



Padstow Noise Impact Assessment

48a Gibson Avenue Padstow

Ausgrid

24-28 Campbell Street,
Sydney NSW 2000

Prepared by:

SLR Consulting Australia Pty Ltd

SLR Project No.: 630.032672

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Basis of Report

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1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Ausgrid Pty Ltd (Ausgrid) to undertake a noise impact assessment of the concept proposal in support of rezoning a site located at 48a Gibson Avenue, Padstow from SP2 Electricity Transmission or Distribution to IN2 Light Industrial to align with the adjacent IN2 Light Industrial (now E4 General Industrial) land.

SLR is suitably qualified to produce this noise impact assessment. SLR staff are members of the Australian Acoustical Society (AAS) and SLR is a member firm of the Association of Australasian Acoustical Consultants (AAAC).

This report summarises the existing noise environment at the site and assesses the potential operational noise impacts associated with the project.

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

1.1 Project Description

The site is located at 48a Gibson Avenue, Padstow within the Canterbury Bankstown Local Government Area and is shown in **Figure 2**.

The site is considered to be a surplus to Ausgrid's operational needs and therefore it is proposed to rezone the land to be consistent with the adjacent land zoned IN2 Light Industrial (Now E4 General Industrial) to pursue redevelopment opportunities.

The existing site has a substation building located on the northern part of the lot with the southern portion cleared with no buildings.

The concept for the proposed rezoned land is to consist of a 1-2 storey warehouse or distribution centre and office. The proposed entry and exit to the site will be via Gow Street.

Figure 1 Site layout

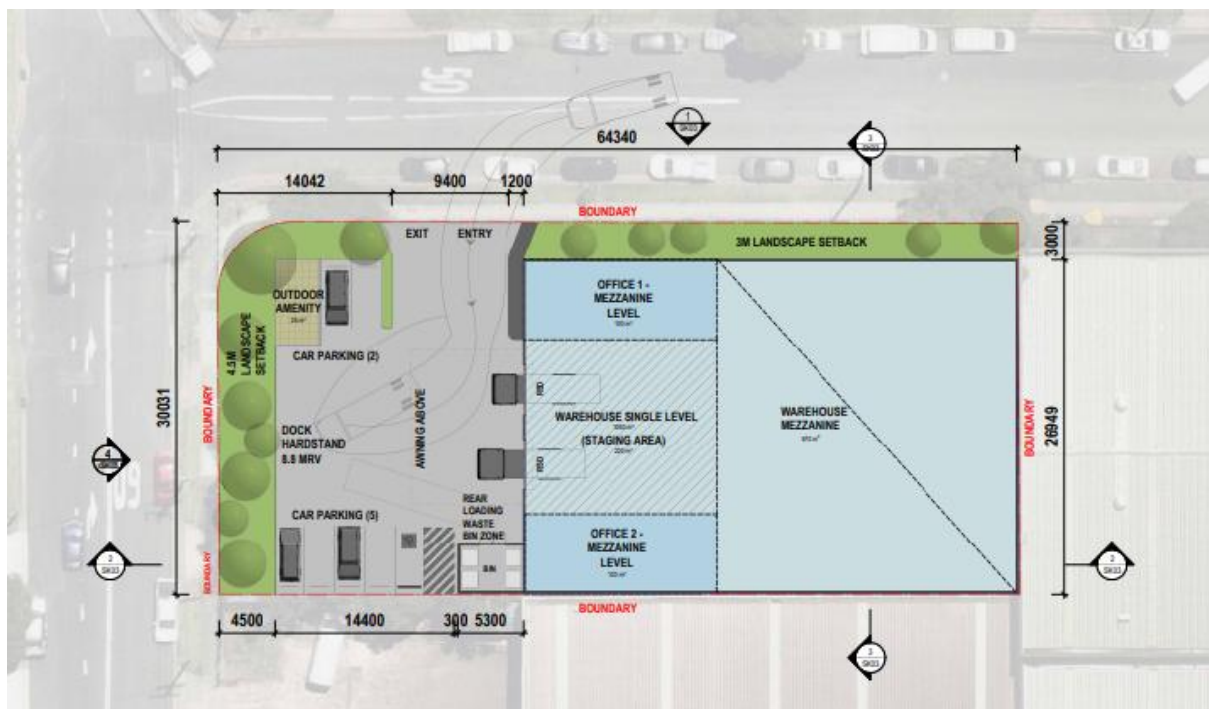


Figure 2 Site Location and Surrounding Receivers



2.0 Existing Noise Environment

The existing noise environment at the site is generally dominated by road traffic from the surrounding road network and urban hum from the existing commercial/ industrial buildings.

Unattended noise monitoring data used in this assessment was sourced from the Noise Impact Assessment (Ref: 220486 R2, dated 13 September 2023) prepared by Pulse White Noise Acoustics for the nearby Padstow Multi-Level Industrial development. Unattended noise monitoring was undertaken at the closest residential property to the proposed site located at 41 Gibson Avenue over the period of 26 September 2022 to 10 October 2022. The measured noise levels have been used to determine the existing noise environment and to set the criteria used to assess the potential impacts from the project.

Attended noise monitoring at three locations adjacent to the site have also been undertaken on Thursday 18 September 2025 to verify the adopted unattended noise monitoring.

