WEPA, Bridgend

Commercial Noise Assessment

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1 INTRODUCTION

1.1 Entran Ltd has been commissioned by Earth & Marine Environmental Consultants Ltd to undertake an assessment of proposed activities pertaining to the operation of a proposed boiler house at the existing WEPA papermill in Bridgend.

1.2 The assessment has been prepared following a variation application for the existing Environmental Permit for the above site that was submitted in 2020.

1.3 The assessment considers the potential impacts on the nearest sensitive receptors in the vicinity of the proposed site in accordance with the most relevant national and local standards and guidelines.

1.4 Details of the site, including plant source details and expected usage, have been compiled based on data obtained from the existing noise assessment and additional information provided by the applicant and are understood to be representative of the proposed site activities.

1.5 This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

1.6 Additionally, BS 4142:2014 recognises that the context of a sound is important when defining the potential for subjective nuisance. The word “sound” is therefore used as opposed to “noise” to describe any sound assessed in the context of the BS 4142 assessment.

2 SITE DESCRIPTION

2.1 The WEPA paper mill site is located on the A4063, approximately 5km north of Bridgend. The site is currently operates under permit for existing papermill activities. The proposed activities include the replacement of existing boilers with a new boiler house, which will house two boilers and ancillary equipment.

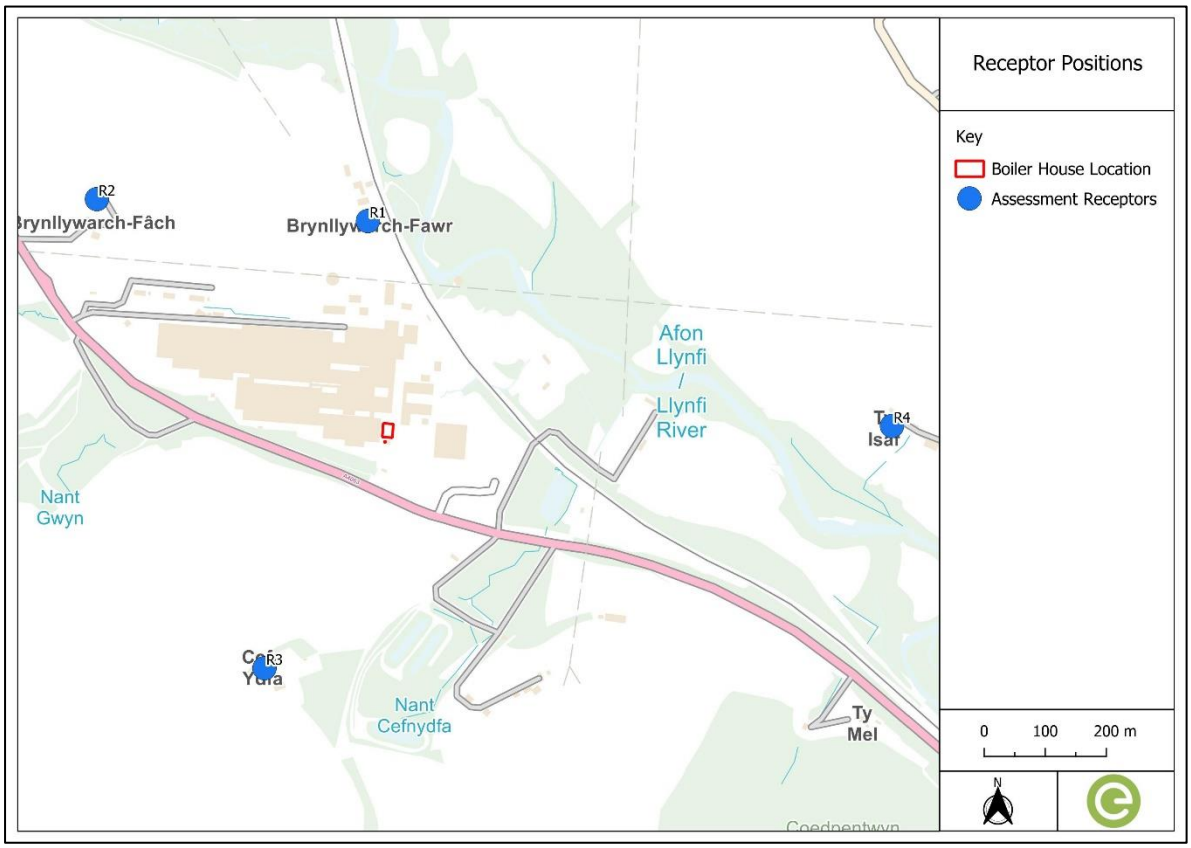
2.2 The nearest residential receptors to the site are situated between approximately 160m and 630m away from the WEPA facility. The nearest receptors are detailed in Table 1.

