



Change of use to the repair and maintenance of heavy goods vehicles, including ancillary vehicle parking

South Western Part of Existing Workshop Building, Pen y Bont Works,
Pentre, Chirk, LL14 5AW

Planning Application Ref: P/2021/1101

R22.1702-3-AG

Noise Impact Assessment



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EXECUTIVE SUMMARY

Spire Environmental Consultants Limited have been appointed by Caulmert on behalf of FCC Environment to undertake an environmental noise assessment for the change of use to the repair and maintenance of heavy goods vehicles, including ancillary vehicle parking, on the south western part of the Existing Workshop Building at Pen y Bont Works, Pentre, Chirk, LL14 5AW.

The existing noise environment is influenced by distant road traffic noise from the A483, local vehicle movements from Border Tachograph and maintenance operations at the FCC site and bird song. The assessment has considered the noise impact of combined operations taking place at the proposed site.

A baseline noise survey was undertaken in the car park of the Pen y Bont works, which is representative of the closest residential receptor to the site. The sound exposure levels of specific activities were calculated and were incorporated in the report and assessed against BS 4142:2014 + A1:2019.

The BS 4142:2014 + A1:2019 assessment is below the adverse impact level at the closest residential receptors to the site.

Predicted internal noise levels at the closest existing residential receptors are well below the specified limit in accordance with BS 8233.

There is no reason why, on the grounds of noise, planning permission should not be granted for the proposed change of use.

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1. INTRODUCTION

Appointment & Background

- 1.1 Spire Environmental Consultants Limited have been appointed by Caulmert on behalf of FCC Environment to undertake an environmental noise assessment of a change of use of part of an existing workshop building to HGV repair and maintenance operations at the FCC Environment Pen y Bont site.
- 1.2 The noise assessment has included the operation of the tools and equipment used during HGV repair and maintenance operations, along with associated HGV movements.
- 1.3 Background noise monitoring was conducted in the FCC Environment car park, at a location representative of the closest noise sensitive residential property to the site.
- 1.4 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Setting

- 1.5 The north western (rear) boundary of the workshop buildings are bounded by an existing woodland area. To the north east, the proposed units are bounded by the existing units occupied by Border Tachograph. To the south east (front) there is an existing concrete area, which is to be used as an HGV parking and turning. To the south west is an existing open canopy area and a detached residential property. Further residential properties are located at Pen y Bont Terrace to the south west.

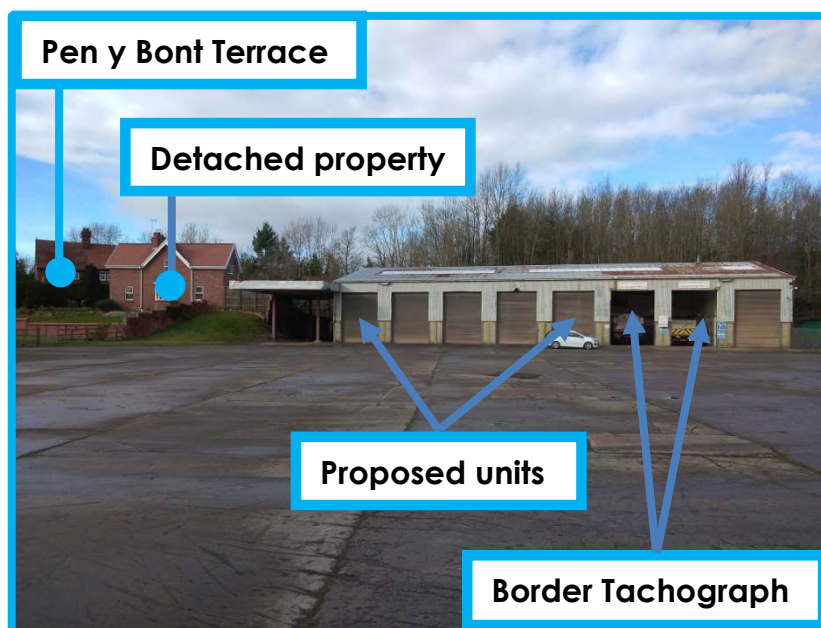


Figure 1: Site setting

Noise Sensitive Receptors

- 1.6 The closest noise sensitive receptor (NSRs) are shown in **Table 1** (below). They include the closest residential receptor, which is a detached dwelling to the south west of the existing workshop building. Further to the south west of the existing workshop building are the residential properties at Pen y Bont Terrace.
- 1.7 The grid references of the closest residential receptors are shown in **Table 1** (below).

NSR Number	Description	Grid Co-ordinates		Bearing from site
		Easting	Northing	
NSR 1	Detached property	329162	341440	SW
NSR 2	Pen y Bont Terrace	329138	341443	SW

Table 1: Noise Sensitive Receptors

Site Operations

- 1.8 The proposed site operations, to be conducted at the Pen y Bont site, as identified by the proposed occupiers of the workshop buildings . These are detailed below:
- HGV air jacks
 - Wheel and tyre changing
 - Tyre inflating
 - Metal fabrication – Cutting/grinding, folding, welding, and hammering metal
 - Battery operated hand tools – drill/driver
 - HGV movements 7 in and 7 out (total 14 per day)
- 1.9 The noise predictions are shown in **Appendix C & D**.