The noise monitoring locations are shown in **Figure 2**.



2.1 Unattended Noise Monitoring

The results from the unattended noise monitoring are presented in **Table 1**.

Table 1 Summary of Unattended Noise Monitoring Results

ID	Address	Measured Noise Levels (dBA)					
		Background Noise (RBL)			Average Noise (LAeq)		
		Day	Evening	Night	Day	Evening	Night
L01 ²	41 Gibson Avenue	54	46	40	69	66	63

Note 1: The assessment periods are the daytime which is 7 am to 6 pm Monday to Saturday and 8 am to 6 pm on Sundays and public holidays, the evening which is 6 pm to 10 pm, and the night-time which is 10 pm to 7 am on Monday to Saturday and 10 pm to 8 am on Sunday and public holidays. See the NSW EPA *Noise Policy for Industry*.

Note 2: Data taken from Pulse White Noise Acoustic Report 220486 – Padstow Multi-Level Industrial development – Noise and Vibration Impact Assessment – R2 dated 13 September 2023.

2.2 Attended Noise Monitoring

The results from the attended noise monitoring are presented **Table 2**.

Table 2 Summary of Attended Noise Monitoring Results

Measurement Location	Address	Start time	Measured Noise level			Observations
			L _{Amax}	L _{Aeq}	L _{A90}	
AL1	33 Gibson Avenue	16:24	84	70	60	Traffic – 68 to 82 dBA Ambient – 54 to 55 dBA
AL2	41 Gibson Avenue	16:56	95	72	62	Traffic – 67 to 84 dBA Ambient noise – 59 to 61 dBA Horn – 95 dBA
AL3	49 Gibson Avenue	19:20	84	72	63	Traffic – 69 to 84 dBA Resident – 71 to 75 dBA Pedestrian – 82 dBA Plane – 69 dBA Ambient noise – 64 dBA

The noise monitoring data from L01 has been adopted to determine the existing acoustic amenity for the surrounding sensitive receivers due to its' location at the nearest and most affected residential receiver west of the site. The use of the data has been verified by the attended noise monitoring undertaken at the nearest residential receivers as the results are generally similar to that obtained at L01 with the L_{Aeq} and L_{A90} slightly lower than that measured during the attended noise survey.

Additionally, residents set further from the site are expected to retain a similar acoustic environment and will also adopt the monitoring data from L01 to establish the project noise trigger levels detailed in **Section 3.1.1**.



3.0 Assessment Criteria

3.1 Operational Noise Criteria

The NSW *Noise Policy for Industry* (NPfI) was released in 2017 and sets out the requirements for the assessment and management of operational noise from industry in NSW.

The NPfI defines how to determine ‘trigger levels’ for noise emissions from industrial developments. Where a development is likely to exceed the trigger levels at existing noise sensitive receivers, feasible and reasonable noise management measures are required to be considered to reduce the impacts.

There are two types of trigger levels – one to account for ‘intrusive’ noise impacts and one to protect the ‘amenity’ of particular land uses:

- The **intrusiveness** of an industrial noise source is generally considered acceptable if the L_{Aeq} noise level of the source, measured over a period of 15-minutes, does not exceed the representative background noise level by more than 5 dB. Intrusive noise levels are only applied to residential receivers. For other receiver types, only the amenity levels apply.
- To limit continual increases in noise levels from the use of the intrusiveness level alone, the ambient noise level within an area from all industrial sources should remain below the recommended **amenity** levels specified in the NPfI for that particular land use.

Intrusive and amenity noise levels are not used directly as regulatory limits. They are used to assess the potential impact of noise, assess feasible and reasonable mitigation options and subsequently determine achievable noise requirements.

The NPfI provides guidance on assigning residential receiver amenity noise categories based on the site-specific features shown in **Table 3**.



Table 3 Residential Receiver Amenity

Receiver Category	Typical Planning Land Use Zoning	Typical Existing Background Noise Levels (RBL)	Description
Rural	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime <40 dBA Evening <35 dBA Night <30 dBA	Rural – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.
Suburban residential	RU5 – village RU6 – transition R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Daytime <45 dBA Evening <40 dBA Night <35dBA	Suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.
Urban residential	R1 – general residential R4 – high density residential B1 – neighbourhood centre (boarding houses and shop-top housing) B2 – local centre (boarding houses) B4 – mixed use	Daytime >45 dBA Evening >40 dBA Night >35 dBA	Urban – an area with an acoustical environment that: • Is dominated by ‘urban hum’ or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources • Has through-traffic with characteristically heavy and continuous traffic flows during peak periods • Is near commercial districts or industrial districts • Has any combination of the above.

Amenity noise categories for the surrounding receivers have been determined with reference to the NPfI. The assessment is shown in **Table 4**.

Table 4 Residential Receiver Amenity Category Assessment

Area	Land Use Zoning	Existing Background Noise Levels RBL (dBA)			Resulting Amenity Classification	Discussion
		Day	Eve	Night		
NCA01	R2 – low density residential, E4 – Industrial Zoned Land	54	46	40	Urban	The surrounding residential area is zoned as R2 – low density residential, however, residences have been classified as urban due to high existing background noise levels that are dominated by road traffic and industrial noise, and due to the location being near to existing commercial/industrial districts.



