in Table 5 below.

Table 5 Predicted Noise Levels at Receptor Locations

Description	Predicted Noise Level $L_{eq,\ 15\ minute}$ (dBA) at Receptor Location			
	R1	R2	R3	R4
Intrusiveness Noise Trigger Level	40	40	40	40
Truck and Forklift movements	31 – 36	29 – 34	25 – 30	24 – 29
Complies	✓	✓	✓	✓

The calculations and predictions in Table 5 consider distance loss to each receptor as well as the following:-

- An adjustment for the forklift operating at full sound power at the closest location to any given receptor for 7.5 minutes in any given 15 minute period;
- An adjustment for the truck operating at full sound power at the closest location to any given receptor for 5 minutes in any given 15 minute period;
- Ground absorption to receptor R3 only.

It should be noted that even without the adjustments to duration of mobile plant operating at full sound power for a full 15 minutes, the intrusiveness noise trigger levels would still be met at each receptor location. The assumptions simply represent a realistic operational worst-case scenario.

It can be seen from the Table 5 that the predicted noise levels at all residential receptor locations are below the intrusiveness noise trigger levels and are therefore acceptable, this is providing the recommendations made in Section 6 below are implemented and maintained.

6. NOISE MITIGATION MEASURES

6.1 Broadband Reversing Alarms

- Tonal reversing alarms on all items of mobile plant should be replaced with broadband alarms to ensure that noise emission does not exhibit tonal characteristics.

7. CONCLUSION

An assessment of the potential noise impact from the proposed use of the former Paper Mill site at 340 Bolong Road, Bomaderry by Shoalhaven Starches has been undertaken.

Calculations and predictions shown that the level of noise emission from the proposed use of the Site is within the intrusiveness noise trigger levels derived from the NSW EPA's Noise Policy for Industry 2017 at all residential receptor locations without the need for mitigation measures other than that outlined in Section 6 of this Report.

Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Appendix A – Noise Survey Instrumentation
Appendix B – Background Noise Survey Graphs
Appendix C – Modifying Factor Corrections (EPA INP 2017)

Noise Survey Instrumentation	Appendix A

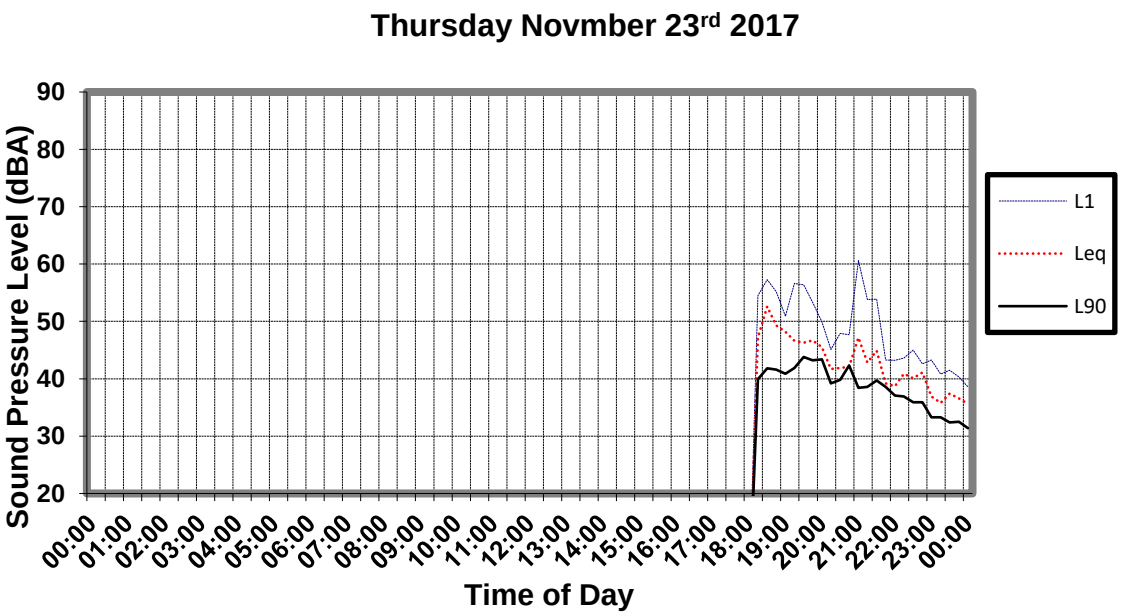
The instrumentation used during the noise survey consisted