Table 1: Residential Receptors

ID	Receptor	Distance from nearest boundary, m
R1	Brynllywarch Farm	160
R2	Brynsiriol Farm	220
R3	Cefn Ydfa Farm	380
R4	Ty Isaf	630

2.3 The residential receptors and proposed boiler house location are presented in Figure 1.

Figure 1: Site Layout and Nearest Residential Receptors



3 ASSESSMENT METHODOLOGY

National Policy: Planning Policy Wales (PPW)

3.1 The Department of the Environment, Food and Rural Affairs (DEFRA), the Department for Communities and Local Government (DCLG) and the Welsh Government (WG) are responsible for all aspects of noise policy in Wales.

3.2 The aim of noise policy within Wales has been to protect individuals from excessive noise levels both in the workplace and within their homes. It has been recognised that severe annoyance to individuals due to noise can lead to sleep disturbance and adverse health effects.

3.3 Under the heading Air Quality and Soundscape, paragraph 6.7.3 of Planning policy Wales states:

"Certain sounds, such as those created by trees, birds or water features, can contribute to a sense of tranquillity whilst others can be reassuring as a consequence of their association with the normality of everyday activities. Problematic forms of sound are generally experienced as noise pollution and can affect amenity and be prejudicial to health or a nuisance. Noise action plans drawn up by public bodies aim to prevent and reduce noise levels where necessary and preserve soundscape quality where it is good."

3.4 Under the heading Framework for Addressing Air Quality and Soundscape, paragraphs 6.7.4 to 6.7.6 state:

"6.7.4 The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure148 to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.

6.7.5 In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing

development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.

6.7.6 In proposing new development, planning authorities and developers must therefore:

• address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors.
• not create areas of poor air quality or inappropriate soundscape; and
• seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes."

The Welsh Government Noise and Soundscape Action Plan (2018)

3.5 The Noise and Soundscape Action Plan (NASP) outlines the Welsh Government's expectations for management of soundscapes.

3.6 The NASP identifies that industrial source are regulated by the Environmental Permitting (England and Wales) Regulations 2016 (EPR), with the methodology provided within BS 4142 commonly adopted for the identification of adverse impacts.

3.7 Methods for avoiding the potential for adverse impacts are provided within the NASP, which states: "*These include:*

"• locating new developments, whether noise-generating or noise-sensitive, to avoid noise issues arising in the first instance (in other words, through the planning system);

• increasing the distance between the source and receptors;

• preventing noise at source by good design and maintenance;

• using barriers or enclosures to prevent noise travelling, including through the use of green infrastructure;

• minimising or containing noise at source by observing good working and management practices; and

• avoiding noisy operations at certain times, such as at night".

The Welsh Government Technical Advice Note 11 Noise

3.8 The Welsh Government has published a series of Technical Advice Notes (TANs), including the October 1997 TAN 11 Noise. TAN 11 sets out the Welsh Government's policies on noise related planning issues, giving guidance to local authorities in Wales on the use of their planning powers to minimise the adverse impacts of noise. Specifically, it:

- outlines the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise;
- sets out noise exposure categories for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise; and
- advises on the use of planning conditions to minimise the impact of noise.

