CSG

acoustics

THE ZETTER HOTEL, 2-7 MONTAGUE ST, LONDON

ZORCA HOLDING LONDON LTD

PLANNING REPORT
CSGA-C2050-T1

20th SEPTEMBER 2022

PREFACE

Project	Zetter Hotel, Montague St, London
Reference	CSGA-C2050-T1
Report Type	Plant Noise Planning Report
Recipient	Zorca Holding London Ltd
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Reviewed by	Andy Ryan BSc (Hons) MIOA

Table P1: Revision Details

Revision Number	Date	Details
-	-	-
-	-	-
-	-	-

CONTENTS

1 INTRODUCTION

CSG Acoustics Ltd has been appointed by Zorca Holding London Ltd to undertake an external plant noise assessment to support a planning application for the Zetter Hotel, 2-7 Montague Street, London, WC1B 5BU.

As part of the refurbishment of the site it is proposed that the existing mechanical systems associated with the site are updated and replaced.

In light of this, this assessment provides a planning demonstration in accordance with the requirements of Camden Council (CC)

The assessment includes:

- Results of a noise survey conducted at the site over a three-day period;
- Proposed plant noise limits based on the results of the noise survey and the Local Authority's planning policy;
- Prediction and assessment of noise levels at the closest worst-affected noise sensitive window using CadnaA noise modelling software; and
- The proposal of suitable noise mitigation at the site.

This report is technical in nature therefore, to assist the reader, explanations of the relevant terminology are presented in Appendix A.

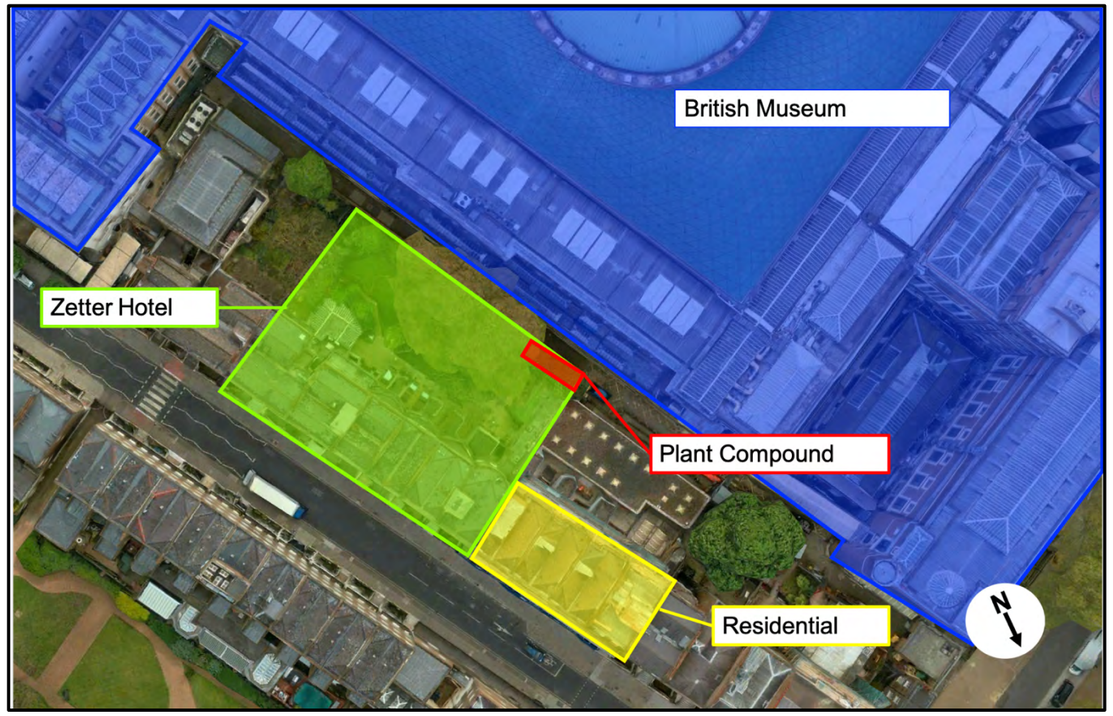
2 EXISTING / PROPOSED SITE

As part of the refurbishment of the property, the existing mechanical services are to be upgraded and replaced. The table below presents the items that are proposed to be located at the site inside a dedicated acoustic enclosure. Figure 2.1 presents the location of the proposed mechanical compound in the context of the surrounding area.