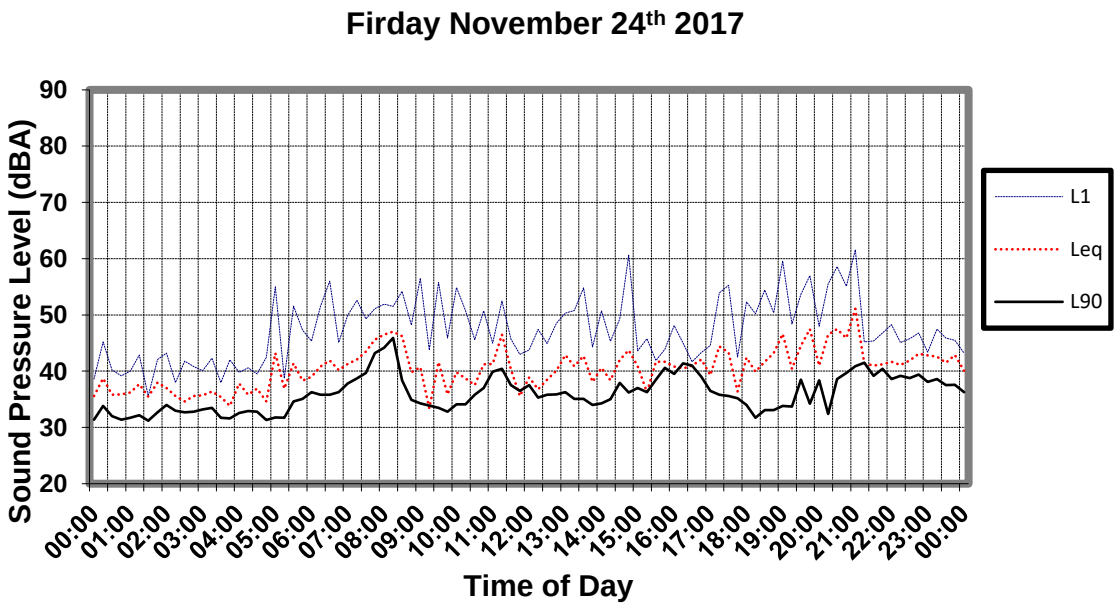
Description	Model No.	Serial No.
Infobyte Noise Logger (Type 2)	iM4	104
Condenser Microphone 0.5” diameter	MK 250	104

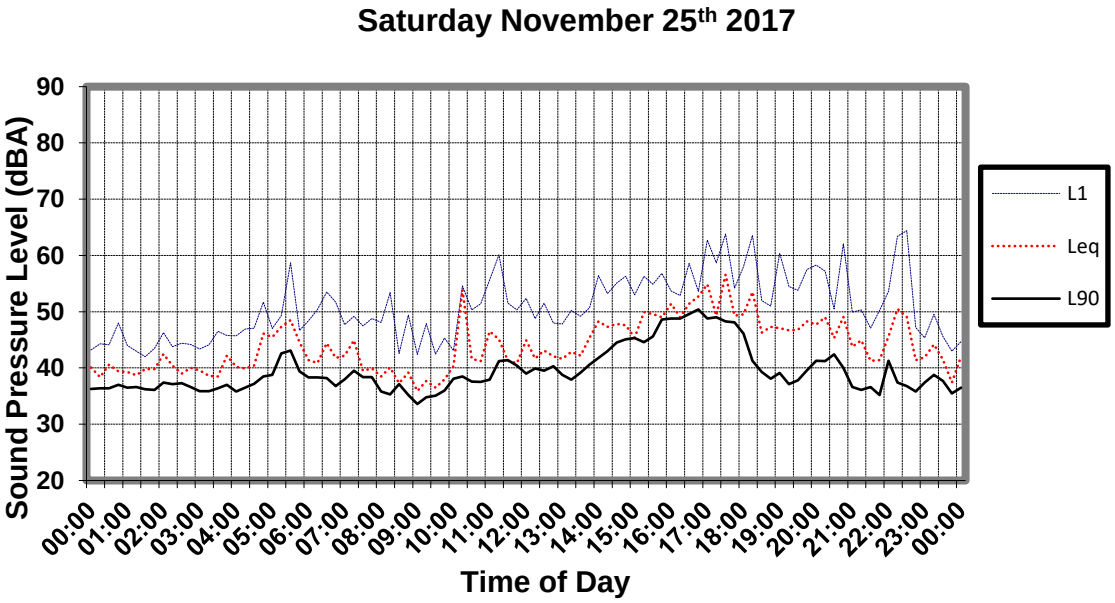
The infobyte noise logger # 104 conforms to Australian Standard AS 1259 as a Type 2 sound level meter.