3.9 TAN 11 considers noise from industrial and commercial developments, which is relevant to the Proposed Development. It states in paragraph B17:

"B17. The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 1987."

3.10 The 1987 version of BS8233 was superseded in 1999 and the 1997 version of BS4142 was superseded in 2014.

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

3.11 British Standard BS 4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound* is intended to be used for the assessment of whether sound of industrial and/or commercial nature is likely to give rise to complaints from people residing in nearby dwellings. The Standard, which was updated in 2014, states that such sound can include:

- 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 or ship movements on or around an industrial and/or commercial site.

3.12 The procedure contained in BS 4142 for assessing the likelihood of complaints is to compare the measured or calculated sound level from the source in question, the *'specific sound level'*, at the assessment position with the background sound level. Where sound contains acoustic features, such as tonality, impulsivity or other noticeable characteristics then a correction is added to the specific sound to obtain the '*rating level*' that reflects the contextual setting of the site.

3.13 To assess the likelihood of complaints, the measured background sound level is subtracted from the rating level. BS 4142 states:

'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.'

The Institute of Environmental Management & Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

3.14 The Institute of Environmental Management and Assessment (IEMA) have recently published the '*Guidelines for Environmental Noise Impact Assessment*'. The guidelines are applicable to noise impact assessment for any scale of development proposal, including core principles to achieve effectively integration with the EIA, and provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

The appropriateness of the noise parameters used for the situation;

- The reference time period used in making the assessment;
- The level, character and frequency content of the noise sources under investigation; and,
- How the predicted noise levels relate to relevant Standards and guidelines.

3.15 The guidelines also recommend that the assessor should determine the degree of impact based on evidence derived from the assessment.

The Professional Practice Guidance on Planning and Noise (2017)

3.16 The '*Professional Practice Guidance on Planning and Noise'* (ProPG) was produced by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) to provide acoustical practitioners with guidance on the management of noise within the planning system in England.

3.17 The reparation of the ProPG acknowledges and reflects the Government's overarching NPSE, the NPPF and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance. It provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- promote appropriate noise exposure standards; and
- assist the delivery of sustainable development.

4 BACKGROUND SOUND LEVELS

4.1 Ambient sound data was obtained as part of the application for the existing permit. Background sound levels were identified and accepted as part of the permit application. These background sound levels have been adopted for this assessment.

4.2 The adopted background sound levels are presented in Table 2 below.

Table 2: Adopted Background Sound Data

Receptor	Background Sound Level, dB $L_{A90,T}$	
	Day	Night
R1 - Brynllywarch Farm	43	41
R2 - Brynsiriol Farm	49	37
R3 - Cefn Ydfa Farm	46	41
R4 - Ty Isaf	46	41

4.3 The previously accepted background sound levels have been adopted to allow assessment in accordance with BS 4142 and to determine the likelihood of adverse effects relating to the proposed development. These levels have been adopted to allow consideration of the likelihood of impacts, in the absence of the current on-site activities.

