

Dunsbury Hill Farm – Plot 3a

Noise Impact Assessment

On behalf of **Portsmouth City Council**

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1 Introduction

1.1 Background

- 1.1.1 Peter Brett Associates LLP (PBA) has been commissioned to provide a noise impact assessment in order to support a reserve matters application for Plot 3a of a proposed commercial development at Dunsbury Hill Farm in Havant.
- 1.1.2 This report establishes the current sound climate at the site and nearest noise sensitive receptors and assesses the potential impacts from the development due to plant and operational noise from the proposed facility.

1.2 Site Location

- 1.2.1 Plot 3a is located approximately 400 m to the east of the A3 (M) junction 3.
- 1.2.2 The nearest noise sensitive receptors are located along Calshot Road, approximately 80 m to the northeast of the proposed site, and along Shepherd Way, approximately 75 m to the east of the proposed site.
- 1.2.3 An indicative site boundary and the nearest noise sensitive receptors are presented in **Figure 1** below.



Figure 1: Indicate Site Boundary and Nearest Noise Sensitive Receptors (Contains OS data © Crown Copyright and database right 2017)

1.3 Scope of Assessment

1.3.1 The objectives of the report are:

- To assess the noise impact (in general accordance with BS4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound) associated with the operation of the proposed facility at the nearest noise sensitive receptors; and
- To assess the potential impact of noise from the car park on existing noise sensitive receptors.

1.4 Acoustic Terminology

1.4.1 This report is technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in **Appendix A**.

2 Policy and Applicable Standards

2.1 Local Policy and Consultation

- 2.1.1 PBA has contacted Havant Borough Council (HBC) to discuss and agree the sound survey and assessment methodology.
- 2.1.2 It was previously agreed in 2015 that the background sound levels as determined with the noise assessment undertaken for Plot 2, would serve as a baseline for each future plot development.
- 2.1.3 It was also agreed that an assessment in general accordance with BS4142:2014 should be undertaken and the rating level from the site should be equal to the typical background sound levels when measured/calculated at 1 m from the façade of the nearest noise sensitive receptors.

2.2 National Policy

The National Planning Policy Framework (NPPF)

- 2.2.1 The NPPF was published in March 2012. In respect of noise, the document states that:
- 2.2.2 *“The planning system should contribute to and enhance the natural and local environment by ... preventing both new and existing development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of ... noise pollution.”*
- 2.2.3 The NPPF goes on to advise that:
“Planning policies and decisions should aim to:
 - Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
 - Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
 - Recognise that development will often create some noise and existing business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
 - Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”
- 2.2.4 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the *“significant adverse impacts”*.

Noise Policy Statement for England (NPSE)

- 2.2.5 The Noise Policy Statement for England was published in March 2010. The document seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long term vision of Government noise policy:
- 2.2.6 *“To promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”*

- 2.2.7 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.
- 2.2.8 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:
- NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
 - LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
- 2.2.9 The NPSE extends these to the concept of a significant observed adverse effect level.
- SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.
- 2.2.10 The NPSE notes *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times"*.

Planning Practice Guidance - Noise (2014)

- 2.2.11 Government's Planning Practice Guidance on noise (PPG) provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.
- 2.2.12 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
- 2.2.13 The LOAEL is described in PPG as the level above which "noise starts to cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."
- 2.2.14 PPG identifies the SOAEL as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

2.3 BS4142:2014 Methods for rating and assessing industrial and commercial sound

- 2.3.1 BS4142: 2014 *'Methods for rating and assessing industrial and commercial sound'* (BS4142) describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

- 2.3.2 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However, the determination of noise amounting to a nuisance is beyond the scope of the standard.
- 2.3.3 The standard should not be used to assess sound from the passage of vehicles on public roads and railway systems; recreational activities; music and other entertainment; shooting grounds; construction and demolition; domestic animals; people; public address systems for speech and other sources falling within the scopes of other standards or guidance. The standard cannot be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.
- 2.3.4 The procedure contained in BS4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur.
- 2.3.5 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:
- Typically, the greater this difference, the greater the magnitude of the impact;
 - A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 2.3.6 Where the initial estimate of the impact needs to be modified due to the context, the following factors should be considered:
- The absolute level of sound;
 - The character and level of the residual sound compared to the character and level of the specific sound; and
 - The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:
 - Façade insulation treatment;
 - Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 - Acoustic screening.

2.4 Effect of Changes in Noise Levels (Car Park)

- 2.4.1 The magnitude of impact from the resultant change in noise level due to vehicles arriving and departing the proposed site has been assessed using the Effect of Changes in Noise Levels table below. Advice from the Design Manual for Roads and Bridges and IEMA's Guidelines on Noise Impact Assessments has been used in order to produce the guidance contained in **Table 2.1**.

