



Swansea Bay University Health Board

CROESERW COMMUNITY CENTRE

Noise Assessment





Swansea Bay University Health Board

CROESERW COMMUNITY CENTRE

Noise Assessment

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. UK0041357.7496

OUR REF.: 0041357.7496.P01

DATE: 25 APRIL 2025

WSP

**Kings Orchard
1 Queen Street
Bristol
BS2 0HQ**

Phone: +44 117 930 6200

WSP.com

QUALITY CONTROL

Issue/revision	First issue
Remarks	Issue
Date	25 th April 2025
Prepared by	Patrick Hoyle
Signature	Hoyle, Patrick (UKPXH777)  Digitally signed by Hoyle, Patrick (UKPXH777) DN: cn=Hoyle, Patrick (UKPXH777), ou=Active, email=patrick.hoyle@wsp.com Date: 2025.04.25 17:26:01 +01'00'
Checked by	Andrew Jarvis
Signature	 Digitally signed by Andrew.Jarvis@wsp.com DN: cn=Andrew.Jarvis@wsp.com Reason: I have reviewed this document Date: 2025.04.25 17:28:28 +01'00'
Authorised by	Andrew Jarvis
Signature	 Digitally signed by Andrew.Jarvis@wsp.com DN: cn=Andrew.Jarvis@wsp.com Reason: I am approving this document Date: 2025.04.25 17:28:54 +01'00'
Project number	UK0041357.7496
File reference	https://wsponlinegbr.sharepoint.com/sites/2025UK397496/Shared Documents/03 WIP/Report/Noise Report 20250425 .

CONTENTS

EXECUTIVE SUMMARY

1	INTRODUCTION	1
2	POLICY, STANDARDS & GUIDANCE	2
2.2	POLICY	2
	NATIONAL	2
	LOCAL	3
	NPTCBC Local Development Plan (LDP) (2011-2026) Adopted January 2016	3
2.3	STANDARDS & GUIDANCE	4
	BS 7445 (2003): DESCRIPTION AND MEASUREMENT OF ENVIRONMENTAL NOISE	4
	BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND	4
	IEMA GUIDELINES FOR ENVIRONMENTAL NOISE IMPACT ASSESSMENT	5
3	ACOUSTIC MONITORING	6
4	NOISE ASSESSMENT	9
4.1	PREDICTED RATING LEVEL	9
	SPECIFIC SOUND LEVELS	9
	RATING LEVELS	9
4.2	INITIAL ESTIMATE OF IMPACT	10
	CONSIDERATION OF CONTEXT	10
	DETERMINATION OF SIGNIFICANCE	11
5	SUMMARY AND CONCLUSIONS	12

TABLES

Table 2-1 – National Planning Policy	2
Table 2-2 Ambient noise change criteria	5
Table 3-1 – Acoustic monitoring results	7
Table 3-2 – Acoustic monitoring results: summary (free-field)	8
Table 4-1 – Noise from fixed plant – Baseline sound levels used to determine noise limits	10