5 ASSESSMENT

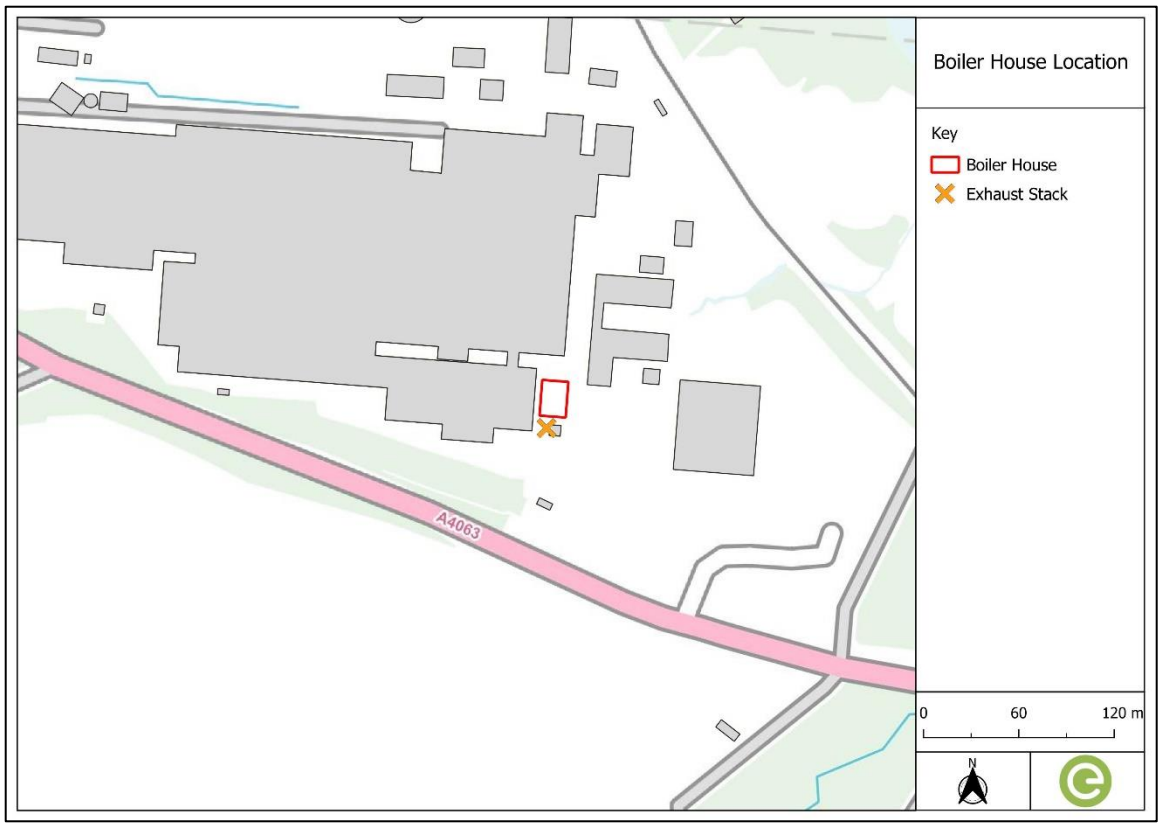
Computer Noise Modelling

5.1 The potential for impacts arising from the proposed activities has been determined by calculation of likely noise levels due to the proposed boiler house. The proposed sources have been considered both in isolation and in combination with the current on-site activities. The previously accepted background sound levels have been adopted for assessment in accordance with BS 4142.

5.2 Sound emission levels from the Proposed Development have been calculated using predictive computer noise modelling. The noise modelling software (Cadna-A) uses algorithms based on ISO 9613 'Attenuation of sound during outdoor propagation' to predict noise levels generated at receiver locations by noise sources.

5.3 The boiler house and exhaust stack have been modelled and sound levels have been calculated at nearby noise sensitive receptor locations as presented in Figure 1. The location of the boiler house and stack are presented in Figure 2.

Figure 2: Modelled Activity Locations



5.4 The applicant has advised that plant items within the proposed boiler house will be specified such that the internal noise level within the boiler house will remain below 90 dB $L_{Aeq,T}$. The specific levels pertaining to the boiler house were calculated using source sound levels from a similar site which includes a boiler house. The spectrum has been adopted as representative of the internal octave band sound level due to the likely plant items and has been corrected such that the calculated internal noise level is 90 dB.

5.5 The noise emitted by the exhaust stack has been calculated based on the equation derived by HGC Engineering for the estimation of noise arising from boiler exhausts where measurements or manufacturer source data are unavailable. The calculation is given as 81+5.6log(kW), with an adjustment factor applied for each octave band. The calculated exhaust noise level has been adopted as representative of the stack without consideration of any attenuation within the system between the exhaust and stack.

5.6 The resultant sound power levels are presented in Table 3. The source sound power levels and derived octave band sound power levels are presented in Appendix B1.