Table 2.1 : Proposed Plant Items To be Included in Plant Compound

Plant Model	Number of Units	SWL (dBA)
REYQ16	2	86
REYQ14	1	81
REYQ24 (8+16)	3	87
ERQ200	3	78
ERQ140	1	69
RYYQ20U	1	88

Figure 2.1: Location of Plant Compound



The closest residential noise sensitive locations to the plant compound will be the upper levels of 8 and 9 Montague Street to the north, which will be approximately 22 metres away. Office use associated with the British Museum is located immediately west of the plant compound.

All other noise sensitive receptor locations are either located at a greater distance from the plant compound or are subject to greater acoustic screening by intervening buildings

Figure 2.2: Location of Proposed Plant Compound in Relation to Residential Noise Sensitive Receptors

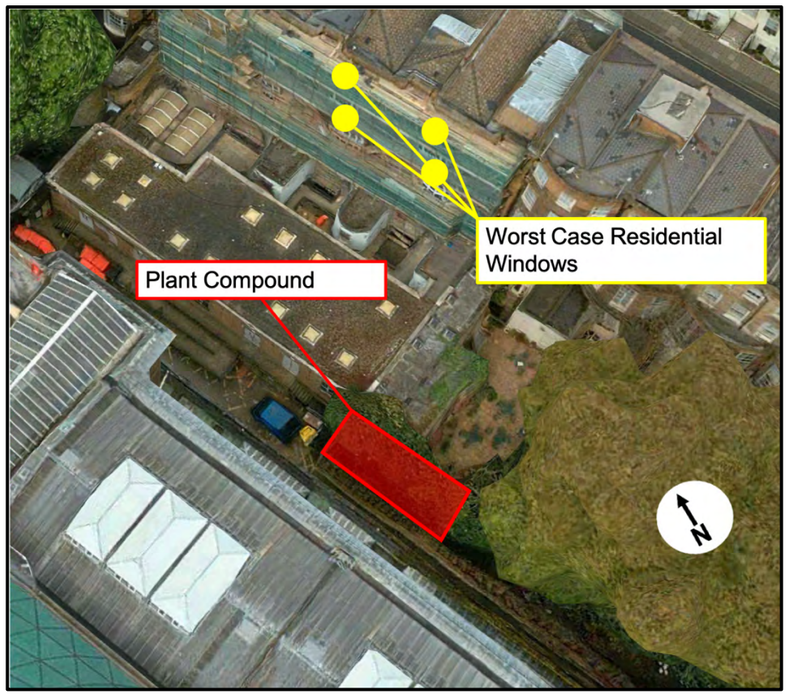
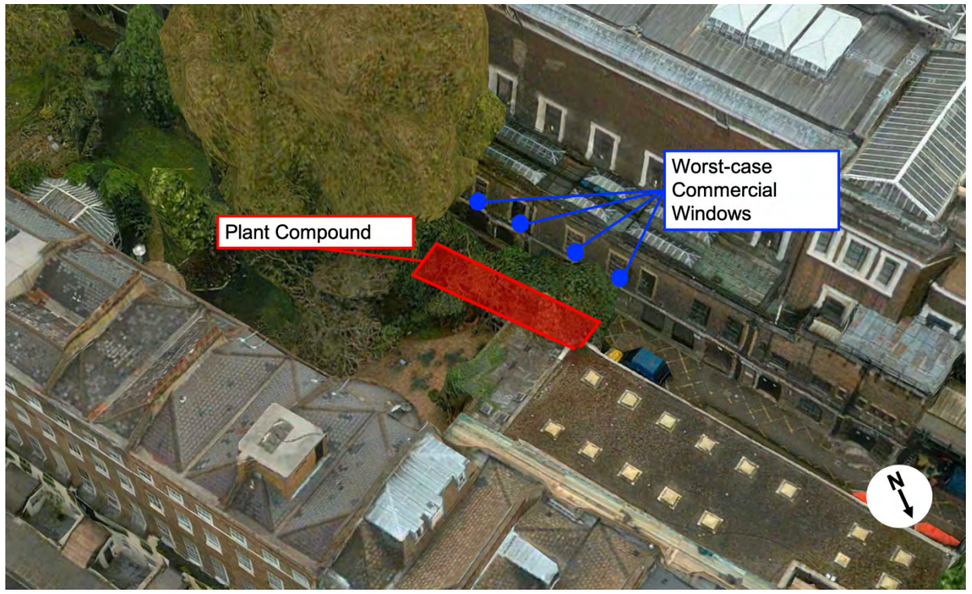