3.1.1 Project Noise Trigger Levels

The trigger levels for industrial noise from the project are summarised in **Table 5**. The Project Noise Trigger Levels (PNTL) are the most stringent of the intrusiveness and amenity trigger level for each period and are highlighted below.

Table 5 Project Noise Trigger Levels

NCA	Receiver Type	Period	Recommended Amenity Noise Level LAeq (dBA)	Measured Noise Level (dBA)		Project Noise Trigger Levels LAeq(15minute) (dBA)	
				RBL ¹	LAeq (period)	Intrusiveness	Amenity ^{2,3}
Residential Receivers							
NCA01,	Residential	Daytime	60	54	69	59	58
		Evening	50	46	66	51	48
		Night-time	45	40	63	45	43
Other Sensitive Receivers							
All	School classroom – Internal	When in use	35 (internal)				35 (internal)
	Commercial	When in-use	65	-	-	-	65
	Industrial	When in-use	70	-	-	-	70

Note 1: RBL = Rating Background Level.

Note 2: The recommended amenity noise levels have been reduced by 5 dB, where appropriate, to give the project amenity noise levels due to other sources of industrial noise being present in the area.

Note 3: The project amenity noise levels have been converted to a 15-minute level by adding 3 dB, as outlined in the NPfl.

3.1.2 Cumulative Noise Impacts

The NPfl aims to limit continuing increases in industrial noise through the application of amenity noise levels. The project amenity noise levels are reduced by 5 dB relative to the recommended amenity levels to allow for other sources of industrial noise in the area (existing and new). By doing this, the policy accounts for potential cumulative impacts by lowering the criteria for each individual development. The NPfl states that “*where the project amenity noise level applies and it can be met, no additional consideration of cumulative industrial noise is required.*”

3.1.3 Sleep Disturbance

The potential for sleep disturbance from maximum noise level events during the night-time period from the development is required to be considered.

The NPfl defines the sleep disturbance screening level as 52 dBA LAF_{max} or the prevailing background level plus 15 dB, whichever is greater.

The sleep disturbance screening levels for the development are shown in **Table 6**.



Table 6 Sleep Disturbance

Location	Noise Level (dBA)	
	Measured Prevailing Night-time Background Level	Sleep Disturbance Screening Level ¹
All	40	55

A detailed maximum noise level event assessment should be completed where the sleep disturbance screening level is exceeded. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

The NPfI refers to the *Road Noise Policy* (RNP) for additional information regarding sleep disturbance. enHealth Council studies are referenced which indicate that for short-term or transient noise events, for good sleep over eight hours the indoor LAF_{max} sound pressure level should ideally not exceed around 45 dBA more than 10 or 15 times per night.

The RNP goes on to conclude that from the research on sleep disturbance to date:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to awaken people from sleep.
- One or two events per night with maximum internal noise levels of 65-70 dBA are not likely to affect health and wellbeing significantly.

3.1.4 Corrections for Annoying Noise Characteristics

Sources of industrial noise can cause greater annoyance where they contain certain characteristics, such as tonality, intermittency or dominant low-frequency content. The NPfI specifies the following modifying factor corrections, shown in **Table 9**, which are to be applied where annoying characteristics are present.

Details of the modifying factor corrections applied in the assessment are provided in **Section 4.1**.

Table 9 NPfI Modifying Factors

Factor	Assessment/ Measurement	When to Apply	Correction ¹
Tonal noise	One-third octave or narrow band analysis	Level of one-third octave band exceeds the level of the adjacent bands on both sides by the levels defined in the NPfI.	5 dB ²
Low-frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements	Measure/assess source contribution C and A weighted Leq,t levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and the level to which the thresholds defined in the NPfI are exceeded.	2 or 5 dB ²
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 and the intermittent nature of the noise is clearly audible. The NPfI further defines intermittent noise as noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB, for example, equipment cycling on and off.	5 dB ³



Factor	Assessment/ Measurement	When to Apply	Correction ¹
		The EPA has confirmed ⁴ that the intermittent correction does not apply to short-term events that emerge above the general industrial noise level and is therefore not applicable to industrial or commercial sites that have vehicle or plant movements at night, including audible reversing alarms. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.	
Maximum adjustment	Refer to individual modifying factors	Where two or more modifying factors are indicated.	Maximum correction of 10 dB ² (excluding duration correction)

Note 1: Corrections to be added to the measured or predicted levels.

Note 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.

Note 3: Adjustment to be applied to night-time only.

Note 4: *How to Apply the Noise Policy for Industry Intermittent Modifying Factor Corrections*, NSW Environment Protection Authority, Acoustics Australia Vol. 50, No. 3, September 2022.

3.1.5 Residual Impacts

The NPfl defines residual noise impacts as exceedances of the Project Noise Trigger Levels which remain after all feasible and reasonable source and pathway mitigation measures have been considered.

The significance of residual noise impacts, as defined in the NPfl, is shown in **Table 7**. Examples of receiver-based treatments that can be used to mitigate residual impacts are shown in **Table 8**.