Table 3: Plant Items and Source Levels

Plant Item	Modelled Sound Power Level, L_{WA}
Boiler House (Internal)	116.5
Boiler Exhaust (9.23 MW boiler)	86.8

5.7 It is understood that the building cladding will be Kingspan KS1000 cladding system or similar. The roller doors are understood to be closed during typical operation. Adopted octave band data for the roof and façade construction is presented in Appendix B2. The building details are presented in Appendix B3. The modelled noise levels for the proposed building and exhaust stack are presented in Appendix B4.

5.8 The calculated specific sound levels at the nearest residential receptors are presented in Table 4.

Table 4: Calculated Specific Sound Levels

Receptor ID	Specific Sound Level, dB
R1	27
R2	21
R3	30
R4	24

5.9 BS 4142 requires that an acoustic feature correction is applied to the specific sound level in order to obtain a rating level $L_{Ar,Tr}$ at the identified receptor. Where applicable, the correction is applied in order to consider the effect of additional acoustic characteristics present in the source of interest. The correction is applied based on tonality, impulsivity and intermittency that may be perceptible at the receptor location.

5.10 Calculated specific levels are well below the adopted background sound levels and therefore are highly unlikely to be perceptible at the receptor locations. Accordingly, no feature correction is required.

Proposed Activities

5.11 The rating levels for the proposed plant items, in isolation from the extant on-site activities, and subsequent BS 4142 assessment are presented in Table 5.

Table 5: Calculated Rating Levels, $L_{Ar,Tr}$ and BS 4142 Assessment

Receptor ID	Specific Sound Level	Acoustic Feature Correction	Rating Level	Background Sound Level	Excess Over Background
Day					
R1	27	0	27	43	-16
R2	21	0	21	49	-28
R3	30	0	30	46	-16
R4	24	0	24	46	-22
Night					
R1	27	0	27	41	-14
R2	21	0	21	37	-16
R3	30	0	30	41	-11
R4	24	0	24	41	-17

5.12 The calculated rating levels do not exceed the background sound levels during all assessment periods. BS 4142 indicates that where the rating level does not exceed the background sound level the impact of the specific sound level is likely to be low.

5.13 The rating levels pertaining to the proposed plant items are unlikely to result in impacts at the nearby residential receptors.

Combined Activities

5.14 The previously accepted commercial sound assessment identified that acoustic feature corrections would be required for the now on-site plant and activities. The previous feature corrections and calculated specific levels, without mitigation, have been adopted to ensure a cautious consideration of the combined proposed and existing activities.

5.15 The rating levels for the combined activities (existing and proposed sources) and BS 4142 assessment are presented in Table 6.

Table 6: Calculated Rating Levels, $L_{Ar,Tr}$ and BS 4142 Assessment

Receptor ID	Specific Sound Level	Acoustic Feature Correction	Rating Level	Background Sound Level	Excess Over Background
Day					
R1	32	2	34	43	-9
R2	28	5	33	49	-16
R3	34	2	36	46	-10
R4	32	2	34	46	-12
Night					
R1	31	2	33	41	-8
R2	28	5	33	37	-4
R3	34	2	36	41	-5
R4	30	2	32	41	-9

5.16 This combined assessment is considered to be suitably cautious and does not take account of any on-site mitigation for existing activities or for the removal of existing boilers, which will be replaced with the proposed boiler house.

5.17 The calculated rating levels remain below the adopted background sound levels even after consideration of combined sound levels and acoustic feature corrections.

Uncertainty – BS 4142

5.18 The calculation of the specific level for proposed items is based on information provided by the applicant, data from similar sites, and the calculations as presented within this assessment. Any changes in activities, plant items or processes will affect the results of this assessment. Based on the information provided, it is understood that the assessment is representative of current on-site and proposed activities.

5.19 The sound level associated with internal boiler house plant items has been calculated based on data from a similar site and a target internal sound level as provided by the applicant. Once specified, the combined source level due to proposed plant items should remain below the sound levels as adopted for the purpose of this assessment.

5.20 Sound levels associated with the stack have been based on an indicative calculation based on empirical prediction for sound levels from boiler exhausts. Any change in data associated with the boiler house and internal plant items may change the outcome of this assessment.