Table 2.1: Effect of Changes in Sound Levels Due to Noise

Change in Sound Level (dB)	Magnitude of Impact	Perception from Increase
0	No Change	Not Noticeable
0.1 - 2.9	Negligible	Noticeable and not intrusive
3 - 4.9	Minor	Noticeable and intrusive
5 - 9.9	Moderate	Noticeable and disruptive
10+	Major	Noticeable and very disruptive

3 Project Proposals

3.1 Proposed Operation

- 3.1.1 The proposal is for a workshop for servicing, repairing and MOT testing of commercial vehicles.
- 3.1.2 Ancillary sales of commercial vehicles would also occur from the front of the plot.
- 3.1.3 The following is also proposed:
- The hours of operations would be
 - Monday – Friday: from 07:15 hours to 18:15 hours; and
 - Saturday: from 08:00 to 13:00 hours.
 - Most vehicle trips to site will be within the hours of operation only and will consists of cars and commercial vehicles; and
 - There would be one delivery of parts per night.

3.2 Proposed Plant

- 3.2.1 The plant assessed as part of the development proposals are:
- A Karcher Power Washer HD 6/12-4 C Plus, located externally, using the space at the rear of the building on the eastern boundary of the plot; and
 - A HPC Aircenter 12 Compressor and Drier Package, located internally in the southeastern corner of the workshop.

3.3 Plant Details

- 3.3.1 Table 3.1 details the preliminary specification for the proposed plant.

Table 3.1: Preliminary Plant Specification

Plant Item	Number of Units	Location	Sound Pressure Level at 1 m* (dBA)
Power Washer	1	External	74
Compressor & Dryer Package	1	Internal	65

* When measured at any point around the plant item

4 Baseline Environmental Sound Survey

4.1 Methodology

- 4.1.1 The environmental sound climate around the site was measured by PBA in 2015 as part of the planning application for Plot 2 (Plot 2, Dunsbury Hill Farm Havant, Environmental Sound Survey and Plant Noise Impact Assessment project ref 35226 Rev1, dated 28 October 2015).
- 4.1.2 As agreed with HBC, the environmental sound survey undertaken in 2015 has been used for this assessment.
- 4.1.3 Full details of the sound survey can be found in the aforementioned report.
- 4.1.4 The typical background sound levels measured at locations representative of noise sensitive receptors pertaining to this current application are presented in **Table 4.1**.

Table 4.1 Typical Background Sound Levels at Nearest Noise Sensitive Receptors

Period	Background Sound Level $L_{A90,15min}$, dB
Daytime (07:00 hours – 23:00 hours)	46
Night-time (23:00 hours – 07:00 hours)	34

- 4.1.5 For the purpose of this assessment, the background noise levels presented in the table above have been used at all noise sensitive receptors.

5 Plant and Delivery Noise Impact Assessment

5.1 Proposed Site Layout & Building Envelope Construction

Proposed Site Layout

- 5.1.1 The assessment has been based on the latest masterplan '3A – Site Plan Drawing Number 10003 rev P02 dated January 2018' and on elevation plan '3A – Elevations 2 of 2 Drawing Number 12004 rev P4 dated March 2018'.
- 5.1.2 Based on a review of the plans the assessment considers the warehouse building located 85 m from the nearest noise sensitive receptor and the car wash area located 80 m from the nearest noise sensitive receptor. Deliveries to the site will typically occur towards the southern part of the warehouse, approximately 100 m from the nearest noise sensitive receptors.

Building Envelope Construction

- 5.1.3 It is understood the building envelope of the proposed workshop is to comprise:
- Insulated steel wall panels with a typical sound insulation performance of R_w 24 dB;
 - Insulated steel roof panels with a typical sound insulation performance of R_w 25 dB; and
 - Roller shutters with a typical sound insulation performance R_w of 16 dB.

5.2 Assessment Assumptions

- 5.2.1 The following has been assumed for the plant noise assessment:
- There will be a single Karcher Power Washer used at the rear of the building on the eastern boundary of the plot;
 - There will be a single HPC Aircenter 12 Compressor and Drier Package used inside the workshop;
 - The plant will only be operational during the daytime;
 - There will be a single delivery of parts to the site during the night-time period; and
 - A 3 m high acoustic barrier is proposed on the eastern boundary of the site.

5.3 Calculation Procedure

- 5.3.1 Calculations have been undertaken in general accordance with BS4142:2014 and ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'.
- 5.3.2 Each plant has been considered as a separate sound source with distance, acoustic feature corrections and screening losses considered for each unit. Contributions from each unit have then been combined at the nearest noise sensitive receptor to establish the specific sound level.