Table 7 NPfl Significance of Residual Noise Impacts

If the Predicted Noise Level minus the Project Noise Trigger Level is:	And the Total Cumulative Industrial Noise Levels is:	Then the Significance of the Residual Noise Level is:
≤ 2 dBA	Not applicable	Negligible
≥ 3 but ≤ 5 dBA	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1dB	Marginal
≥ 3 but ≤ 5 dBA	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB	Moderate
> 5 dBA	≤ recommended amenity noise level	Moderate
	> recommended amenity noise level	Significant



Table 8 NPfl Examples of Receiver-based Treatments to Mitigate Residual Noise Impacts

Significance of Residual Noise Impact	Example of Potential Treatment
Negligible	The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.
Marginal	Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
Moderate	As for 'marginal', but also upgraded facade elements, such as windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels.
Significant	May include suitable commercial agreements were considered feasible and reasonable.



4.0 Assessment Methodology

4.1 Operational Noise Assessment

The potential operational noise levels from the proposal have been predicted to the surrounding receivers using the ISO 9613-2 algorithm in SoundPLAN v8.2, implemented in accordance with ISO 17534-3. This algorithm is considered suitable due to:

- The surrounding area being a complex urban environment with various buildings and structures providing shielding to the nearest receivers.
- ISO 9613 including noise-enhancing weather conditions including downwind propagation, or equivalently, propagation under a well-developed moderate ground-based temperature inversion.

The model includes ground topography, buildings and representative noise sources from the proposal.

The potential impacts have been determined by comparing the predicted noise levels to the NPfI Project Noise Trigger Levels in a 15-minute assessment period.

4.1.1 Operational Noise Sources

The concept proposal comprises of one warehouse area including two office areas, combined light and heavy vehicle street access via Gow Street, hardstand area and carparking. Parking for light vehicles are located along the northern and southern boundary of the site which is anticipated to generally be used by staff.

As the proposal is only concept design, the exact use of the building is unknown and therefore a number of assumptions have been adopted included:

- Internal noise sources are assumed to generally be associated with typical warehousing operations (i.e. forklifts, waste bins, hoists, plastic compactor, etc) and office space activities.
- It assumed all unloading would take place within the warehouse staging area as indicated on the site plan and shown in **Figure 1**.
- It is assumed there would be roof mounted mechanical plant servicing both offices.
- The use of the proposal will be limited to daytime hours only (7am to 6pm Monday to Friday).

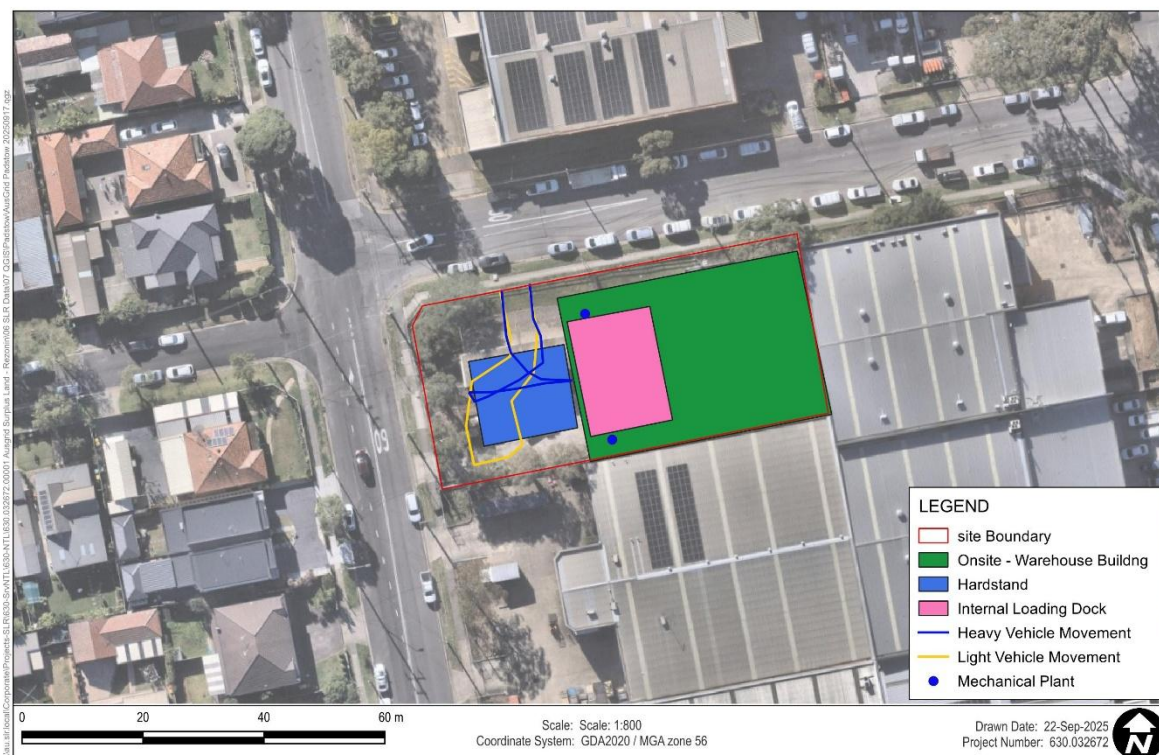
Based on the above, the main sources of operational noise at the development are expected to include:

- On-site light and heavy vehicle movements
- Loading dock activities within the internal staging area (assumed both loading dock doors will be open).
- Mechanical plant
- Off-site vehicle movements.