5.21 The background sound levels were accepted as part of the previous permit application and have been adopted to allow consideration of the combined on-site activities as well as proposed items. The use of these previously accepted levels is considered to be appropriate for cautious consideration without the inclusion of the previously introduced plant items. The current background sound level is likely to be higher. In this instance, the calculated rating levels associated with the proposed boiler house would fall further below the background sound levels.

6 CONCLUSIONS

6.1 An assessment has been undertaken for the potential impacts attributable to the sound emitted from the proposed boiler house at the existing WEPA paper mill site in Bridgend.

6.2 Information provided by the applicant has been used to calculate the likely specific and rating sound levels attributable to the proposed and existing activities at the nearest receptors.

6.3 Based on the information and considerations as presented within this assessment, the excess of the calculated rating over the background sound level indicates that there is low likelihood of newly introduced adverse impacts due to the proposed boiler house.

6.4 Consideration of the combined sound levels, inclusive of current on-site activities indicates that the combined rating level would also fall below the previously accepted background sound levels, which have been adopted for this assessment.

6.5 The assessment has been undertaken based on the information provided and the associated calculations are detailed within this report. The calculations indicate that significant impacts are unlikely.

APPENDIX A – INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}. This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as $_{A90(1hour)}$ and $L_{A90(5mins)}$. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

Table A1: Glossary of Terms

Term	Definition
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). 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 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level 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.
$L_{eq,T}$	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.
$L_{max,F}$	A noise level index defined as the maximum noise level during the 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.
$L_{90,T}$	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.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
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 ($L_{Aeq,T}$).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ($L_{Aeq,T}$)
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ($L_{Aeq,T}$)
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ($L_{Ar,Tr}$).

APPENDIX B – SOURCE DATA

Appendix B1: Octave Band Source Sound Power Levels

Plant/Item	Sound Power Level, dB L_{WA} per Octave Band, Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
Example boiler house internal	106.2	108.8	111.4	110.3	107.1	106.9	105.2	102.6	100.6
Boiler House internal assumption*	110.4	113.1	115.7	114.6	111.4	111.2	109.5	106.8	104.8
Boiler Exhaust	99.2	98.2	95.2	93.2	81.2	74.2	66.2	63.2	49.2

** calibrated to attain 90 dB internal sound pressure level*

Appendix B2: Façade Material Details

Element	Item	Octave Band Centre Frequency								
		31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
SRI										
Roller Doors	Ascot Roller Doors	14	14	14	17	18	15	19	19	19
Kingspan Cladding	Kingspan 1000Rw	20	20	18	20	24	20	29	39	47
Absorption Coefficient, α										
Roller Doors	Ascot Roller Doors	0.5	0.5	0.5	0.35	0.15	0.05	0.05	0	0
Kingspan Cladding	Kingspan 1000Rw	0.15	0.15	0.45	0.7	0.85	0.9	0.9	0.75	0.6
Concrete	Rough Concrete	0.01	0.01	0.02	0.03	0.03	0.03	0.04	0.07	0.07

Appendix B3: Boiler House Details

Radiating Surface	Element	Length	Width	Height	Items
N Façade	Panelling	-	16.5	8.5	Kingspan Cladding
	Door	-	6	5	Roller Doors
	Door	-	1	2.1	Roller Doors
	Door	-	6	5	Roller Doors
E Façade	Panelling	22.5	-	8.5	Kingspan Cladding
S Façade	Panelling	-	16.5	8.5	Kingspan Cladding
	Door	-	1	2.1	Roller Doors
W Façade	Panelling	22.5	-	8.5	Kingspan Cladding
	Door	-	1	2.1	Roller Doors
	Door	-	3	5	Roller Doors
Floor	Floor	22.5	16.5	-	Concrete
Roof/Ceiling	Roof/Ceiling	22.5	16.5	-	Kingspan Cladding