FIGURES

Figure 3-1 - Survey Location, receptors & proposed plant	6
--	---

APPENDICES

APPENDIX A

GLOSSARY

APPENDIX B

CALCULATION OF SPECIFIC SOUND LEVELS



1 INTRODUCTION

- 1.1.1. WSP UK Ltd has been instructed by Swansea Bay University Health Board to carry out a noise assessment of a proposed Air Handling Unit (AHU) and other air new plant included within the proposal to redevelop the Croeserw Community Centre to accommodate healthcare and administrative uses ('the Proposed Development'). The Proposed Development is located within the administrative area of Neath Port Talbot County Borough Council (NPTCBC).
- 1.1.2. The Proposed Development consists of the adaption of the existing facility to provide offices, consultation rooms, treatment rooms, a dental facility and a beauty salon. It is assumed that noise emissions due to sources other than the air handling plant (primarily vehicle movements to, and from the car park) will be consistent with the previous use. Therefore, noise from air handling plant is the only aspect of the Proposed Development which requires assessment to ensure the amenity of nearby residents is protected.
- 1.1.3. The new facility is intended to be operational between 0800 to 2100 hrs Monday to Friday. The operation of the AHU is anticipated to be required up to one hour either side of the operational hours of the facility (0700 to 2200 hrs).
- 1.1.4. To inform an assessment of noise from the proposed air handling plant, an attended baseline sound level survey was carried out, focussing on the more sensitive morning and evening periods when baseline sound levels are expected to be lowest.
- 1.1.5. Based on the results of the baseline survey and data indicating the location and specifications of the AHU a noise assessment has been undertaken in accordance with the BS 4142.
- 1.1.6. A glossary describing terminology used in this report is provided in Appendix A.

2 POLICY, STANDARDS & GUIDANCE

- 2.1.1. Summaries of the national planning policy, local planning policy, guidance and standards relevant to the assessment of the Proposed Development are set out below.

2.2 POLICY NATIONAL

- 2.2.1. Relevant National planning policies are set out in Table 2-1.

Table 2-1 – National Planning Policy

Policy	Context
Planning Policy Wales (PPW) ¹	Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs, MTANs and policy clarification letters comprise national planning policy. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation and resultant duties such as the Socio-economic Duty.
Technical Advice Note (TAN) 11: Noise (1997) ²	TAN 11 provides general advice on noise and, with regard to industrial development, refers to superseded versions of noise related British Standards: BS 4142, BS 8233; And with regard to construction noise: BS 5228. A draft of an updated version of this document went through consultation in 2023, TAN 11: Air Quality, Noise and Soundscape. A key element of this proposed update is the introduction of good soundscape design as a prerequisite to good placemaking.

¹ Welsh Government (February 2024). Planning Policy Wales: Edition 12.

² Welsh Assembly Government (1997). Technical Advice Note (TAN) 11: Noise.

Future Wales: The National Plan 2040³

Future Wales is a new kind of development plan which provides a national spatial strategy setting out where Wales should focus development over the next 20 years to address key national priorities through the planning system, including sustaining and developing a vibrant economy, supporting town and city centres, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of communities.

LOCAL

NPTCBC Local Development Plan (LDP) (2011-2026) Adopted January 2016

2.2.9. NPTCBC's LDP⁴ guides the future development of the area, providing a vision which sets out where, when and how much new development can take place up to 2026. It is aimed to provide developers and the public with certainty about the planning framework for Neath Port Talbot.

2.2.10. One of the main objectives of the LDP is to address noise issues:

"OB16: Address air quality issues and minimise the adverse impacts from noise generating and polluting activities."

2.2.11. Policy EN 8 states that developments which would result in unacceptable noise impacts will not be permitted, unless appropriate mitigation measures are included:

"Policy EN 8

Pollution and Land Stability

Proposals which would be likely to have an unacceptable adverse effect on health, biodiversity and/or local amenity or would expose people to unacceptable risk due to the following will not be permitted:

- *Air pollution;*
- *Noise pollution;*
- *Light pollution;*
- *Contamination;*
- *Land instability;*
- *Water (including groundwater) pollution.*

Proposals which would create new problems or exacerbate existing problems detailed above will not be acceptable unless mitigation measures are included to reduce the risk of harm to public health, biodiversity and/or local amenity to an acceptable level"

³ Welsh Government (24 February 2021). Future Wales, The National Plan 2040. Digital ISBN 978-1-80082-873-5. Print ISBN 978-1-80082-875-9.

⁴ Neath Port Talbot County Borough Council (2016). Local Development Plan (2011-2026) Adopted January 2016.