2. STANDARDS AND GUIDANCE

Planning Guidance (Wales)

- 2.1 The Planning Policy Wales (PPW), includes details of the land use policies implemented by the Welsh Government. The latest version of this document is Edition 11 dated February 2021. This document is supplemented by a series of Technical Advice Notes (TANs). The relevant TAN for this project is TAN 11 – Noise.

Technical Advice Note (TAN) 11 - Noise

- 2.2 In accordance with TAN 11, the relevant noise criteria are specified below:
- a) Noise levels arising from day/night-time activities in the vicinity of the proposed development site and the impact upon nearby residential properties, and
 - b) A detailed scheme of noise insulation and / or attenuation measures so designed to safeguard the amenity of nearby residential properties.

BS 4142: 2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

- 2.3 This standard describes methods for rating and assessing the following:
- Sound from industrial and manufacturing processes.
 - Sound from fixed installations which comprise mechanical and electrical plant and equipment.
 - Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.
- 2.4 The methods 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. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

- 2.5 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,T}$). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.
- 2.6 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.
- 2.7 Comparing the rating level with the background sound level, BS 4142 states:

"Typically, the greater this difference, the greater the magnitude of 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.

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."

- 2.8 BS 4142 states that where the initial impact needs to be modified due to the context, consideration should be given following.
- Absolute level of sound.
 - Character of the residual and specific sound; and,
 - Sensitivity of the receptor.

- 2.9 The overall impact may be modified when the above factors are considered.

BS 8233:2014: Guidance On Sound Insulation And Noise Reduction For Buildings

- 2.10 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

- 2.11 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 8** below:

Table 3: Summary of internal ambient noise levels to be achieved in habitable rooms

Activity	Location	Internal noise level criteria (L _{Aeq,T} dB)	
		Daytime (07:00 –23:00 hrs)	Night-time (23:00 –07:00 hrs)
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30

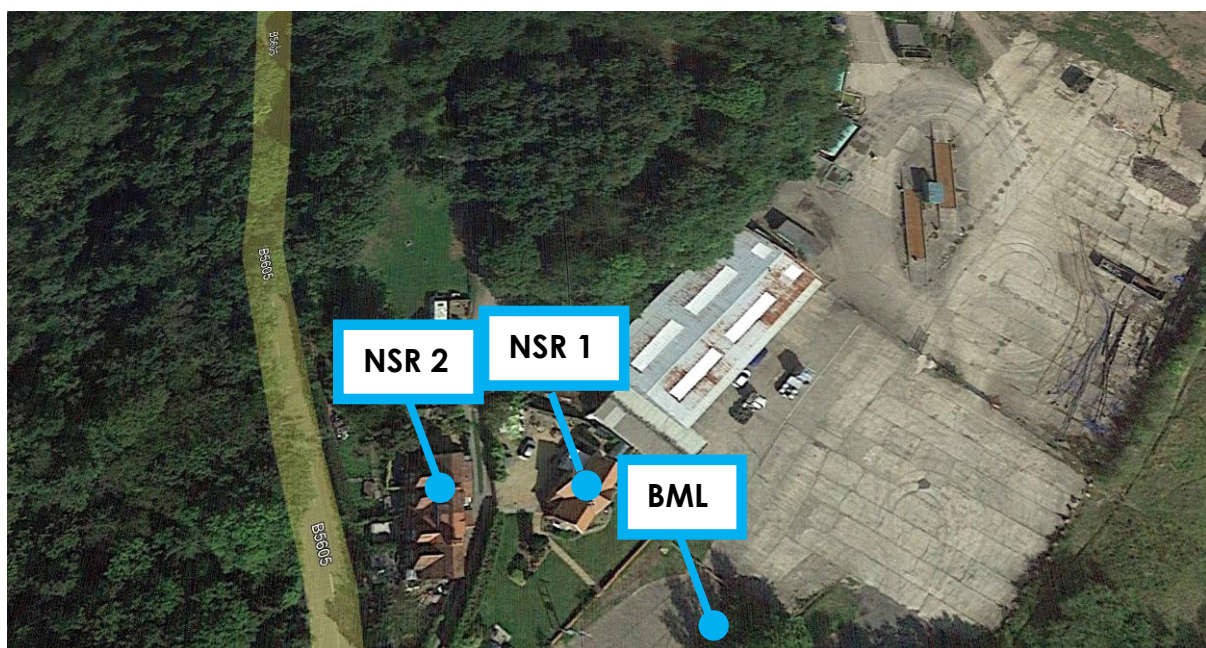
- 2.12 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L_AF_{max} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise*.
- 2.13 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the noise level does not exceed 50 dB L_{Aeq,T}, with an upper guideline value of 55 dB L_{Aeq,T} which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

3. BASELINE NOISE SURVEY

Baseline Survey Methodology

- 3.1 A Baseline noise survey has been undertaken to determine the prevailing noise climate at the closest residential receptor to the site. During the survey period, monitoring was undertaken in the Pen y Bont Works car park for a continuous 7-day period. The monitoring location is shown in **Figure 2** (below).

Figure 2: Baseline Monitoring Location & Noise Sensitive Receptors



- 3.2 At the BML, environmental noise monitoring was conducted in car park of the Pen y Bont works, in a free-field location, using a tripod mounted sound level meter at a height of 1.2m from the ground. This location is representative of the noise climate at NSRs 1 & 2.

Measurement Equipment

- 3.3 The noise survey was undertaken using Class 1 sound level meters. A calibration check was undertaken prior to and upon completion of the surveys. No significant calibration drift was found to have occurred. All laboratory calibration (biennial for the sound level meter and annual for the calibrator) was up-to-date at the time. The equipment used for the survey is summarised in **Table 4** below.