The location of all modelled noise sources is shown in **Figure 3**. A summary of the expected noise sources and assessment scenarios associated with the operation of the development is provided below.



Figure 3 Noise Source Locations



On-Site Traffic

On-site vehicles have been modelled based on the assumptions shown in **Table 9**. The volumes are representative of the peak 15-minute period for the daytime based on information provided.

The volumes conservatively assume that light and heavy vehicles concurrently access the site during the worst-case 15-minute assessment period.

Based on information provided, only medium ridge trucks would be accessing the proposed warehouse in conjunction with various light vehicles.

Table 9 Vehicle Traffic Data – Worst-case 15-Minute Period

Lot	Vehicle Type	Number of Vehicles in Worst-case 15-minute Period ¹		
		Daytime (7am to 6pm)	Evening (6pm to 10pm)	Night-time (10pm to 7am)
Proposal site	Heavy trucks	0	0	0
	Medium trucks	1	0	0
	Light vehicles	2	0	0

Note 1: Total vehicles, includes both inbound and outbound vehicles.



Table 10 Vehicle Sound Power Levels

Vehicle	Movement	Sound Power Level (dBA)	Vehicle Speed (km/h)
Heavy trucks	On-lot routes and hardstands	108 ¹	10
Medium trucks	On-site routes and hardstands	97 ¹	10
Light vehicles	Car park	90 ²	20

Note 1: Sound power level for large trucks based on 106 dBA for trucks at slow speed for 80% of the time and 111 dBA for trucks accelerating for 20% of the time and is representative of trucks with three or more axles. Sound power level for medium trucks based on 100 dBA for trucks at slow speed for 80% of the time and 106 dBA for trucks accelerating for 20% of the time and is representative of trucks with two axles and six tires. Sound power levels taken from the Federal Highway Administration's Traffic Noise Model.

Note 2: Sound power level based on SLR measurement data.

Hardstands and Loading Docks

Details of the hardstand and loading dock noise sources are shown in **Table 11**. Loading and unloading (fork lift activities) have been modelled to occur within in the warehouse staging area, whilst truck activities have been modelled to occur on the hardstand area as shown **Figure 3** with the roller door occurring at the façade.

Table 11 Typical Hardstand and Loading Dock Noise Sources

Noise Source	Sound Power Level (dBA) ¹	Typical Duration of Use in Worst-case 15-minute Period
Truck reversing alarm	107 ^{2,3}	30 seconds
Forklift reversing alarm	102 ^{2,3}	90 seconds
Air brakes	118	1 second
Roller door	94	15 seconds
Electric forklift	84	900 seconds

Note 1: SWLs based on measurement data, where appropriate.

Note 2: SWL based on recommendation to use broadband reversing alarms, see **Section 6.1**.

Note 3: SWL includes a -3 dB reduction due to alarms being discrete events.

Internal Activities

Exact details of the future tenants of the warehouse is unknown, however would likely be associated with typical warehousing and distribution uses. Internal noise-generating activities at all warehouses are expected to generally be minimal. A sound power level of 75 dBA has also been applied at openings in the facades of the warehouse to cover potential break-out noise from general internal activities, based on observations of loading activities at similar warehouse facilities. Warehouse roller shutter doors are assumed to be open during loading dock activities.

Mechanical Plant

The details of the potential external mechanical plant have been assumed. This information is presented in **Table 12**.



Table 12 Mechanical Plant Details

Noise Source	Sound Power Level (dBA)	Indicative Locations	Quantity
HVAC unit	80 ^{1,2}	Rooftop of warehouse building	2

Note 1: Conservatively assumed all mechanical plant to operate during daytime only.

Note 2 Indicative sound power levels used on similar projects for external mechanical plant have been modelled as no information is currently available.

Noise Sources with Potential for Sleep Disturbance

No assessment of sleep disturbance has been undertaken as operations are proposed to be limited to daytime hours only.



4.1.2 Corrections for Annoying Noise Characteristics

The potential annoying noise characteristics and modifying factor corrections relevant to the proposal are:

- **Tonality** – the only source identified with potential tonal characteristics is truck and forklift reversing alarms. However, this can be managed via implementing broadband reversing alarms, which are easily implemented hence no corrections have been applied.
- **Low frequency noise** – previous measurements of sources similar to those operating at the development indicate that no sources are expected to result in low frequency noise impacts.
- **Intermittent noise** – the NPfI defines intermittent noise as noise heard at the receiver where the level suddenly drops or increases several times during the assessment period, with a noticeable change of at least 5 dB. The intermittent correction does not apply to short-term events that emerge above the general industrial noise level and is therefore not applicable to industrial or commercial sites that have vehicle or plant movements at night, including audible reversing alarms. No sources have been identified with potential intermittent characteristics.

4.1.3 Weather Conditions

Certain weather conditions can increase noise levels by focusing noise towards receivers. Noise-enhancing weather conditions can occur where wind blows from the source to the receiver, or where temperature inversions occur.

Fact Sheet D of the NPfI requires noise assessments to consider the potential effects of noise-enhancing weather conditions, such as wind from the source to the receiver and/or temperature inversions.