2.3 STANDARDS & GUIDANCE

BS 7445 (2003): DESCRIPTION AND MEASUREMENT OF ENVIRONMENTAL NOISE

- 2.3.1. BS 7445:2003⁵ defines and prescribes best practice during recording and reporting of environmental noise. It is inherently applied in all instances when making environmental noise measurements and is applicable to the acoustic monitoring undertaken to inform this assessment.

BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

- 2.3.2. BS 4142⁶ provides methods to determine the potential significance of impacts arising from sound of an industrial or commercial nature (e.g., the 'specific sound' from proposed new plant units) at nearby noise sensitive receptors.
- 2.3.3. An initial estimate of impact is first undertaken which compares the predicted specific sound levels, combined with any rating penalties to account for the character of the specific sound, with the representative baseline residual and background sound levels. The following guidance is provided to assess the severity of any impact:
- a) *Typically the greater this difference the greater the magnitude of the impact.*
 - b) *A difference of around 10 dB or more likely to be an indication of a significant impact depending on the context.*
 - c) *A difference of around 5 dB is likely to be an indication of an adverse impact depending on the context.*
 - d) *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 low impact.*
- 2.3.4. Following the initial estimate of impact, contextual aspects are considered. The final assessment result, and determination of significance, is dependent on consideration of context.
- 2.3.5. With regard to the consideration of context, BS 4142 states:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following:

1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

⁵ British Standards Institution (2003). BS 7445. Description and measurement of environmental noise.

⁶ British Standards Institution (2019). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it. ...”

IEMA GUIDELINES FOR ENVIRONMENTAL NOISE IMPACT ASSESSMENT

- 2.3.6. The IEMA Guidelines for environmental noise impact assessment⁷ contain guidance on criteria for ambient noise changes. Table 2-2 provides criteria for ambient noise changes based on the IEMA guidelines.

Table 2-2 Ambient noise change criteria

Effect Descriptor	Noise change, dB	Description
None/ Not significant	<= +2.9	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals
Slight	+3 to +4.9	A 3 to 4.9 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Moderate	+3 to +4.9	A 3 to 4.9 dB L_{Aeq} change in sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Substantial	>= +5	Greater than 5 dB L_{Aeq} change in sound level at a noise-sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a receptor of great sensitivity to noise

⁷ IEMA (2014). Guidelines for environmental noise impact assessment, Version 1.2.

3 ACOUSTIC MONITORING

- 3.1.1. To inform the assessment, Short Term (ST) acoustic monitoring was undertaken on 17th February 2025 in order to quantify and characterise the existing baseline acoustic environment at a location representative of the nearest NSRs.
- 3.1.2. The sound level meter used for the measurements (Rion NA-28, serial no. 01070573) conforms to the relevant standards and was within industry standard laboratory calibration periods. Field calibration checks were performed using an acoustic calibrator (01dB-Stell Cal 21, serial no. 34134167) at the beginning and end of each set of measurements and no significant drift was observed.
- 3.1.3. Approximate locations of the monitoring location, proposed air handling plant and the nearest Noise Sensitive Receptors (NSRs) are identified below in Figure 3-1.

Figure 3-1 - Survey Location, receptors & proposed plant



- 3.1.4. Monitoring location ST1 was located at the end of the road at Bryn Coed in free-field conditions. Monitoring location ST1 is considered representative of the baseline acoustic environment in the vicinity of the nearest NSRs. Monitoring was undertaken from approximately 08:15 to 09:30 hrs and from 20:00 to 22:00 hrs.

- 3.1.5. Weather conditions during the monitoring were dry, with low wind speeds: wind speeds measured during the surveying using a hand held anemometer were between 0 to 0.1 ms⁻¹ in the morning and were between 0 to 1 ms⁻¹ in the evening.
- 3.1.6. Subjective observations indicate that the acoustic environment was dominated by sound from road traffic on the local highway network, with contributions from local activity, aeroplanes passing overhead and the sounds of birdsong, dogs barking and a nearby wind turbine (approx. 1.3 km east) also audible.
- 3.1.7. The acoustic monitoring results are provided in Table 3-1, below, with a summary provided in Table 3-2. The results provided in Table 3-2 exclude the measurement at 08:42 due to the influence of unrepresentative events during that sample period.