Table 4: Noise monitoring equipment

Equipment	Manufacturer	Serial Number	Calibration due Date
Sound Level Meter		G061905	26 April 2023
Acoustic Calibrator		64316	28 Nov 2022

Meteorological Conditions

- 3.4 Representative weather conditions obtained from Liverpool John Lennon Airport for the survey period are shown in **Table 5** (below).

Date	Temperature °C	Wind speed (m/s)	Wind direction	Precipitation
Monday 7 th February 2022	3.9 – 12.8	0.9 – 9.8	SW	None
Tuesday 8 th February 2022	11.1 – 12.8	7.2 – 11.2	SW	Light rain
Wednesday 9 th February 2022	6.1 – 12.2	1.3 – 9.4	SW	Light rain
Thursday 10 th February 2022	3.9 – 7.8	3.6 – 11.6	Variable	Light rain
Friday 11 th February 2022	2.2 – 7.8	1.3 – 8.9	Variable	None
Saturday 12 th February 2022	6.1 – 8.9	3.1 – 10.7	SE	Light rain
Sunday 13 th February 2022	7.8 – 10.0	2.7 – 11.6	SE/SW	Light rain
Monday 14 th February 2022	6.1 – 7.2	5.8 – 9.8	W	Light rain

Table 5 – Weather conditions during the survey periods

- 3.5 During the survey periods, the temperature was between 2.2 and 12.8 °C. The wind speed was between 0.9 and 11.6 m/s. The wind direction was predominantly from the south west and south east. There was light rain for six days during the survey period.

Operational hours

- 3.6 The proposed operating hours are as follows:

Monday – Friday 07:30 – 18:30 hours
Saturday – 07:30 – 13:30 hours
Sunday & Bank Holiday No site activity

Measured baseline levels (BML)

- 3.7 The baseline sound levels were measured in the Pen y Bont Works car park for a continuous 7-day period. Summaries of the results during the proposed operational hours are shown in in **Table 6** (below). The full results are shown in **Appendix B**.

Survey Period	dB L _{Aeq,1h}	dB L _{A90,1h}	*dB L _{Amax,f,1h}
Monday 7 th February 2022	41.7 – 53.7	39.2 – 40.8	59.8 – 80.2
Tuesday 8 th February 2022	43.6 – 54.6	39.0 – 49.2	62.5 – 81.8
Wednesday 9 th February 2022	41.0 – 52.3	36.1 – 38.7	68.1 – 75.0
Thursday 10 th February 2022	41.2 – 52.9	37.6 – 39.4	67.8 – 83.9
Friday 11 th February 2022	43.5 – 53.5	38.9 – 46.3	56.4 – 75.5
Saturday 12 th February 2022	48.4 – 52.5	43.7 – 46.2	67.2 – 79.7
Sunday 13 th February 2022	-	-	-

*Maximum obtained over survey period

Table 6 BML noise levels closest residential property during proposed operational hours

- 3.8 At the BML, the existing measured ambient noise level during the proposed operational hours was between 41.0 and 54.6 L_{Aeq,1h}. The corresponding background sound level was between 36.1 and 49.2 L_{A90,1h}. The lowest typical background sound level was 39.0 L_{A90,1h}, as this was recorded as the lowest background sound level on three of the six days of the survey period.
- 3.9 The noise climate at the BML was influenced by distant road traffic noise from the A483 to the east, bird song and local HGV movements from the Border Tachograph premises operations within the existing workshop building

4. NOISE ASSESSMENT

- 4.1 The noise assessment has considered the cumulative noise impact of wheel and tyre changing and metal fabrication operations which are to take place inside the former workshop building and HGV movements which are to take place in the existing hardstanding area outside this building. These operations have been predicted to the closest noise sensitive residential receptors, which are located to the south west.
- 4.2 Short-term noise measurements were taken of specific activities, which are to be undertaken during HGV repair and maintenance operations. These were measured at Selecta a Tyre Buxton and Gould Alloys, Chesterfield which undertake similar operations to those now proposed at Pen y Bont. The worst-case noise levels during site activities has been predicted at the closest residential properties. These are shown in **Appendix C** and summarised in **Tables 8 – 10** (below).

Description	Closest residential property	Pen-y-Bont Terrace
Wheel & tyre changing combined operations	39	34
Acoustic correction	-	-
Rating Level	39	34
Background sound level	39	39
Excess over background	0	- 5
BS 4142 impact	Below Adverse	Low impact

Table 8 – Wheel & Tyre Changing BS 4142 Assessment

- 4.3 The BS 4142 assessment shown in **Table 8**, shows the cumulative noise impact during wheel & tyre changing operations. The noise calculations are shown in **Appendix C**.
- 4.4 An acoustic character correction has not been applied, as the proposed wheel and tyre changing operations will not be out of character with the noise sources associated with the activities conducted by Border Tachograph.
- 4.5 At the closest residential property, the rating level is equal to the background sound level. The BS 4142 assessment is well below the adverse impact level of + 5 dB.
- 4.6 The BS 4142 assessment at Pen y Bont Terrace during wheel and tyre changing operations is below the exiting background sound level. Therefore, this is indicative of a low impact.