The noise prediction modelling uses ISO 9613-2 algorithms which include noise-enhancing weather conditions including downwind propagation, or equivalently, propagation under a well-developed moderate ground-based temperature inversion.

As such, the assessment has conservatively applied noise-enhancing weather conditions for all periods as per Option 1 of Fact Sheet D of the NPfI.



5.0 Noise Assessment

5.1 Operational Noise

A summary of the operational noise assessment at the receivers surrounding the project is shown in **Table 13**. Noise levels have been predicted to the surrounding receivers, with the worst-case predictions presented. Noise contour maps are shown in **Appendix B**. The predicted levels are compared to the PNTLs to determine the potential impact from the project.

Table 13 Industrial Noise Assessment – NPfl

Receiver Area	Noise Level LAeq(15minute) (dBA)									Compliance
	Project Noise Trigger Level			Predicted ¹			Exceedance			
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	
Residential Receivers										
NCA01	58	48	43	55	NA ²	NA ²	-	NA	NA	Yes
Other Sensitive Receivers										
School Classrooms	45 ³	NA	NA	<30	NA	NA	-	NA	NA	Yes
Commercial	65	65	65	61	NA ²	NA ²	-	NA	NA	Yes

Note 1: Assessment considers all operational noise sources. The predicted noise levels are shown for the most-affected receiver in each area/category.

Note 2: The use of the proposed warehouse is limited to daytime hours only. Therefore no assessment of evening and night-time operations have been undertaken.

Note 3: The criteria is specified as an internal noise level for this receiver category. As the Noise model predicts an external noise level, it has been conservatively assumed that all schools have openable windows and external noise levels are 10 dB higher than the corresponding internal level, which is representative of windows being partially open.

The above assessment indicates that operational noise from the proposal is predicted to comply with the PNTLs at all surrounding receivers.

5.2 Sleep Disturbance

No assessment for sleep disturbance has been undertaken as operations are understood to be limited to daytime hours only.

6.0 Mitigation and Management Measures

6.1 Operational Management

Operational noise levels from the proposal are expected to comply with the relevant noise goals at all sensitive receivers during daytime only. As operations are only proposed to occur during daytime hours, there is no requirement to consider any specific operational mitigation or management measures.

Notwithstanding, Best Management Practice (BMP) and Best Available Technology Economically Available (BATEA) measures are provided in the NPfl (see **Appendix C**). These can be referenced and implemented by the future tenants at the site, where applicable, to minimise noise emissions as far as possible.

If operations are proposed to change once more information is known, an updated noise assessment will be required.



7.0 Conclusion

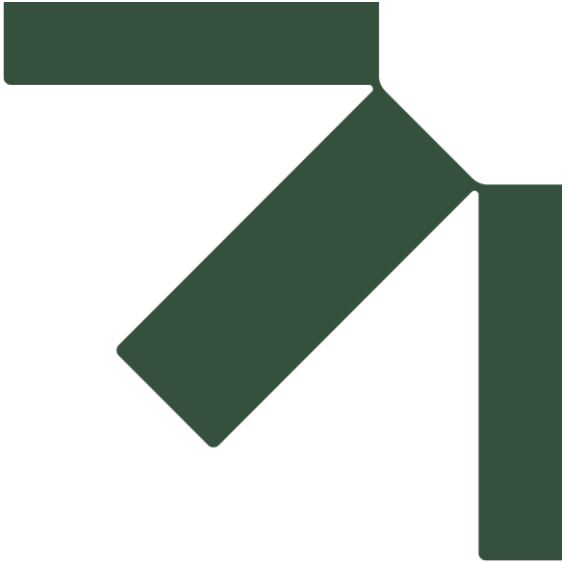
SLR has been engaged by Ausgrid to prepare a noise impact assessment of the concept proposal in support for the proposed rezoning of the site located at 48a Gibson Avenue, Padstow. The concept proposal consists of a single warehouse operating between 7am and 6pm Monday to Friday.

Operational noise emissions from the proposal have been predicted to the surrounding receivers and the levels are expected to comply with the trigger level during the daytime only. As such, there is no requirement to consider any operational mitigation or management measures for the proposal.

Based on the predicted levels, the proposed rezoning is considered appropriate from an acoustic standpoint for operation during the daytime period.

If operations are proposed to change once more information is known, an updated noise assessment will be required.





Appendix A Acoustic Terminology

Padstow Noise Impact Assessment

48a Gibson Avenue Padstow

Ausgrid

SLR Project No.: 630.032672

25 September 2025

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

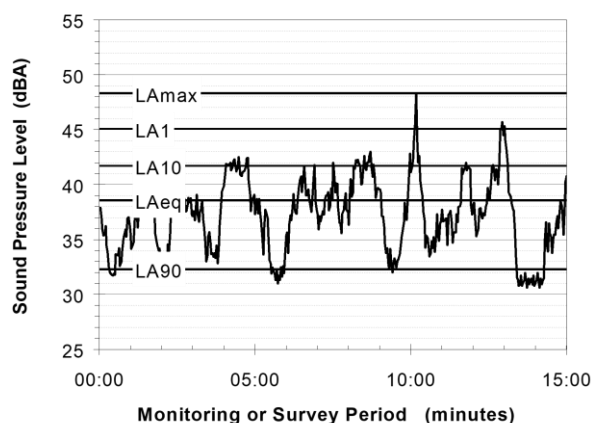
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

- LA1 The noise level exceeded for 1% of the 15 minute interval.
- LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.
- LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.
- LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
- LMax The A-weighted maximum sound pressure level of an event measured with a sound level meter.