Table 3-1 – Acoustic monitoring results

Start date & Time	Duration (hh:mm)	Measured sound pressure level, dB	
		Ambient, L _{Aeq,T}	Background, L _{A90,T}
Morning			
17/04/2025 08:12	15:00	39	27
17/04/2025 08:27	15:00	43	29
17/04/2025 08:42	15:00	48	32
17/04/2025 08:57	15:00	36	28
17/04/2025 09:12	15:00	44	28
17/04/2025 09:27	07:12	42	29
Evening			
17/04/2025 19:59	15:00	45	30
17/04/2025 20:14	15:00	36	30
17/04/2025 20:29	15:00	38	31
17/04/2025 20:44	15:00	40	31
17/04/2025 20:59	15:00	36	28
17/04/2025 21:14	15:00	35	29
17/04/2025 21:29	15:00	35	29
17/04/2025 21:44	14:59	36	30

Table 3-2 – Acoustic monitoring results: summary (free-field)

Period/ Parameter	Ambient, $L_{Aeq,T}$	Background, $L_{A90,T}$
Morning		
Range	36 to 44	27 to 32
Average*	43	29
Evening		
Range	35 to 45	28 to 31
Average*	39	30

* - Ambient: log. Average, background: arithmetic average

- 3.1.8. Based on the results in Table 3-2, and for the purposes of the assessment, the representative baseline background sound level is 30 dB $L_{A90,T}$ and the residual sound levels are 39 to 43 dB $L_{Aeq,T}$.
- 3.1.9. It is acknowledged that the duration of the baseline survey is limited, however the survey period is considered representative of the most sensitive times of day when the AHU is anticipated to be in operation. The results of the surveying are considered typical of the rural nature of the location, as the measured sound levels are very low, in absolute terms.
- 3.1.10. There will be periods when background sound levels are lower than the representative background sound level set out above. However, as the background sound levels are low in absolute terms, it is considered that the absolute level of the specific sound is of greater importance than the difference between the rating level and the background sound level, in accordance with the section of BS 4142 reproduced under paragraph 2.3.5:

“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. ...”

4 NOISE ASSESSMENT

4.1 PREDICTED RATING LEVEL

SPECIFIC SOUND LEVELS

- 4.1.1. The specific sound level was predicted based on manufacturer's sound level data⁸ and drawings indicating the location and layout of the external plant^{9,10}. The predictions account for the directivity of the supply and exhaust inlets/ outlets, geometric spreading, the spectral shape of the noise emissions and the performance of the proposed attenuators¹¹. The predicted specific sound level assumes that the main noise sources are casing breakout from the AHU, the fresh-air inlet and exhaust outlet and the condensers. All other sources are assumed to be negligible contributors and are ignored for the purposes of the assessment.
- 4.1.2. Though there is some variation in the ground heights of the plant location and the nearest NSRS, the nearest NSRs the propagation paths are generally unobstructed, except in the case of 7 Pen-y-Wern, where the building envelope of the community centre provides partial/ full screening to the AHU casing and AHU condensers.
- 4.1.3. Calculations of the predicted specific sound levels are provided in Appendix B.
- 4.1.4. It is noted that the predicted specific sound levels are based on nominal duty for all plant items, and that in reality, it is unlikely that all plant would be operating at nominal duty at all times. This is particularly the case for cooling plant, which is less likely to be required to operate at nominal/ maximum duty during the more sensitive morning and evening periods.