Description	Closest residential property	Pen-y-Bont Terrace
Metal fabrication operations	36	34
Acoustic correction	+3	+3
Rating Level	39	37
Background sound level	39	39
Excess over background	0	- 2
BS 4142 impact	Below Adverse	Low impact

Table 9 – Metal Fabrication BS 4142 Assessment

- 4.7 The BS 4142 assessment shown in **Table 9**, shows the cumulative noise impact during metal fabrication operations. The noise calculations are shown in **Appendix C**.
- 4.8 An acoustic character correction of + 3dB has been applied for metal hammering. Although this will be taking place within a building, the shutter door may be open, so it will be just perceptible at the closest noise sensitive receptors.
- 4.9 At the closest residential property, the rating level is equal to the background sound level. The BS 4142 assessment is well below the adverse impact level of + 5 dB.
- 4.10 The BS 4142 assessment at Pen y Bont Terrace during metal fabrication operations is below the existing background sound level. Therefore, this is indicative of a low impact.

Description	Closest residential property	Pen-y-Bont Terrace
HGV movements	33	31
Acoustic correction	-	-
Rating Level	33	31
Background sound level	39	39
Excess over background	- 6	- 8
BS 4142 impact	Low Impact	Low impact

Table 10 – HGV movements BS 4142 Assessment

- 4.11 The BS 4142 assessment shown in **Table 10**, shows the noise impact of HGV movements. The noise calculations are shown in **Appendix C**.
- 4.12 An acoustic character correction has not been applied, as HGV movements are already taking place at Border Tachograph.
- 4.13 At the closest residential property, the rating level is below the background sound level. The BS 4142 assessment is indicative of a low impact.
- 4.14 The BS 4142 assessment at Pen y Bont Terrace during HGV movements is below the exiting background sound level. Therefore, this is indicative of a low impact.

- 4.15 Internal predicted noise levels inside the closest residential properties are shown in **Table 11** (below). The predicted internal levels have taken into account the 15 dB attenuation from a half-open window.

Description	Closest residential property	Pen-y-Bont Terrace
Predicted external noise level	39 $L_{Aeq,T}$	34 $L_{Aeq,T}$
Half-open window attenuation	-15	-15
Predicted internal noise level	23 $L_{Aeq,T}$	19 $L_{Aeq,T}$

Table 11 – BS 8233 Assessment

- 4.16 The worst-case predicted external noise levels are 39 $L_{Aeq,T}$ the closest residential property and 34 $L_{Aeq,T}$ at Pen y Bont Terrace. When taking account -15 dB for a half-open window, the predicted internal levels are 23 $L_{Aeq,T}$ the closest residential property and 19 $L_{Aeq,T}$ at Pen y Bont Terrace. These predicted noise levels are well below the lowest daytime noise level of 35 $L_{Aeq,T}$ specified in BS 8233.

5. MEASUREMENT UNCERTAINTY

- 5.1 As part of this updated noise assessment, we have considered the potential uncertainties in the noise measurements undertaken. These are discussed below.

Background Noise Assessment

- 5.2 Background noise levels were taken for a continuous 7-day period. During the survey period, the B5605 road from Pentre to Newbridge which runs to the west of the site was closed to through traffic due to a landslip. We have been advised by FCC, this was a well-used commuter route, with significant volumes of traffic using this road, particularly at peak times.
- 5.3 The NSRs are located in close proximity to the B5605. NSR 1 is 35m and NSR 2 is located approximately 12m from the carriageway edge. The existing background sound levels are therefore likely to be reduced by between 1 and 3 dB(A) as a result of the road closure.

Predicted Noise Levels

- 5.4 Short-term noise measurements were taken of specific activities using equipment representative of specific operations. The wheel & tyre changing, and metal fabrication activities will be conducted inside a building. The noise predictions have assumed these will be taking place with the shutter doors open. However, these may be conducted with the shutter doors closed, increasing the attenuation provided by the building. The overall predicted noise levels of these activities has therefore increased by around 1 dB(A)
- 5.5 The on-times of each activity are based on the amount of time taken to perform each activity and the anticipated number of HGVs undergoing activity per day. If each of these activities were increased by 50%, this could result in a 3dB(A) increase in the predicted noise levels at the closest residential properties.

Uncertainty Conclusions

- 5.6 When taking all of the factors into consideration, there is an overall increase in the predicted noise levels of 1 dB(A). In the BS 4142 assessment, the overall rating levels remain the same. The BS 8233 assessment is still below the lowest daytime internal noise limit.

6. CONCLUSIONS

- 6.1 Spire Environmental Consultants Limited has been appointed by Caulmert on behalf of FCC Environment to undertake an environmental noise assessment of the repair and maintenance of heavy goods vehicles at the Pen y Bont Works.
- 6.2 The noise assessment has included the combined operations during wheel and tyre changing and metal fabrication operations. HGV movements were also included in the noise predictions.
- 6.3 Baseline noise monitoring was undertaken at a location representative of the closest noise sensitive receptor to the site. The survey, and subsequent assessment work, have been undertaken in accordance with current standards and guidance.
- 6.4 Specific noise levels of proposed site activities were measured at Select a Tyre, Buxton and Gould Alloys, Chesterfield which undertake similar operations to those now proposed at Pen y Bont. These were used to predict the noise levels to the closest noise sensitive residential properties.
- 6.5 A detailed noise assessment has been undertaken to determine the likely noise impact of the proposed heavy goods vehicle repair and maintenance operations at the closest residential receptors. The Rating Level is below the existing background sound levels; therefore, the BS 4142 indicates site operations will have a low impact at the closest noise sensitive receptors.
- 6.6 The predicted internal noise levels at the closest noise sensitive receptors, are well below the lowest daytime noise limit in BS 8233.
- 6.7 When considering the measurement uncertainty, there would be an increase of 1 dB(A) in the predicted noise levels from site activities. However, this does not result in a change in the conclusions of the BS 4142 and BS 8233 assessments.
- 6.8 There is no reason why, on the grounds of noise, planning permission should not be granted for the proposed change of use.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, 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} and L_{90}	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX B: Measured Noise Levels