Figure 2.3: Location of Proposed Plant Compound in Relation to Commercial Windows



3 GUIDANCE AND CONSULTATION

This assessment has been undertaken in accordance with National and Local planning policy for Camden Council and relevant British Standards.

Local and National Planning Policy for the Borough is presented in Appendix B of this document.

3.1 LOCAL PLANNING POLICY

Camden Local Plan (2017)

The Camden Local Plan (2017) sets out the planning policies and replaces the Core Strategy and Development Policies planning documents (adopted in 2010). There are also a number of Supplementary Planning Guidance documents, one of which, CPG6:Amenity includes reference to British Standard 4142.

Appendix 3 of the Local Plan presents Noise Thresholds for various scenarios, including noise from 'Industrial and Commercial Noise Sources' which is relevant to this application. The document states the following;

> "Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 '*Methods for rating and assessing industrial and commercial* sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10dB below background (15dB if tonal components are present) should be considered as the design criterion)."

The Scope of BS4142 is with regard to external noise levels at residential windows, and as such the above criterion is adopted for these types of noise sensitive receivers.

A review of the Local Plan has determined that there is no specific guidance with regards to external / internal noise criteria for commercial offices similar to that associated with the British Museum.

As such, a review of suitable guidance documents including the British Council For Offices (BCO), and BS8233 *Guidance on Sound Insulation and Noise Reduction for Buildings* provides useful context to potential noise impacts within general office uses.

BCO state under 'External Noise Intrusion' that levels should not exceed criteria of NR40 for Open Plan Offices and NR35 for Cellular Office spaces, which equates to be between 40dBA and 45dBA.

Table 2 of BS8233 gives typical noise levels for acoustic privacy in shared spaces and states the following;

> *Noise levels generally apply to steady sources, such as those due to road traffic, mechanical services or continuously running plant, and should be the noise level in the space during normal hours of occupation but excluding any noise produced by the occupants and their activities.*

Table 2 sates that the typical noise levels for acoustic privacy in shared spaces should have a design range of between 45dBA and 50dBA.

In light of the above, a reasonable design level for noise break-in to an adjacent office would be 45dBA. Given the typical reduction of an open window (10-15dB) the resulting adopted criteria would be 55dBA -60dBA external to the building.

4 NOISE SURVEY

Environmental noise measurements have been carried out over a five-day period from 13:30 on Thursday 28th July 2022 and concluding 03:30 on 3rd August 2022. Measurements were undertaken to establish the existing noise levels at the site. The survey methodology and results are set out below.