RATING LEVELS

- 4.1.5. Whilst there are no third octave data available to undertake an assessment of tonality, it is considered unlikely that noise emissions would be tonal. Note this assumes that all plant will be subject to regular maintenance and not develop squeaks or other attention catching features.
- 4.1.6. The noise emissions will not be impulsive as fan speed will increase and decrease gradually. The specific sound level at the nearest NSRs is unlikely to be characterised as intermittent, as the plant is likely to operate continuously for the majority of the time. The specific sound level will be sufficiently below the ambient sound level to not be otherwise readily distinguishable in the residual acoustic environment.
- 4.1.7. Based on the above, the specific sound would not attract any rating penalties and the rating level is equal to the specific sound level.

⁸ Daikin (March 2025). Technical report. Croeserw Community Centre. HTM AHU. Ref. 2094888/Rev.01.

⁹ Stride Treglown (March 2025). Proposed Site Plan. Drawing no. 153506-STL-XX-00-DR-A-ZZZZ-90010.

¹⁰ AECOM (April 2025). Mechanical Services, Ventilation, Ground Floor Proposed Layout. Sheet no. CCC-ACM-XX-00-DR-ME-311005.

¹¹ Allaway Acoustics (March 2025). '103459Q1_IL.pdf', Croeserw Community Centre. Project no. 103459. Schedule no. 225103459Q1.

4.2 INITIAL ESTIMATE OF IMPACT

4.2.1. The BS 4142:2014:A1:2019 initial estimate of impact is presented below in Table 4-1.

Table 4-1 – Noise from fixed plant – Baseline sound levels used to determine noise limits

Location	Representative baseline sound levels, dB		Specific sound level, dBA L _s	Rating penalty, dB	Rating level, dB L _{Ar,Tr}	Rating level difference, dB
	Background, L _{A90,T}	Residual, L _{Aeq,T}				
7 Pen-y-Wern	30	39 to 43	31	0	31	+1
11 Pen-y-Wern			33	0	33	+3

4.2.2. The results in Table 4-1 indicate that the predicted rating levels are between +1 and +3 dB above the representative background sound level, which is are between 4 dB and 2 dB below the threshold for an adverse impact. This is indicative of a low (i.e. below adverse) impact at 7 Pen-y-Wern and indicative of a potential adverse impact at 11 Pen-y-Wern.

4.2.3. The results of the initial estimate alone do not confirm the outcome of the assessment, as consideration of context in accordance with BS 4142 must be undertaken before determining the outcome of the assessment.

CONSIDERATION OF CONTEXT

4.2.4. The first contextual aspect to consider is the absolute level of the specific sound. The absolute level of the predicted sound level is low in absolute terms and is considered unlikely to result in any adverse impacts to external or internal amenity.

4.2.5. The second contextual aspect to consider is the character and absolute level of the specific sound in relation to the character and level of the residual sound. Whilst the character of the specific sound is different to the character of the residual sound, calculations indicate that, at most, while residual sound levels are at the lowest, the addition of the specific sound would give rise to a +1 dB increase in the ambient noise level. With reference to the criteria provided in Table 2-2, this ambient noise change is considered to be not significant. When residual sound levels are higher, the addition of the specific sound would not give rise to any increase in the ambient sound level.

4.2.6. The character of the specific sound may be slightly different to the residual acoustic environment, which is dominated by transport sources, but it is at a relatively low level compared to the residual sound level.

4.2.7. Additionally, as outlined under paragraph 4.1.4, the predicted specific sound levels are considered worst case, and that for the majority of the time, and particularly during the more sensitive morning and evening periods, actual noise immissions at the nearest NSRs would be lower than predicted.