5.4 Calculation of Screening Attenuation

- 5.4.1 A 3 m high acoustic barrier is proposed along the eastern boundary of the site, which would provide line of sight screening to operations on site from the nearest noise sensitive receptors.

5.5 Acoustic Feature Corrections

- 5.5.1 It is not known whether the sound emitted by the proposed internal plant item (HPC Aircenter 12 Compressor and Drier Package) is likely to have any specific feature corrections. However, it is considered possible that the compressor may exhibit impulsive acoustic characteristics. A feature correction of +6dB has therefore been applied to the calculated specific level.
- 5.5.2 Whilst not exhibiting tonal characteristics the proposed jet washer is likely to be distinctive against the residual acoustic environment and have impulsive characteristics. A total penalty of +9 dB has therefore been applied.
- 5.5.3 An acoustic feature correction of 9dB has been applied to the delivery reversing alarm to account for its tonality.

5.6 Assessment Results

- 5.6.1 **Table 5.1** details a summary of the assessment for each noise source and the cumulative impact at the nearest receptor. The assessment considers sound levels during a 1-hour assessment period with all plant noise operational during the daytime and during a 15-minute assessment period during the night-time.

Table 5.1: BS4142 Assessment Summary

Noise Source	Daytime (T = 1hour)	Night-time (T = 15 minutes)
Calculated Rating Level Internal Plant and Operations ($L_{Aeq,T}$), dB	21	N/A
Calculated Rating Level External Operations and Deliveries ($L_{Aeq,T}$), dB	40	32*
Calculated Cumulative Rating Level ($L_{Ar,T}$), dB	40	32
Background Sound Level (L_{A90}), dB	46	34
Difference between Rating Level and Background Sound Level, dB	-6	-2
Assessment of Impact	Indication of a low impact, depending on the context	Indication of a low impact, depending on the context

*Delivery only

- 5.6.2 The numerical assessment indicates that the level of impact is likely to be below the agreed LOAEL at the most affected receptor (an indication of a low impact, depending on context) during both the daytime and the night-time.

5.7 Context and Mitigation Factors

- 5.7.1 It is important to recognise context in the assessment of the likely noise impact on the proposed development site arising from the operation of the gas fired peaking plant.

- 5.7.2 The following factors should be taken into consideration:

- The absolute sound level;
- The character and level of the residual and specific sound levels; and
- The sensitivity of the receptor and use of mitigation measures.

Absolute Sound Levels

- 5.7.3 The calculated specific sound level at the worst affected façade of existing noise sensitive receptors, falls below the relevant criteria in World Health Organisation and BS8233 guidelines with respect to noise levels in external amenity areas.

Character and Level of Residual and Specific Sound Levels

- 5.7.4 Calculations show that the residual sound levels are generally higher than the calculated specific sound levels.
- 5.7.5 It should also be noted that Plot 3A is part of the bigger industrial estate. As such it is considered that the occupants are likely to exhibit a degree of acceptance with respect to any audible sound from the proposed facility.

Receptor Sensitivity

- 5.7.6 It should be recognised that the vast majority of activities on site would occur during the daytime working hours. As such, nearby residents are likely to be less affected during the more sensitive evening and night-time periods.

5.8 Uncertainty

- 5.8.1 Care has been taken to reduce uncertainty as far as reasonably possible. However, it should be recognised that in any environmental sound survey and assessment process uncertainty exists.
- 5.8.2 Whilst considered representative, the background sound levels on which this assessment is based have been derived from surveys undertaken in 2015. There is a therefore degree of uncertainty inherent in the baseline environmental sound data.

5.9 Summary

- 5.9.1 The effect that the proposed development will have on the existing background noise levels has been calculated in general accordance with BS4142:2014. The noise impacts at the nearest sensitive receptors have been calculated by comparing the existing background sound levels, with the relevant calculated future rating level.

- 5.9.2 Acoustic feature corrections have been applied where sound sources are judged to be discernible from the background sound climate at the noise sensitive receptors.
- 5.9.3 The proposed noise barrier has been included in the assessment.
- 5.9.4 Considering the preliminary results of the assessment and the context detailed above, the proposed use of the site should be considered acceptable, in relation to noise.