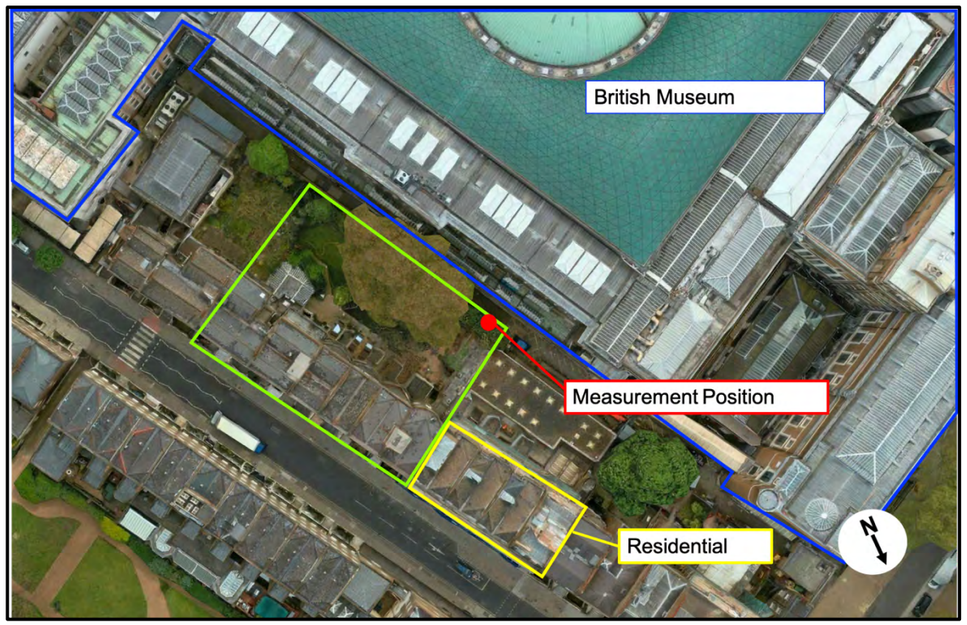
Noise measurements have been taken at a height of 2.5m above ground floor level, at the rear of the site, in the approximate location of the proposed plant compound.

The measurement location was selected to represent the background noise levels at the nearest noise sensitive properties adjacent to the site.

It should be noted that the location was also selected so that any existing mechanical services associated with the site were not audible at the measurement position.

Figure 4.1 presents the measurement position.

Figure 4.1: Measurement Position



The equipment used for the survey was as follows:

Table 4.1: Equipment

Equipment	Model	Serial No.	Certificate No.	Calibration Date
Class 1 SLM	01dB FUSION	10816	05231/1	21/04/2021
Microphone	GRAS 1/2" - 40CD	383040		
Preamplifier	01dB - PRE22	10959		
Calibrator	Cirrus CR:511E	33927	05354/1	27/07/2021

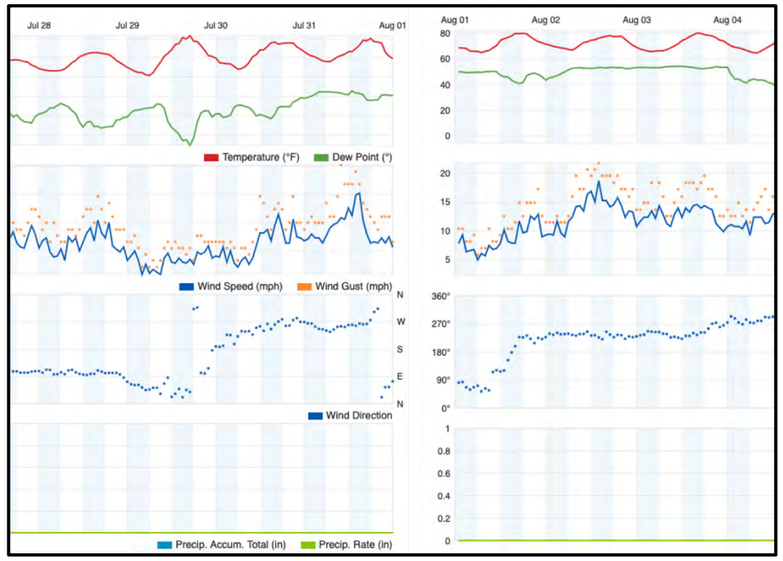
4.1 RESULTS

The noise survey was mostly unattended, with observations taken by the surveyor at the start and end of the measurements.

The weather for the duration of the survey was suitable for noise measurement, with no precipitation with wind speeds within the acceptable range.