Appendix B4: Modelled Octave Band Sound Power Levels

Source	Octave Band Sound Level Power Level, dB L_{WA}								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Building_E	76.7	79.3	77.3	70.6	63.8	66.4	59.7	58.3	58.0
Building_S	73.1	75.7	75.1	69.1	60.3	63.6	52.8	41.9	33.7
Building_W	73.3	75.9	75.2	69.1	60.5	63.7	53.4	45.9	43.9
Building_N	74.1	76.8	75.7	69.4	61.3	64.3	55.4	51.8	51.3
Building_Roof	73.1	75.7	75.1	69.1	60.3	63.6	52.8	41.9	33.7
Stack Outlet (2 no.)	102.2	101.2	98.2	96.2	84.2	77.2	69.2	66.2	52.2

APPENDIX C – PERMITTING REQUIREMENT: COORDINATE INFORMATION

Appendix C1: Coordinate Data, Proposed Point Sources

Plant Item	Coordinates		Height, m
	X	Y	
Exhaust Stack	287931.9	1870223.0	30.1

Appendix C2: Coordinate Data, Proposed Sound Emitting Buildings

Plant Item	Coordinates		Height, m
	X	Y	
Boiler House, Corner	287929.1	187053.4	8.5
Boiler House, Corner	287945.6	187052.2	8.5
Boiler House, Corner	287943.9	187029.6	8.5
Boiler House, Corner	287927.4	187030.9	8.5

Appendix C3: Coordinate Data, Receptors

Receptor	Coordinates	
	X	Y
R1 - Brynllywarch Farm	287903.9	187384.0
R2 - Brynsiriol Farm	287460.5	187419.8
R3 - Cefn Ydfa Farm	287734.7	186652.8
R4 - Ty Isaf	288761.4	187048.8

Appendix C4: Coordinate Data, Proposed Buildings

Item	Coordinates		Height, m
	X	Y	
Exhaust Stack Vertices	287932.8	187022.6	30
Exhaust Stack Vertices	287932.7	187022.6	30
Exhaust Stack Vertices	287932.7	187022.5	30
Exhaust Stack Vertices	287932.7	187022.5	30
Exhaust Stack Vertices	287932.7	187022.4	30
Exhaust Stack Vertices	287932.6	187022.4	30
Exhaust Stack Vertices	287932.6	187022.3	30
Exhaust Stack Vertices	287932.5	187022.3	30
Exhaust Stack Vertices	287932.5	187022.2	30
Exhaust Stack Vertices	287932.4	187022.2	30
Exhaust Stack Vertices	287932.4	187022.2	30
Exhaust Stack Vertices	287932.3	187022.1	30
Exhaust Stack Vertices	287932.3	187022.1	30
Exhaust Stack Vertices	287932.2	187022.1	30
Exhaust Stack Vertices	287932.2	187022.1	30
Exhaust Stack Vertices	287932.1	187022.0	30
Exhaust Stack Vertices	287932.0	187022.0	30
Exhaust Stack Vertices	287932.0	187022.0	30
Exhaust Stack Vertices	287931.9	187022.0	30
Exhaust Stack Vertices	287931.9	187022.0	30
Exhaust Stack Vertices	287931.8	187022.0	30
Exhaust Stack Vertices	287931.7	187022.0	30
Exhaust Stack Vertices	287931.7	187022.0	30
Exhaust Stack Vertices	287931.6	187022.0	30
Exhaust Stack Vertices	287931.6	187022.1	30
Exhaust Stack Vertices	287931.5	187022.1	30
Exhaust Stack Vertices	287931.4	187022.1	30
Exhaust Stack Vertices	287931.4	187022.1	30
Exhaust Stack Vertices	287931.3	187022.2	30
Exhaust Stack Vertices	287931.3	187022.2	30
Exhaust Stack Vertices	287931.2	187022.3	30
Exhaust Stack Vertices	287931.2	187022.3	30
Exhaust Stack Vertices	287931.1	187022.3	30
Exhaust Stack Vertices	287931.1	187022.4	30
Exhaust Stack Vertices	287931.1	187022.4	30
Exhaust Stack Vertices	287931.0	187022.5	30
Exhaust Stack Vertices	287931.0	187022.5	30
Exhaust Stack Vertices	287931.0	187022.6	30
Exhaust Stack Vertices	287931.0	187022.7	30
Exhaust Stack Vertices	287930.9	187022.7	30
Exhaust Stack Vertices	287930.9	187022.8	30
Exhaust Stack Vertices	287930.9	187022.8	30
Exhaust Stack Vertices	287930.9	187022.9	30
Exhaust Stack Vertices	287930.9	187023.0	30
Exhaust Stack Vertices	287930.9	187023.0	30
Exhaust Stack Vertices	287930.9	187023.1	30
Exhaust Stack Vertices	287930.9	187023.2	30
Exhaust Stack Vertices	287930.9	187023.2	30
Exhaust Stack Vertices	287931.0	187023.3	30
Exhaust Stack Vertices	287931.0	187023.3	30