Table B1: Results from BML – Pen y Bont Works car park

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Daytime					
07/02/2022 13:00:00	1-hour	53.7	78.9	55.3	39.6
07/02/2022 14:00:00	1-hour	51.6	80.2	51.3	39.7
07/02/2022 15:00:00	1-hour	49.6	73.2	49.1	40.8
07/02/2022 16:00:00	1-hour	52.0	75.1	54.7	39.7
07/02/2022 17:00:00	1-hour	45.3	73.5	46.2	39.5
07/02/2022 18:00:00	1-hour	41.7	59.8	43.1	39.2
07/02/2022 19:00:00	1-hour	39.2	59.6	39.8	36.4
07/02/2022 20:00:00	1-hour	42.5	59.6	44.6	37.1
07/02/2022 21:00:00	1-hour	41.8	56.8	44.1	37.8
07/02/2022 22:00:00	1-hour	43.8	65.1	44.4	38.2
07/02/2022 23:00:00	1-hour	53.7	78.9	55.3	39.6
Over survey period		48.7	80.2	47.3	38.8

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Night-time					
07/02/2022 23:00:00	1-hour	45.4	63.0	47.3	38.5
08/02/2022 00:00:00	1-hour	48.7	61.0	51.8	44.0
08/02/2022 01:00:00	1-hour	47.3	61.2	50.0	42.7
08/02/2022 02:00:00	1-hour	42.5	60.6	45.8	36.9
08/02/2022 03:00:00	1-hour	39.8	57.5	42.6	35.0
08/02/2022 04:00:00	1-hour	39.8	58.0	42.1	35.6
08/02/2022 05:00:00	1-hour	41.0	56.1	43.1	37.4
08/02/2022 06:00:00	1-hour	41.7	60.1	43.8	37.1
Over survey period		44.5	63.0	45.8	38.4

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Daytime					
08/02/2022 07:00:00	1-hour	49.9	74.4	45.9	39.4
08/02/2022 08:00:00	1-hour	46.4	69.9	47.4	41.4
08/02/2022 09:00:00	1-hour	48.0	73.2	48.6	40.4
08/02/2022 10:00:00	1-hour	48.5	69.2	51.1	40.8
08/02/2022 11:00:00	1-hour	54.6	74.5	54.5	48.2
08/02/2022 12:00:00	1-hour	52.2	76.1	53.0	49.2
08/02/2022 13:00:00	1-hour	51.4	81.8	52.0	48.3
08/02/2022 14:00:00	1-hour	52.2	68.8	54.2	48.8
08/02/2022 15:00:00	1-hour	49.7	71.9	50.9	40.3
08/02/2022 16:00:00	1-hour	47.7	66.6	48.0	39.0
08/02/2022 17:00:00	1-hour	43.6	67.1	44.4	39.6
08/02/2022 18:00:00	1-hour	43.8	62.5	45.1	40.8
08/02/2022 19:00:00	1-hour	44.9	66.3	44.2	40.0
08/02/2022 20:00:00	1-hour	43.2	63.0	44.5	39.4
08/02/2022 21:00:00	1-hour	40.3	54.3	41.7	37.7
08/02/2022 22:00:00	1-hour	41.7	62.4	42.5	37.0
Over survey period		49.1	81.8	48.0	41.9

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Night-time					
08/02/2022 23:00:00	1-hour	36.9	61.7	38.6	34.8
09/02/2022 00:00:00	1-hour	40.4	63.1	40.1	34.8
09/02/2022 01:00:00	1-hour	39.6	56.7	42.5	35.0
09/02/2022 02:00:00	1-hour	39.1	58.2	42.2	34.0
09/02/2022 03:00:00	1-hour	39.6	57.8	42.7	33.9
09/02/2022 04:00:00	1-hour	38.8	56.5	41.0	33.8
09/02/2022 05:00:00	1-hour	39.6	58.0	41.7	34.4
09/02/2022 06:00:00	1-hour	40.6	57.4	44.0	35.2
Over survey period		39.4	63.1	41.6	34.5

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Daytime					
09/02/2022 07:00:00	1-hour	49.4	72.8	47.0	37.6
09/02/2022 08:00:00	1-hour	47.7	70.0	49.3	38.6
09/02/2022 09:00:00	1-hour	52.2	75.0	53.1	37.8
09/02/2022 10:00:00	1-hour	48.9	74.1	51.6	38.2
09/02/2022 11:00:00	1-hour	46.0	68.9	47.4	37.4
09/02/2022 12:00:00	1-hour	46.3	73.1	48.0	36.2
09/02/2022 13:00:00	1-hour	48.3	73.5	51.5	36.1
09/02/2022 14:00:00	1-hour	52.3	75.1	54.9	37.1
09/02/2022 15:00:00	1-hour	49.0	73.9	50.9	36.8
09/02/2022 16:00:00	1-hour	50.1	72.5	52.7	37.3
09/02/2022 17:00:00	1-hour	47.3	72.5	50.4	38.7
09/02/2022 18:00:00	1-hour	41.0	68.1	42.6	36.6
09/02/2022 19:00:00	1-hour	37.7	51.9	39.4	35.0
09/02/2022 20:00:00	1-hour	36.6	58.1	38.1	34.1
09/02/2022 21:00:00	1-hour	38.0	55.3	39.0	34.2
09/02/2022 22:00:00	1-hour	37.4	49.5	39.7	33.9
Over survey period		47.9	75.1	47.2	36.6