A graphical summary of the weather for the period is given below. The data is from the closest weather station with available data. (ILONDO440)

Figure 4.2: Weather Profile at Local Station



The sound levels at the site are typical of a central London mixed commercial area. The dominant noise sources are mechanical services associated with the rear of the British Museum which characterise the local background noise levels.

A summary of the time averaged ambient levels and the typical lowest measured background levels over the measurement periods are shown in Table 4.2. It should be noted that the presented lowest L_{A90} levels are based on a 15-minute measurement period.

A summary of the measured noise levels during the full measurement period is represented graphically in Appendix C.

Table 4.2: Measured Average Ambient and Lowest Background Noise Levels

Period	Average $L_{Aeq,T}$ - dB	Typical Lowest L_{A90} - dB
Day time	56dB	52dB
Evening	53dB	51dB
Night-time	54dB	51dB

5 PLANT NOISE ASSESSMENT

This report is to support a planning application for a number of external plant items to be located in a dedicated acoustic compound at the Zetter Hotel site.

The proposed plant items are presented in Table 2.1 in Section 2 of this report. Full noise details (in octaves) are presented in Appendix D of this report and all noise calculations have used the full octave band data.

5.1 PLANT NOISE LIMITS

Based on the above and the requirements set out in Section 3 of this report, Table 5.1 presents the typical lowest L_{A90} noise level and the associated proposed noise limit at residential dwellings.

Table 5.1: Residential Plant Noise Emission Limits Based on Measured L_{A90}, (Free-field) dB

Location	Period	Typical Lowest L_{A90} – dB	**Proposed Noise Limit L_{Ar}**
Windows of Noise Sensitive Dwellings	Day	52dB	42dB
	Evening	51dB	41dB
	Night	51dB	41dB
Noise limit based on -10dB requirement			

Note that the limits suggested in the third column above are rating levels (L_{Ar}) and as such any design should take into account the acoustic characteristics of the plant items. In this instance the proposed units do noy display characteristics whereby the acoustic correction should be applied.

In terms of the adopted noise limit associated with the offices of the British Museum an internal noise level of 45dBA has been adopted. Based on the recommended acoustic reduction for an open window (10-15dB) this would equate to a noise level of **55-60dBA** outside of the windows.

Should any other items of plant be installed as part of the development, the cumulative noise from all items should not exceed the limits stated in Table 5.1 or the limit of 55-60dBA outside of the office of the British Museum.

5.2 EXTERNAL PLANT NOISE ASSESSMENT

A noise model has been built in the proprietary noise modelling software CadnaA.

The noise model set-up includes the following;

- Second order reflections – to account for reflections from surrounding architecture
- Building heights and architecture as per existing site layout

Noise control in the form of the following has been included in the noise model. It should be noted that it is the responsibility of the noise control specialist contractor to undertake their own calculations to demonstrate compliance with the noise planning requirements. The below insertion losses are presented for information purposes and to demonstrate that a solution is feasible for the site.

Table 5.2: Acoustic Enclosure Required Insertion Losses

Item	Insertion Loss dB, Octave Band Centre Frequency (Hz)							
	63	125	250	500	1K	2K	4K	8K
Exhaust – 900mm Long 20% FA	5	10	19	37	42	37	32	22
Intake – 300mm Acoustic Louvres	5	7	11	12	13	14	12	9

Screenshots of the CadnaA noise model are presented below showing the noise levels at surrounding residential elevations and at the rear of the British Museum.

Figure 5.1: 2D View of the Noise Model

The image above shows the plant items as blue crosses that will be located in the dedicated enclosure. The coloured circles at various building elevations show the predicted maximum noise levels and white/black circles indicate the maximum levels at the receiver location. It can be seen that the predicted maximum noise level at any of the residential building elevation is 39dBA, whilst the maximum at the British Museum is 56dBA.