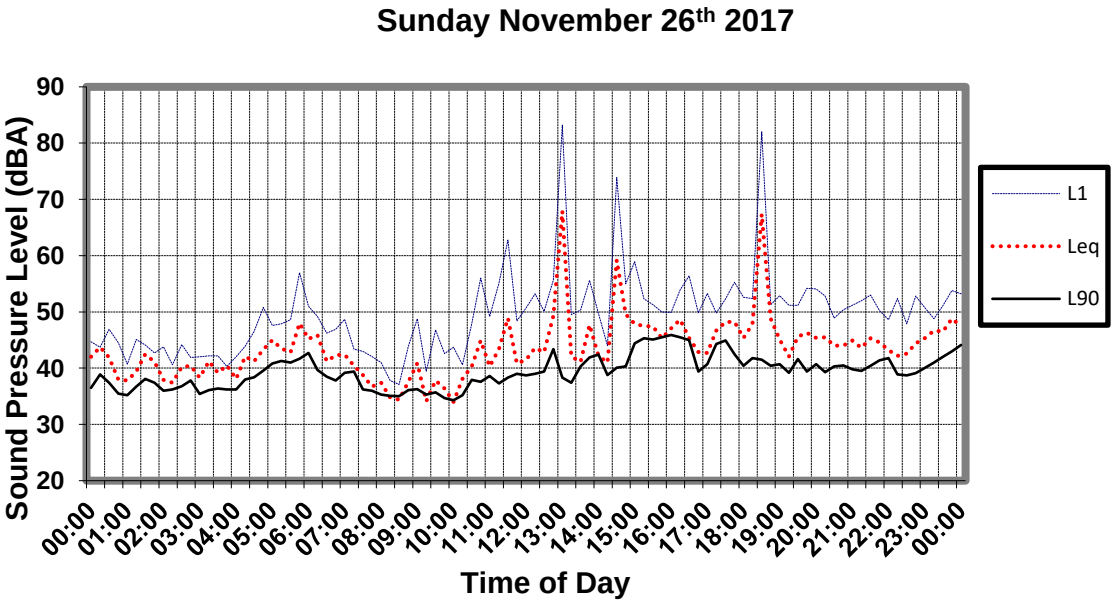
The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates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

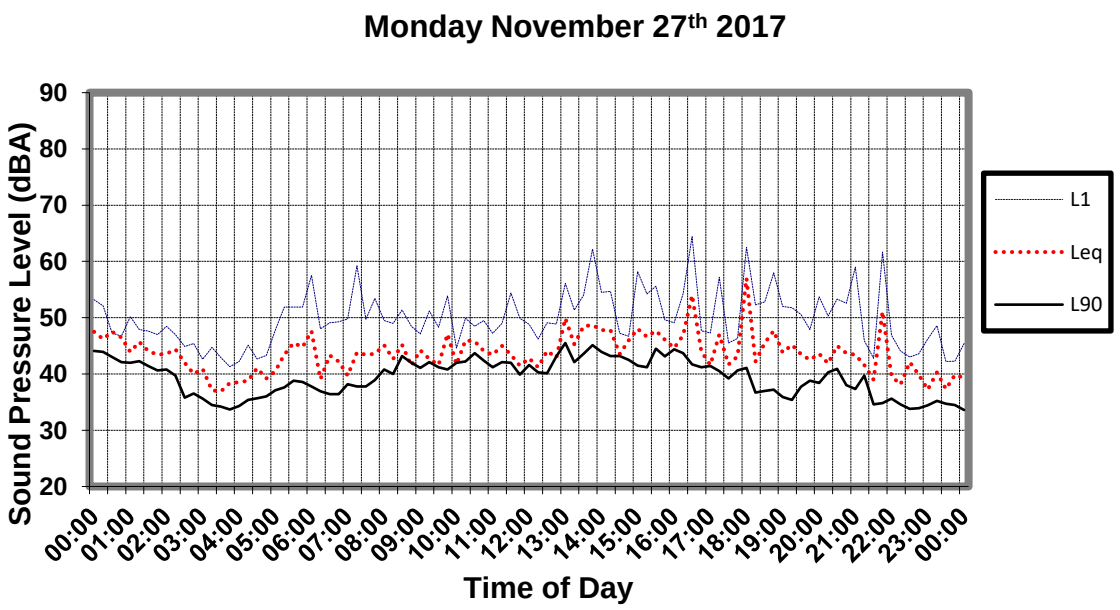
Background Noise Survey Graphs	Appendix B