Item	Coordinates		Height, m
	X	Y	
Exhaust Stack Vertices	287931.0	187023.4	30
Exhaust Stack Vertices	287931.0	187023.4	30
Exhaust Stack Vertices	287931.1	187023.5	30
Exhaust Stack Vertices	287931.1	187023.6	30
Exhaust Stack Vertices	287931.2	187023.6	30
Exhaust Stack Vertices	287931.2	187023.6	30
Exhaust Stack Vertices	287931.2	187023.7	30
Exhaust Stack Vertices	287931.3	187023.7	30
Exhaust Stack Vertices	287931.3	187023.8	30
Exhaust Stack Vertices	287931.4	187023.8	30
Exhaust Stack Vertices	287931.4	187023.8	30
Exhaust Stack Vertices	287931.5	187023.8	30
Exhaust Stack Vertices	287931.6	187023.9	30
Exhaust Stack Vertices	287931.6	187023.9	30
Exhaust Stack Vertices	287931.7	187023.9	30
Exhaust Stack Vertices	287931.7	187023.9	30
Exhaust Stack Vertices	287931.8	187023.9	30
Exhaust Stack Vertices	287931.9	187023.9	30
Exhaust Stack Vertices	287931.9	187023.9	30
Exhaust Stack Vertices	287932.0	187023.9	30
Exhaust Stack Vertices	287932.1	187023.9	30
Exhaust Stack Vertices	287932.1	187023.9	30
Exhaust Stack Vertices	287932.2	187023.9	30
Exhaust Stack Vertices	287932.2	187023.8	30
Exhaust Stack Vertices	287932.3	187023.8	30
Exhaust Stack Vertices	287932.4	187023.8	30
Exhaust Stack Vertices	287932.4	187023.8	30
Exhaust Stack Vertices	287932.5	187023.7	30
Exhaust Stack Vertices	287932.5	187023.7	30
Exhaust Stack Vertices	287932.5	187023.6	30
Exhaust Stack Vertices	287932.6	187023.6	30
Exhaust Stack Vertices	287932.6	187023.5	30
Exhaust Stack Vertices	287932.7	187023.5	30
Exhaust Stack Vertices	287932.7	187023.4	30
Exhaust Stack Vertices	287932.7	187023.4	30
Exhaust Stack Vertices	287932.8	187023.3	30
Exhaust Stack Vertices	287932.8	187023.3	30
Exhaust Stack Vertices	287932.8	187023.2	30
Exhaust Stack Vertices	287932.8	187023.1	30
Exhaust Stack Vertices	287932.8	187023.1	30
Exhaust Stack Vertices	287932.8	187023.0	30
Exhaust Stack Vertices	287932.8	187023.0	30
Exhaust Stack Vertices	287932.8	187022.9	30
Exhaust Stack Vertices	287932.8	187022.8	30
Exhaust Stack Vertices	287932.8	187022.8	30
Exhaust Stack Vertices	287932.8	187022.7	30
Exhaust Stack Vertices	287932.8	187022.6	30