Figure 5.2: 3D View of the Noise Model

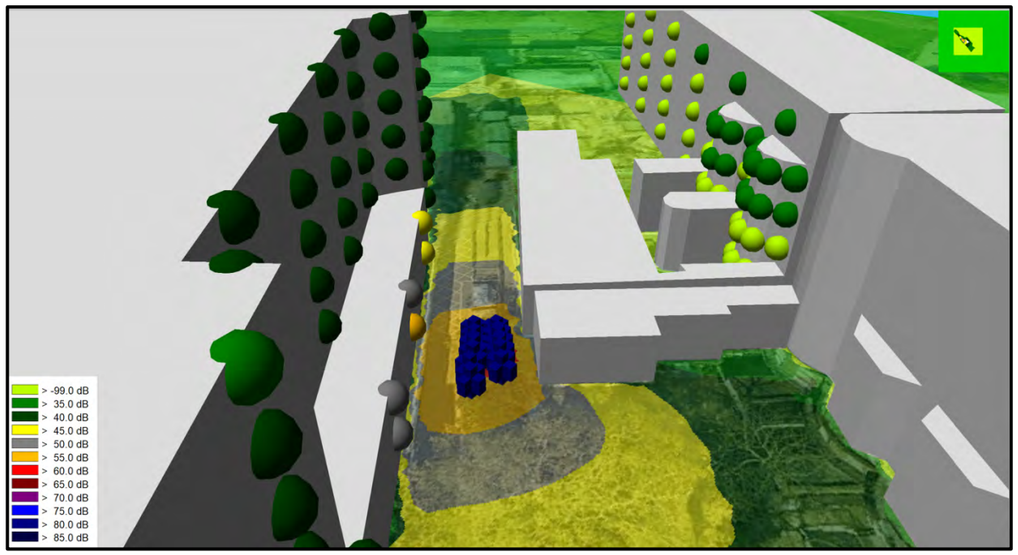


Table 5.3 presents the predicted noise levels at the closest worst-affected residential window, based on the inclusion of the above mitigation and based on the results of noise limit.

Appendix E presents a calculation protocol example from the noise model, showing the worst-case sound transmission pathway from one of the AC units to the worst-case assessment location. This calculation protocol shows all the acoustic corrections that are applied in the noise model.

Table 5.3: Predicted External Noise Levels and Assessment

Period	Predicted Noise Level,	Proposed Noise Limit L_{As}	Comparison Against Noise Limit
Daytime	39dBA	42dB	-3dB
Evening		41dB	-2dB
Night		41dB	-2dB

In light of the above, and assuming that the stated noise control is installed at the site, predicted noise levels will meet the requirements of the local planning authority.

In terms of noise levels predicted at the external façade of the British Museum, as shown in Figure 5.1, the maximum level is 56dBA. Based on the adopted criteria presented in Section 3 (55dBA-60dBA) it is clear that the levels are within the adopted suitable range.

Based on the noise model and calculations presented in Appendix E and the summaries presented above, noise levels are predicted to meet the requirements of the Local Authority.

6 CONCLUSION

CSG Acoustics Ltd has been appointed by Zorca Holding London Ltd to undertake an external plant noise assessment to support a planning application for The Zetter Hotel, 2-7 Montague Street, London WC1B 5BU.

The application includes a number of external plant items that are to be housed in a dedicated acoustic enclosure to the rear of the site. The minimum insertion loss of the acoustic enclosure is presented in Table 5.2 of this report.

The assessment has been carried out in accordance with national planning guidance and the requirements of Camden Council planning policy, and is based on a noise survey conducted over five days.

Based on the proposed location of the plant units and the inclusion of the acoustic enclosure, predicted noise levels will meet the requirements of the Local Authority at residential dwellings and also meet the adopted criteria for the British Museum.

With respect to BS4142, the operation of the plant would be considered to have a low impact on the noise climate surrounding the site.

Assuming the noise limits are met and with respect to the principles of the National Planning Policy Framework, the predicted noise levels will be at the NOEL (No Observed Effect Level) at residential dwellings.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Decibel (dB) – The unit used to describe sound. A logarithmic scale is used to describe sound pressure levels and sound power levels. The logarithms used are to base 10; hence, an increase of 10dB in sound pressure level corresponds to a doubling in perceived loudness of the sound.