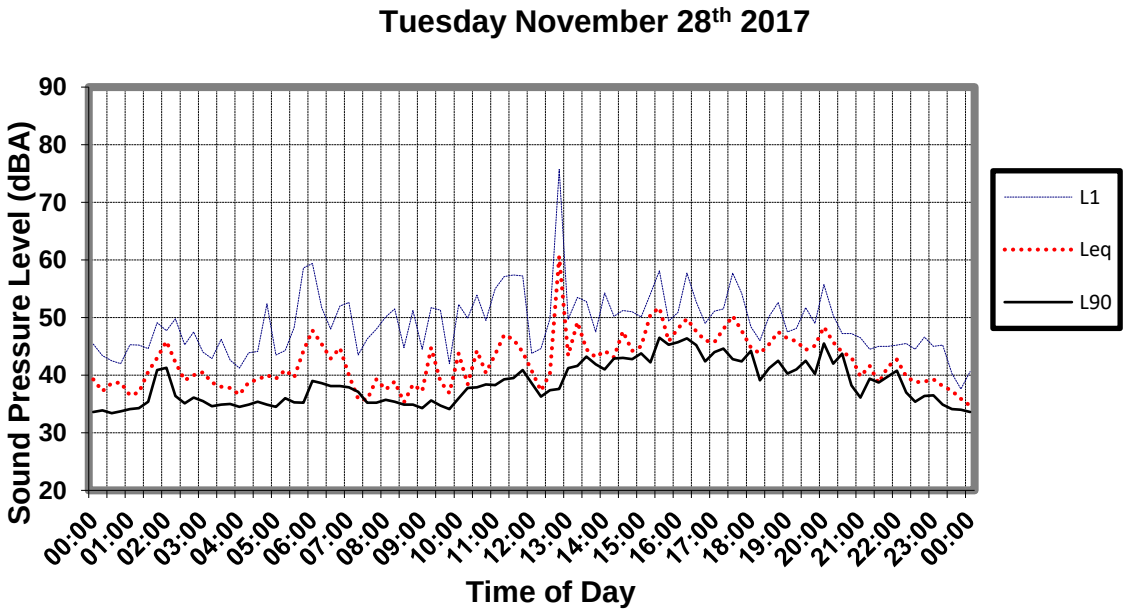





Saturday November 25th 2017
Sound Pressure Level (dBA)
90
80
70
60
50
40
30
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
L1
Leq
L90


Sunday November 26th 2017
Sound Pressure Level (dBA)
90
80
70
60
50
40
30
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
L1
Leq
L90


Monday November 27th 2017
Sound Pressure Level (dBA)
90
80
70
60
50
40
30
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
L1
Leq
L90