4.2.8. Based on the above, it is considered unlikely that the specific sound would give rise to any adverse impacts.

DETERMINATION OF SIGNIFICANCE

- 4.2.9. Consideration of the contextual aspects indicates that the initial estimate of impact at 7 Pen-y-Wern is correct, and the results of the assessment at 7 Pen-y-Wern indicate that the specific sound is unlikely to give rise to adverse impacts.
- 4.2.10. Consideration of the contextual aspects indicates that the initial estimate of impact at 11 Pen-y-Wern, which indicated the potential for an adverse effect, is likely an over-estimate. Therefore, based on the context, it is considered appropriate to modify the result of the initial estimate to a low impact. Therefore, the results of the assessment at 11 Pen-y-Wern indicate that the specific sound is unlikely to give rise to adverse impacts.
- 4.2.11. In summary, the results of the BS 4142 assessment indicate that predicted noise levels from the air handling plant are unlikely to give rise to adverse impacts at the nearest NSRs. The Proposed Development therefore accords with the requirements of the relevant British Standards, national and local planning policies and is therefore acceptable.

5 SUMMARY AND CONCLUSIONS

- 5.1.1. WSP UK Ltd has been instructed by Swansea Bay University Health Board to carry out a noise assessment of a proposed air handling plant included within the proposal to redevelop the Croeserw Community Centre to accommodate healthcare and administrative uses ('the Proposed Development'). The Proposed Development is located within the administrative area of Neath Port Talbot County Borough Council.
- 5.1.2. The Proposed Development consists of the adaption of the existing facility to provide offices, consultation rooms, treatment rooms, a dental facility and a beauty salon. It is assumed that noise emissions due to sources other than the air handling plant (primarily vehicle movements to, and from the car park) will be consistent with the previous use. Therefore, noise from the proposed air handling plant is the only aspect of the Proposed Development which requires assessment to ensure the amenity of nearby residents is protected.
- 5.1.3. The new facility is intended to be operational between 0800 to 2100 hrs Monday to Friday. The operation of the air handling plant is anticipated to be required up to one hour either side of the operational hours of the facility (0700 to 2200 hrs).
- 5.1.4. To inform an assessment of noise from the proposed new building services plant, an attended baseline sound level survey was carried out, focussing on the more sensitive morning and evening periods when baseline sound levels are expected to be lowest.
- 5.1.5. Based on the results of the baseline survey and data indicating the location and specifications of the air handling plant a noise assessment has been undertaken in accordance with the BS 4142.
- 5.1.6. The results of the BS 4142 assessment indicate that predicted noise levels from the proposed air handling plant are unlikely to give rise to adverse impacts.
- 5.1.7. The Proposed Development therefore accords with the requirements of the relevant British Standards, national and local planning policies and is therefore acceptable.

Appendix A

GLOSSARY



Noise

Noise is defined as unwanted sound. Human ears are generally able to respond to sound in the frequency range 20 Hz (very deep bass) to 20,000 Hz (very high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain).

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 dBA increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dBA is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

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 effect of lower and higher frequencies, in a similar manner to the human ear. 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 dBA or L_{Aeq} , L_{A90} etc, according to the parameter being measured.

The perception of noise is affected by a number of other factors beyond the sound level and frequency content. For example, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A1 - Range of Sound Levels Commonly Found In The Environment

Sound levels	Location
0 dBA	Threshold of hearing
20 to 30 dBA	Quiet bedroom at night
30 to 40 dBA	Living room during the day
40 to 50 dBA	Typical office
50 to 60 dBA	Inside a car
60 to 70 dBA	Typical high street
70 to 90 dBA	Inside factory
100 to 110 dBA	Burglar alarm at 1m away
110 to 130 dBA	Jet aircraft on take off

Acoustic Terminology

Table A2 - Acoustic Terminology

Terminology	Meaning
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dBA	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. It is the noise index which is typically considered to best represent the sound level which is actually perceived.
L_{Amax}	L_{Amax} is the maximum instantaneous 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 level determined at a point typically at least 3.5 m away from reflective surfaces other than the ground.
Façade Level	A sound level determined at a distance of 1 m in front of a sound reflecting plane such as a building façade. A standard correction of -3 dB may be added to a façade sound level to correct the measured sound level to a free-field sound level. The standard -3 dB correction is most applicable in situations where the façade has a relatively unobstructed angle of view of the source (i.e. an uninterrupted 180° angle of view of the source in the horizontal plane, with the façade behind extending in all directions). It is typically only necessary to consider façade sound levels when measurements must be undertaken at a façade location, for example: where a dwelling is located entirely at first floor level, or above, with no external amenity space at ground floor level. In this case, predicted façade sound levels should be assessed against façade baseline sound levels.
Ambient Sound	Totally encompassing sound in a given situation, at a given time, usually composed of sound from many sources near and far.