5. Frequency Analysis

Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

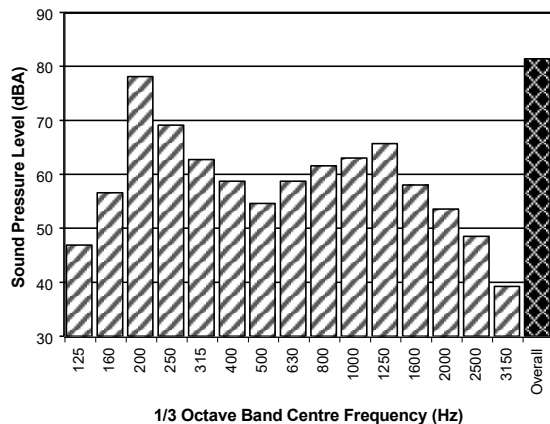
The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)



The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V , expressed in mm/s can be converted to decibels by the formula $20 \log (V/V_0)$, where V_0 is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

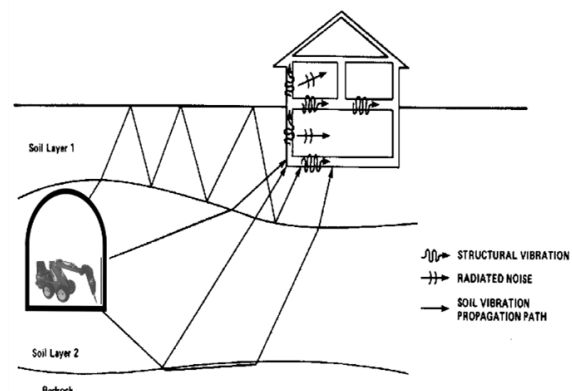
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

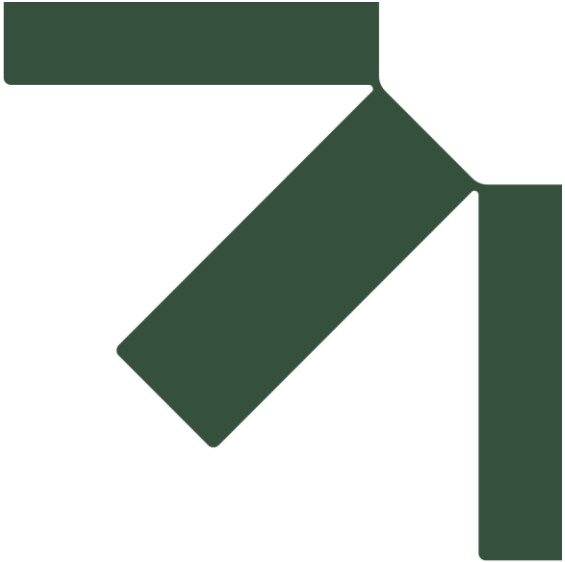
Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.





Appendix B Noise Contour Maps

Padstow Noise Impact Assessment

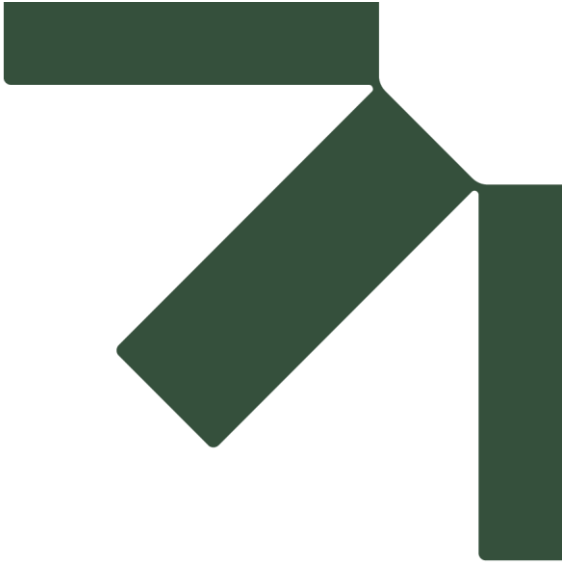
48a Gibson Avenue Padstow

Ausgrid

SLR Project No.: 630.032672

25 September 2025





Appendix C NPfI Mitigation Measures

Padstow Noise Impact Assessment

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Best Management Practice (BMP)

Best management practice (BMP) is the application of particular operational procedures that minimise noise while retaining productive efficiency.

Where applied, these measures and practices are often documented in a noise management plan so that operational practices and undertakings are clearly understood and applied at all levels of an industrial operation. Application of BMP can include the following types of practice:

- Using the quietest plant that can do the job
- Scheduling the use of noisy equipment at the least-sensitive time of day
- Not operating, or reducing operations at night
- Siting noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise
- Where there are several noisy pieces of equipment, scheduling operations so they are used separately rather than concurrently
- Keeping equipment well-maintained and operating it in a proper and efficient manner
- Using 'quiet' practices when operating equipment, for example, positioning idling trucks in appropriate areas
- Running staff-education programs and regular tool box talks on the effects of noise and the use of quiet work practices.