Tuesday November 28th 2017
Sound Pressure Level (dBA)
90
80
70
60
50
40
30
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
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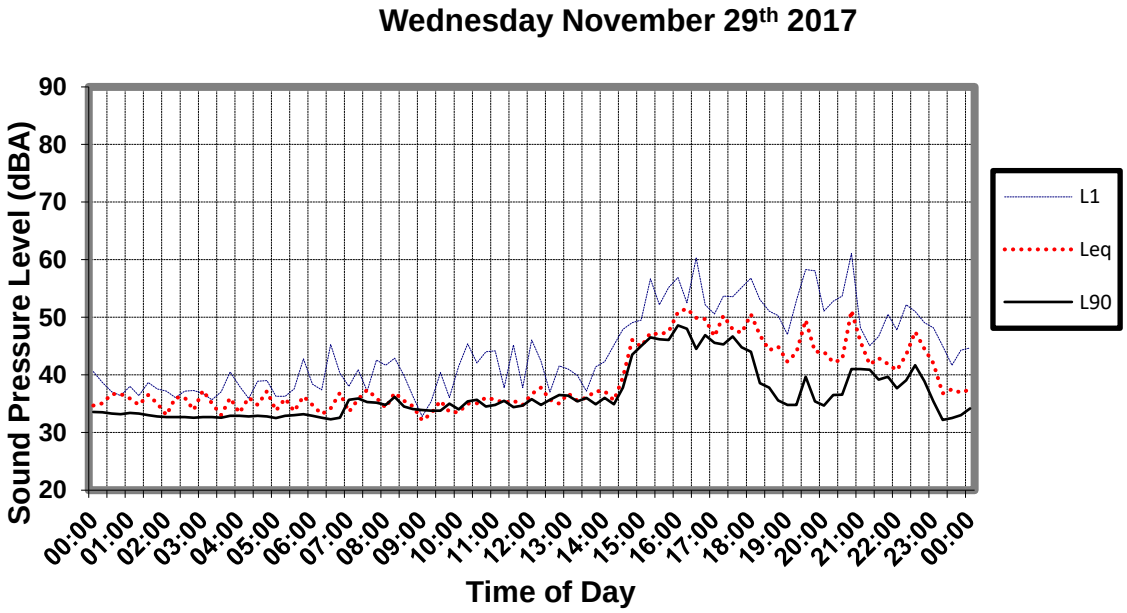
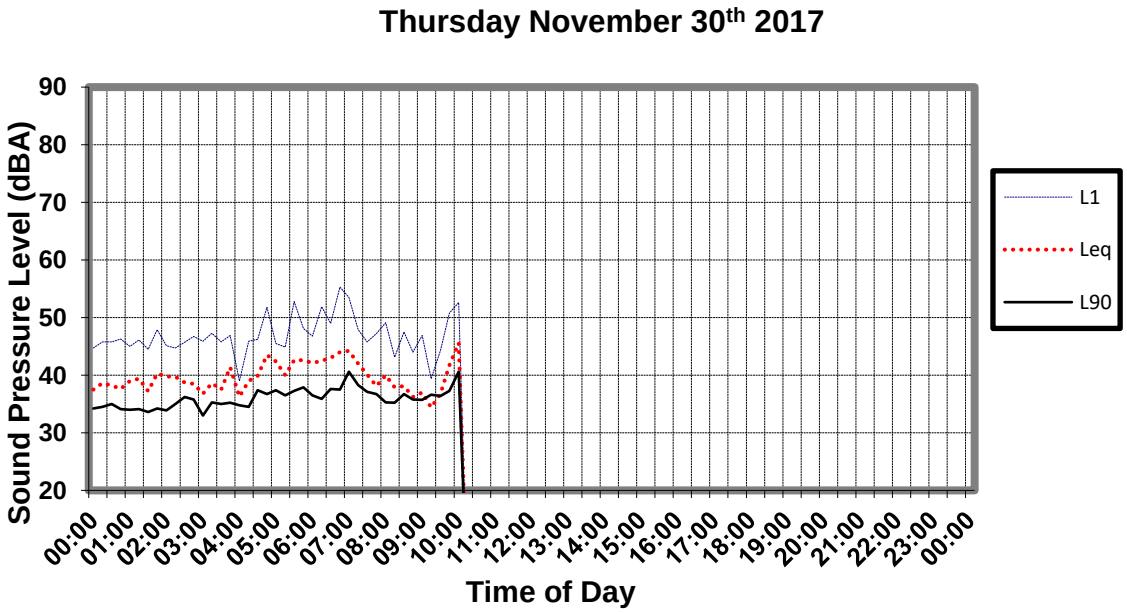
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
L1
Leq
L90


Wednesday November 29th 2017
Sound Pressure Level (dBA)
90
80
70
60
50
40
30
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
L1
Leq
L90


Thursday November 30th 2017
Sound Pressure Level (dBA)
90
80
70
60
50
40
30
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00
Time of Day
L1
Leq
L90

Modifying Factor Corrections	Appendix C

Modifying factor corrections from Fact Sheet C of the NSW Noise Policy for Industry 2017.

Table C1 Modifying Factor Corrections (from Table C1 of the NSW NPfI)

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Tonal Noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (ISO1996.2-2007 – Annex D).	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 500–10,000 Hz • 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz • 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.	+ 5 dB	Third octave measurements should be undertaken using unweighted or Z-weighted measurements. Note: Narrow-band analysis using the reference method in ISO1996-2:2007, Annex C may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified, e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands.
Low Frequency Noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10–160 Hz	Measure/assess source contribution C- and A-weighted $L_{eq,T}$ levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: • where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period • where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2 dB(A) positive adjustment applies for the daytime period.	2 or 5 dB[2]	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations.
Intermittent Noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level.	The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.	+ 5 dB	Adjustment to be applied for **night time only**

Table C1 Modifying Factor Corrections (from Table C1 of the NSW NPfI) *Cont…*

Factor	Assessment/ Measurement	When to Apply	Correction	Comments
Duration	Single-event noise duration may range from 1.5 m to 2.5 h	One event in any 24-hour period	0 to -20dBA	The project noise trigger level may be increased by an adjustment depending on duration of noise (see Table C3).
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated	Maximum correction of 10 dBA[2] (excluding duration correction)	

Notes:

1. Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.

2. Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

3. Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.