Specific Sound	When assessing industrial or commercial sound, the specific sound is the sound of the (proposed or existing) industrial or commercial activity under assessment.
Rating Level	When assessing industrial or commercial sound, the rating level is equal to the specific sound level plus any rating penalties which are applied to account for any features of the specific sound which may serve to make the specific sound more distinct and/ or distinguishable in the residual acoustic environment.
Residual Sound	When assessing industrial or commercial sound, the residual sound level is equal to the ambient sound level, in the absence of the specific sound (in the case of a proposed industrial or commercial activity, the residual sound level is equivalent to the existing ambient sound level prior to addition of the specific sound level to the acoustic environment).

Appendix B

CALCULATION OF SPECIFIC SOUND LEVELS





Parameter/ Description			Sound level per octave band, dB								Overall, dBA
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Sound levels of plant											
AHU - Data received	Supply Unit Inlet, sound power level L_W		65	72	67	66	65	63	65	58	71
	Return Unit Outlet, sound power level L_W		68	73	70	72	74	73	72	60	79
	Supply - Airborne (Casing breakout), sound power level L_W		59	66	54	54	57	53	40	28	60
	Return - Airborne (Casing breakout), sound power level L_W		58	62	52	52	54	51	40	24	58
	Casing breakout total, sound power level L_W		62	67	56	56	59	55	43	29	62
Condensers	ERQ250AW1 adjacent AHU, sound pressure level at 1 m L_P		61	63	62	57	52	46	38	32	58
	RXM50A9 (serving AC-19), sound pressure level at 1 m L_P										48
Distances to NSRs	11 Pen-y-Wern - centre of garden		7 Pen-y-Wern - centre of garden								
Approx. distance to AHU inlet/ outlet, m	15		30								
Approx. distance to AHU casing, m	20		33								
Approx. distance to AHU condensers, m	24		34								
Approx. distance to AC-19 condenser, m	35		10								
Predicted specific sound level, dB $L_{Aeq,T}$ - 11 Pen-y-Wern - centre of garden											
Casing breakout total	Hemispherical spreading		28	33	22	22	25	21	9	-5	28
Supply Unit Inlet	Hemispherical spreading, duct attenuation, end reflection, attenuator.		30	28	10	-10	-29	-21	-13	-5	13
Return Unit Outlet	Hemispherical spreading, duct attenuation, end reflection, attenuator.		26	13	-13	-19	-30	-21	-16	-13	2
2 no. AHU condensers	Hemispherical spreading		33	35	34	29	24	18	10	4	30
AC-19 condenser	Quarter space spreading										17
Predicted specific sound level											33
Predicted specific sound level, dB $L_{Aeq,T}$ - 7 Pen-y-Wern - centre of garden											
Casing breakout total	Hemispherical spreading, 5 dB screening correction		18	24	13	13	15	12	0	-14	-5
Supply Unit Inlet	Hemispherical spreading, duct attenuation, end reflection, attenuator.		24	22	4	-16	-35	-27	-19	-11	7
Return Unit Outlet	Hemispherical spreading, duct attenuation, end reflection, attenuator.		20	7	-19	-25	-36	-27	-22	-19	-4
2 no. AHU condensers	Hemispherical spreading, 10 dB screening correction		20	22	21	16	11	5	-3	-9	17
AC-19 condenser	Quarter space spreading										31
Predicted specific sound level											31



Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

wsp.com

PUBLIC