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Night-time					
09/02/2022 23:00:00	1-hour	36.2	52.4	36.9	33.1
10/02/2022 00:00:00	1-hour	34.5	65.0	34.6	32.5
10/02/2022 01:00:00	1-hour	34.1	51.6	34.6	32.3
10/02/2022 02:00:00	1-hour	34.1	53.7	34.9	32.7
10/02/2022 03:00:00	1-hour	40.0	59.3	43.9	33.0
10/02/2022 04:00:00	1-hour	38.3	54.7	41.2	33.3
10/02/2022 05:00:00	1-hour	39.4	63.8	41.5	34.5
10/02/2022 06:00:00	1-hour	40.4	59.2	42.9	35.7
Over survey period		37.8	65.0	38.8	33.4

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Daytime					
10/02/2022 07:00:00	1-hour	46.6	69.0	47.5	38.6
10/02/2022 08:00:00	1-hour	48.8	68.5	50.9	38.9
10/02/2022 09:00:00	1-hour	51.2	70.2	57.0	39.4
10/02/2022 10:00:00	1-hour	48.3	69.2	51.3	39.1
10/02/2022 11:00:00	1-hour	47.8	70.2	47.2	38.2
10/02/2022 12:00:00	1-hour	52.9	83.9	48.7	38.1
10/02/2022 13:00:00	1-hour	51.8	78.7	52.4	39.3
10/02/2022 14:00:00	1-hour	51.3	74.7	50.6	38.9
10/02/2022 15:00:00	1-hour	49.9	67.8	49.6	38.2
10/02/2022 16:00:00	1-hour	46.9	73.6	46.3	37.7
10/02/2022 17:00:00	1-hour	44.6	70.8	45.2	38.9
10/02/2022 18:00:00	1-hour	41.2	69.0	41.3	37.6
10/02/2022 19:00:00	1-hour	40.2	57.8	41.2	37.7
10/02/2022 20:00:00	1-hour	39.0	59.7	39.3	35.8
10/02/2022 21:00:00	1-hour	36.7	61.1	37.1	33.4
10/02/2022 22:00:00	1-hour	37.4	55.3	37.4	34.1
Over survey period		48.3	83.9	46.4	37.7

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Night-time					
10/02/2022 23:00:00	1-hour	37.0	57.1	37.6	34.3
11/02/2022 00:00:00	1-hour	35.6	52.7	35.9	32.9
11/02/2022 01:00:00	1-hour	34.7	52.6	35.2	33.1
11/02/2022 02:00:00	1-hour	37.3	54.1	38.0	34.0
11/02/2022 03:00:00	1-hour	39.5	56.6	42.5	34.6
11/02/2022 04:00:00	1-hour	37.9	53.9	39.8	34.6
11/02/2022 05:00:00	1-hour	40.5	53.1	43.1	36.5
11/02/2022 06:00:00	1-hour	45.1	64.9	48.0	39.8
Over survey period		39.8	64.9	40.0	35.0

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Daytime					
11/02/2022 07:00:00	1-hour	48.2	65.2	50.5	44.6
11/02/2022 08:00:00	1-hour	52.3	74.5	53.6	46.3
11/02/2022 09:00:00	1-hour	50.3	70.5	50.1	43.8
11/02/2022 10:00:00	1-hour	53.5	74.6	58.2	40.4
11/02/2022 11:00:00	1-hour	46.9	72.9	47.1	40.5
11/02/2022 12:00:00	1-hour	43.5	66.0	44.8	39.1
11/02/2022 13:00:00	1-hour	47.9	68.4	51.3	39.4
11/02/2022 14:00:00	1-hour	50.5	75.5	53.6	38.9
11/02/2022 15:00:00	1-hour	50.9	72.5	55.0	40.0
11/02/2022 16:00:00	1-hour	47.9	74.6	46.7	40.5
11/02/2022 17:00:00	1-hour	48.4	68.4	47.3	41.3
11/02/2022 18:00:00	1-hour	44.4	56.4	45.9	42.3
11/02/2022 19:00:00	1-hour	44.1	54.7	45.8	41.7
11/02/2022 20:00:00	1-hour	42.5	52.8	44.3	39.8
11/02/2022 21:00:00	1-hour	41.1	51.2	42.9	38.5
11/02/2022 22:00:00	1-hour	39.8	53.0	41.5	37.0
Over survey period		48.6	75.5	48.7	40.9

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Night-time					
11/02/2022 23:00:00	1-hour	40.7	53.8	42.9	37.4
12/02/2022 00:00:00	1-hour	39.6	52.8	41.7	36.5
12/02/2022 01:00:00	1-hour	39.0	61.5	39.8	35.7
12/02/2022 02:00:00	1-hour	40.0	59.9	42.1	35.9
12/02/2022 03:00:00	1-hour	38.4	53.8	40.4	35.2
12/02/2022 04:00:00	1-hour	38.9	56.1	41.0	35.3
12/02/2022 05:00:00	1-hour	41.8	54.9	44.2	37.8
12/02/2022 06:00:00	1-hour	44.3	56.6	46.6	40.2
Over survey period		40.8	61.5	42.3	36.8