6 Car Park Noise Impact Assessment

6.1 Assessment Methodology

- 6.1.1 The potential noise impact associated with the use of the proposed car park relates to changes in ambient noise levels due to additional vehicle movements and activities (i.e. door slams and switching engines on) during the operation of the proposed new car park.
- 6.1.2 The assessment calculates the change in ambient noise levels due to the sound levels generated by the proposed car park during peak hours at the nearest sensitive residential receptors.
- 6.1.3 Measurements of car movements associated with a typical car park have previously been undertaken. Activities measured included:
- Car driving in, manoeuvring and stopping including occupant exiting the car and door slam; and
 - Occupant getting in car, slamming door, manoeuvring and driving away.
- 6.1.4 The car surveyed was a Volvo V40 hatchback considered to be representative of a typical car.
- 6.1.5 The likely noise impact of the car park operations has been assessed based on car arrival (including door slam) and car departure (including door slam). Sound levels used in the assessment are provided in **Table 6.1**.

Table 6.1: Typical Sound Level Associated with Car Park Activity

Source Activity	L _{AE} at 3 m (dB)	L _{Amax} at 3 m (dB)
Car driving in, manoeuvring and stopping including occupant exiting the car and door slam	74	73
Occupant getting in car, slamming door, manoeuvring and driving away	77	74

6.2 Trip Generation

- 6.2.1 As a worst-case scenario, we have assumed that the predicted 27 staff would all leave by car during the same 1-hour assessment period.

6.3 Ambient Sound Levels (L_{Aeq}, 1hour)

- 6.3.1 The 1-hour ambient sound level during the identified peak period has been derived from the levels measured during the 2015 survey.
- 6.3.2 Distance attenuation has been applied to the levels measured at the survey location along the A3 (M).
- 6.3.3 The calculated ambient sound levels at the nearest noise sensitive receptors are presented in **Table 6.2** below.

Table 6.2: Calculated Ambient Sound Level

Measured Ambient Sound Level (dB $L_{Aeq,1hour}$) along the A3 (M)	Calculated Ambient Sound Level (dB $L_{Aeq,1hour}$) at Nearest Noise Sensitive Receptor
51	46

6.4 Noise Impact Assessment

- 6.4.1 **Table 6.3** details the calculated sound level at the nearest noise sensitive receptor due to the operation of the car park and the subsequent change in ambient sound level as a result of the operations.

Table 6.3: Car Park Noise Impact Assessment Summary

Calculation Description	Sound Level (dB)
Calculated Ambient Sound Level during Peak Hour ($L_{Aeq,1hr}$)	46
Calculated Sound Level (Car Park Only) ($L_{Aeq,1hr}$)	27
Cumulative Ambient Sound Level at Receptor ($L_{Aeq,1hr}$)	46
Change in Ambient Sound Level during Peak Hour ($L_{Aeq,1hr}$)	0

- 6.4.2 The results indicate that no change in ambient sound levels at nearby receptors due to the car park operations are anticipated. No specific mitigation measures are therefore considered necessary.

7 Conclusion

- 7.1.1 Peter Brett Associates (PBA) has been commissioned in order to support a reserve matters application for Plot 3a of a proposed commercial development at Dunsbury Hill Farm in Havant.
- 7.1.2 The results of the environmental sound climate surveys undertaken around the site in 2015 have formed the basis of the assessment.
- 7.1.3 An assessment in general accordance with BS4142:2014 has been undertaken to determine the likely impact associated with the proposed plant and delivery activities at the nearest noise sensitive receptors. Calculations indicate that the level of impact is likely to be below the agreed LOAEL and would be an indication of having a low impact.
- 7.1.4 An assessment of the potential change in sound level due to the operation of the new car park has been undertaken. Calculations indicate that the change in noise levels at the worst affected noise sensitive receptors would lead to no change in ambient noise levels and no mitigation measures are deemed necessary.
- 7.1.5 The assessment has confirmed that the noise impacts due to the development are not likely to be significant at the nearby dwellings and the operation of the development is acceptable from a noise perspective.

Appendix A Glossary of Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Daytime	The period 07:00-23:00 hours.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20 \mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, which determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
Insertion Loss	Insertion loss is the difference in sound pressure level at a single fixed position before and after a noise control element (e.g. enclosure, barrier etc) is installed.
L_{AE} or SEL	A noise level which, if maintained for a period of 1 second, would cause the same A-weighted sound energy to be received as is actually received from a given noise event.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on

	the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A – weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$ or Background Noise Level	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
LOAEL	Lowest Observed Adverse Effect Level. This is the noise level above which adverse effects on health and quality of life can be detected.
Night-time	The period 23:00-07:00 hours.
NOEL	No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
Noise Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Rating Noise Level	The specific noise source plus any adjustment for the characteristic features of the noise, denoted by $L_{Ar,T}$.
SOAEL	Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level, L_p	The sound pressure level, L_p is the sound pressure relative to a standard reference pressure of 20 μPa (20×10^{-6} Pascals) on a decibel scale.
Specific Noise Level	The noise source under investigation for assessing the likelihood of complaints, measured as and $L_{Aeq,T}$