Best Available Technology Economically Achievable (BATEA)

With 'Best available technology economically achievable' (BATEA), equipment, plant and machinery that produce noise incorporate the most advanced and affordable technology to minimise noise output. Affordability is not necessarily determined by the price of the technology alone. Increased productivity may also result from using more advanced equipment, offsetting the initial outlay, for example, using 'quieter' equipment that can be operated over extended hours. Old or badly-designed equipment can often be a major source of noise.

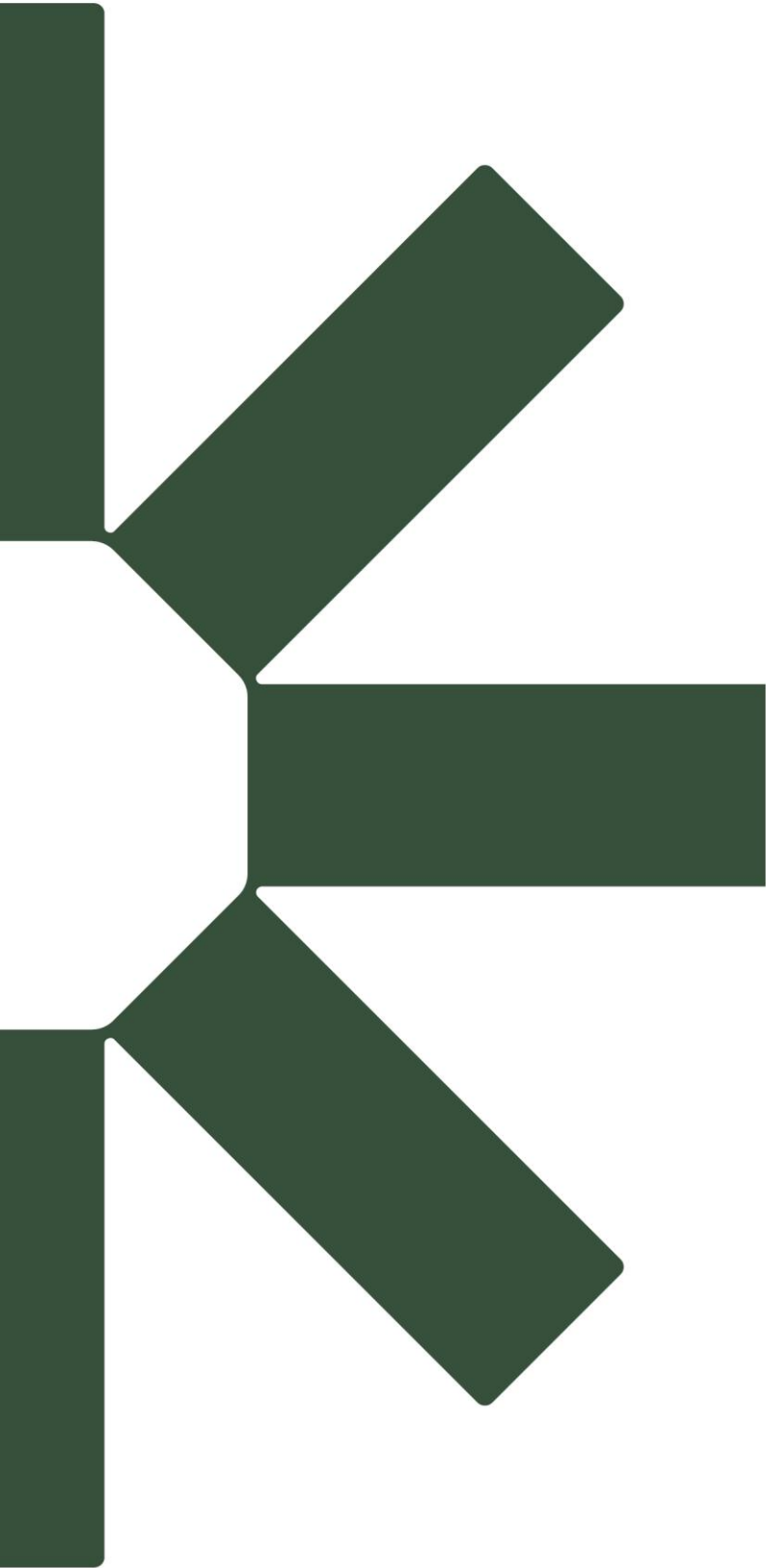
Where BMP fails to achieve the required noise reduction by itself, the BATEA approach should then be considered. Examples of uses of BATEA include:

- Considering alternatives to tonal reversing alarms (where work health and safety is appropriately considered)
- Using equipment with efficient muffler design
- Using quieter engines, such as electric instead of internal combustion
- Fitting and maintaining noise reduction packages on plant and equipment
- Using efficient enclosures for noise sources
- Damping or lining metal trays or bins
- Active noise control.

For many industries there are a wide range of factors that can restrict the feasibility and reasonableness of applying BMP or BATEA measures on a particular site. Work health and safety considerations must also be taken into account as well as any other regulatory and process requirements.







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