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Daytime					
12/02/2022 07:00:00	1-hour	49.7	72.3	52.0	43.7
12/02/2022 08:00:00	1-hour	52.5	79.7	55.1	45.1
12/02/2022 09:00:00	1-hour	49.9	70.4	51.8	44.8
12/02/2022 10:00:00	1-hour	51.3	69.5	54.1	45.8
12/02/2022 11:00:00	1-hour	49.2	67.2	50.9	45.8
12/02/2022 12:00:00	1-hour	49.7	69.8	51.7	46.2
12/02/2022 13:00:00	1-hour	48.4	73.7	50.0	45.9
12/02/2022 14:00:00	1-hour	46.8	65.4	48.2	44.4
12/02/2022 15:00:00	1-hour	46.8	74.8	46.9	43.7
12/02/2022 16:00:00	1-hour	46.1	64.0	47.3	43.5
12/02/2022 17:00:00	1-hour	50.2	79.7	47.9	44.3
12/02/2022 18:00:00	1-hour	45.0	69.7	46.9	41.7
12/02/2022 19:00:00	1-hour	42.3	52.3	44.0	39.9
12/02/2022 20:00:00	1-hour	41.9	55.8	44.0	38.9
12/02/2022 21:00:00	1-hour	43.1	70.5	44.8	40.2
12/02/2022 22:00:00	1-hour	40.9	68.7	42.3	38.2
Over survey period		48.3	79.7	48.6	43.3

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Night-time					
12/02/2022 23:00:00	1-hour	39.4	55.6	41.2	36.9
13/02/2022 00:00:00	1-hour	40.9	62.2	42.5	36.3
13/02/2022 01:00:00	1-hour	40.9	61.0	43.9	35.9
13/02/2022 02:00:00	1-hour	40.8	57.2	43.7	36.1
13/02/2022 03:00:00	1-hour	39.8	53.3	42.6	35.9
13/02/2022 04:00:00	1-hour	41.3	67.2	43.8	37.8
13/02/2022 05:00:00	1-hour	42.1	57.7	44.1	38.5
13/02/2022 06:00:00	1-hour	43.5	61.2	46.1	39.6
Over survey period		41.3	67.2	43.5	37.1

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Daytime					
13/02/2022 07:00:00	1-hour	50.6	74.9	49.6	43.1
13/02/2022 08:00:00	1-hour	48.7	82.0	49.5	44.1
13/02/2022 09:00:00	1-hour	49.5	73.2	51.1	46.0
13/02/2022 10:00:00	1-hour	51.8	75.1	52.7	47.9
13/02/2022 11:00:00	1-hour	52.1	78.9	52.9	49.0
13/02/2022 12:00:00	1-hour	51.7	74.3	51.9	48.4
13/02/2022 13:00:00	1-hour	48.9	70.6	50.1	46.9
13/02/2022 14:00:00	1-hour	49.6	77.7	50.3	47.1
13/02/2022 15:00:00	1-hour	49.2	78.0	50.5	46.4
13/02/2022 16:00:00	1-hour	48.9	81.2	49.9	45.8
13/02/2022 17:00:00	1-hour	46.2	77.3	47.5	39.3
13/02/2022 18:00:00	1-hour	40.7	65.1	42.2	38.1
13/02/2022 19:00:00	1-hour	39.3	52.8	41.4	36.6
13/02/2022 20:00:00	1-hour	39.3	57.8	39.3	36.5
13/02/2022 21:00:00	1-hour	36.2	56.2	37.5	34.4
13/02/2022 22:00:00	1-hour	37.1	63.9	36.9	34.9
Over survey period		48.6	82.0	47.1	42.8

Table B1 (Continued)

Start time & date	Period (T)	dB LAeq,T	dB LAfmax	dB LA10,T	dB LA90,T
Night-time					
13/02/2022 23:00:00	1-hour	35.8	48.6	36.5	34.5
14/02/2022 00:00:00	1-hour	35.5	47.9	36.2	34.4
14/02/2022 01:00:00	1-hour	34.8	54.1	35.5	33.7
14/02/2021 02:00:00	1-hour	38.6	55.8	41.9	34.0
14/02/2021 03:00:00	1-hour	39.4	65.0	42.2	34.9
14/02/2021 04:00:00	1-hour	38.3	53.2	40.0	35.3
14/02/2021 05:00:00	1-hour	39.8	57.9	41.2	37.2
14/02/2021 06:00:00	1-hour	42.9	64.1	45.4	38.4
Over survey period		38.9	65.0	39.9	35.3

APPENDIX C: Predicted Noise Levels

Table C1: HGV air jacks

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Jacking HGV @ 1m	72.5	72.5
Cycle duration (4 corners 30 secs per corner x 7 HGVs per day)	14 mins	14 mins
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-6.32	-6.32
Distance, source to receiver (m)	26	46
Distance correction dB(A)	-28.0	-33.1
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	23.2	18.1

Table C2: Impact gun loosening & tightening wheel bolts

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Loosening & tightening wheel bolts @ 1m	85.0	85.0
Cycle duration (6 wheels per HGV 10 secs per wheel x 7 HGVs)	7 mins	7 mins
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-9.33	-9.33
Distance, source to receiver (m)	26	46
Distance correction dB(A)	-28.0	-33.1
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	32.7	27.6

Table C3: Tyre fitting & removing machine – removing tyre

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Removing tyre @ 1m	77.2	77.2
Cycle duration (6 wheels per HGV 30 secs per wheel x 7 HGVs)	21 mins	21 mins
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-4.56	-4.56
Distance, source to receiver (m)	26	46
Distance correction dB(A)	-28.0	-33.1
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	29.6	24.5

APPENDIX C (Continued)

Table C4: Tyre fitting & removing machine – breaking tyre beads

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Breaking tyre beads @ 1m	76.8	76.8
Cycle duration (6 wheels per HGV 30 secs per wheel x 7 HGVs)	21 mins	21 mins
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-4.56	-4.56
Distance, source to receiver (m)	26	46
Distance correction dB(A)	-28.0	-33.1
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	29.2	24.1

Table C5: Tyre fitting & removing machine – re-fitting tyre

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Re-fitting tyre @ 1m	65.0	65.0
Cycle duration (6 wheels per HGV 30 secs per wheel x 7 HGVs)	21 mins	21 mins
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-4.56	-4.56
Distance, source to receiver (m)	26	46
Distance correction dB(A)	-28.0	-33.1
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	17.4	12.3

Table C6: Compressor inflating tyres

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Compressor inflating tyres @ 1m	78.5	78.5
Cycle duration (6 wheels per HGV 1 min per wheel x 7 HGVs)	42 mins	42 mins
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-1.55	-1.55
Distance, source to receiver (m)	26	46
Distance correction dB(A)	-28.0	-33.1
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	34.0	28.9

APPENDIX C (Continued)

Table C7: Tyre fitting & removing machine – balancing wheel

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Balancing wheel @ 1m	78.9	78.9
Cycle duration (6 wheels per HGV 30 secs per wheel x 7 HGVs)	21 mins	21 mins
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-4.56	-4.56
Distance, source to receiver (m)	26	46
Distance correction dB(A)	-28.0	-33.1
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	31.3	26.2

Table C8: Welding operations

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Welder @ 1m	62.5	62.5
Cycle duration (Continuous operation)	60	60
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-	-
Distance, source to receiver (m)	39	54
Distance correction dB(A)	-31.6	-34.5
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	15.9	13.0

Table C9: Cutting & grinding operations

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Cutting & grinding operations @ 1m	90.1	90.1
Cycle duration (10 mins per hour)	10	10
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-7.78	-7.78
Distance, source to receiver (m)	50	62
Distance correction dB(A)	-33.8	-35.7
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	33.5	31.6

APPENDIX C (Continued)

Table C10: Cordless drill/driver

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Cordless drill/driver @ 1m	76.8	76.8
Cycle duration (10 mins per hour)	10	10
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-7.78	-7.78
Distance, source to receiver (m)	39	54
Distance correction dB(A)	-31.6	-34.5
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	22.4	19.5

Table C11 - Static metal cutting machine

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Static metal cutting machine @ 1m	85.1	85.1
Cycle duration (1 min per hour)	1	1
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-17.78	-17.78
Distance, source to receiver (m)	42	60
Distance correction dB(A)	-32.3	-35.4
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	20.0	16.9

Table C12: Static metal cutting machine - guillotine

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Guillotine @ 1m	82.1	82.1
Cycle duration (1 minute per hour)	1	1
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-17.78	-17.78
Distance, source to receiver (m)	42	60
Distance correction dB(A)	-32.3	-35.4
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	17.0	13.9

APPENDIX C (Continued)

Table C13: Hammering metal

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Hammering metal @ 1m	97.2	97.2
Cycle duration (60 hammer impacts per minute)	1	1
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-17.78	-17.78
Distance, source to receiver (m)	42	60
Distance correction dB(A)	-32.3	-35.4
Barrier correction	-15	-15
Sound exposure level dBL_{Aeq,1h}	32.1	29.0

Table C14: HGV movements

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
HGV movements @ 1m	77.0	77.0
Cycle duration (approx. 30 secs per HGV)	2.3	2.3
Number of cycles	1	1
Correction for 1h reference period – dB(A)	-14.2	-14.2
Distance, source to receiver (m)	67	91
Distance correction dB(A)	-18.2	-19.5
Angle of view correction dB(A)	-12.0	-12.0
Barrier correction	-	-
Sound exposure level dBL_{Aeq,1h}	32.6	31.3

APPENDIX D – Combined Operations

Table D1: Wheel & tyre changing

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
HGV air jacks	23.2	18.1
Impact gun	32.7	27.6
Removing tyre	29.6	24.5
Breaking tyre beads	29.2	24.1
Re-fitting tyre	17.4	12.3
Compressor inflating tyres	34.0	28.9
Balancing wheels	31.3	26.2
Sound exposure level dBL_{Aeq,1h}	38.8	33.8

Table D2: Metal fabrication

	Sound exposure level calculations dBL _{Aeq,1h}	
	NSR 1	NSR 2
Welding operations	15.9	13.0
Cutting & grinding	33.5	31.6
Cordless drill/driver	22.4	19.5
Static metal cutting machine	20.0	16.9
Guillotine	17.0	13.9
Hammering metal	32.1	29.0
Sound exposure level dBL_{Aeq,1h}	36.3	33.8