Sound Power Level (SWL) – This is a product of the source alone and is independent of its surroundings. It is a measure of the amount of sound power output measured in decibels.

Sound Pressure Level (SPL) – This is a function of the source and its surroundings and is a measure of the sound pressure at a point in space. The sound pressure measured or reported can be influenced by room/mounting conditions and the distance that the measurement is taken.

Octave Bands – The human ear is sensitive to sound over a range of approximately 20 Hz to 20 KHz and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it.

"A" Weighting – A number of frequency weightings have been developed to imitate the ear's varying sensitivity to sound of different frequencies. The most commonly used weighting is the "A" weighting. The "A" weighted SPL can be measured directly or derived from octave or one-third octave band SPLs. The result is a single figure index which gives some idea of the subjective loudness of the sound, but which contains no information as to its frequency content.

Intermittency and Time-Weighting – The degree of annoyance caused by a noise also depends on its duration and intermittency of a noise. Intermittent, impulsive or repetitive noises tend to be more annoying than continuous noises. Various time-weightings have been derived to measure sounds of differing intermittences and these can be measured directly on modern equipment. The most common time-weightings in use are as follows:-

L_{90} This is the sound pressure level exceeded for 90% of the measurement period. It is widely used to measure background noise levels.

L_{eq} The equivalent continuous noise level is often used to measure intermittent noise. It is defined as the notional steady noise level that would contain the same acoustic energy as the varying noise. Because the averaging process used is logarithmic, the L_{eq} level tends to be dominated by the higher noise levels measured.

APPENDIX B: PLANNING POLICY AND GUIDANCE

NATIONAL PLANNING POLICY

NATIONAL PLANNING POLICY FRAMEWORK AND THE NOISE POLICY STATEMENT FOR ENGLAND

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

The NPPF contains four aims, which are set out at paragraph 123 in Section 11 of the document, titled *Conserving and enhancing the natural environment*:

> *"Planning policies and decisions should aim to:*
> *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
> *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
> *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them cause of changes in nearby land uses since they were established; and*
> *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

> *"NOEL – No Observed Effect Level*
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
> *LOAEL – Lowest Observed Adverse Effect Level*
> *This is the level above which adverse effects on health and quality of life can be detected.*
> *2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
> *SOAEL – Significant Observed Adverse Effect Level*
> *This is the level above which significant adverse effects on health and quality of life occur."*

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:*
> - *Avoid significant adverse impacts on health and quality of life;*
> - *Mitigate and minimise adverse impacts on health and quality of life; and*
> - *Where possible, contribute to the improvement of health and quality of life."*

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

> *"2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).*
> *2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.*
> *2.25 This aim (the third aim), seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."*

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

LOCAL PLANNING POLICY

BRITISH STANDARD 4142

British Standard (BS) 4142: 2014 *Methods for rating and assessing industrial and commercial sound* is intended to be used to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings.

The procedure contained in BS4142 for assessing the likelihood of complaints is to compare the "*specific sound level*", which is the measured or predicted sound level from the source in question immediately outside the dwelling, with the background sound level.

NOTE 1 of paragraph 8.1.4 states that when determining the background sound level for the assessment;

> "A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value"

BS4142 provides various corrective methods depending on if the sound source is tonal (0 to +6dB), impulsive (0 to +9dB) or distinctive (0 to 3dB), which can be applied.

> *"The likelihood of noise provoking complaints is assessed by subtracting the background noise level from the rating noise level. BS4142 states:*
> *a) Typically, the greater this difference, the greater the magnitude of the impact.*
> *b) A difference of around +10 dB or more is likely to be an indication of a significant adverse 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 a low impact, depending on the context.*
> *NOTE 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

In the context of the NPPF, it is considered that a situation between where BS4142 suggests a low impact (specific sound levels below the measured background noise level) and an indication of significant adverse impact (specific sound levels exceed +10dB above the measured background noise level) would equate to the Lowest Observed Adverse Effect Level (LOAEL).

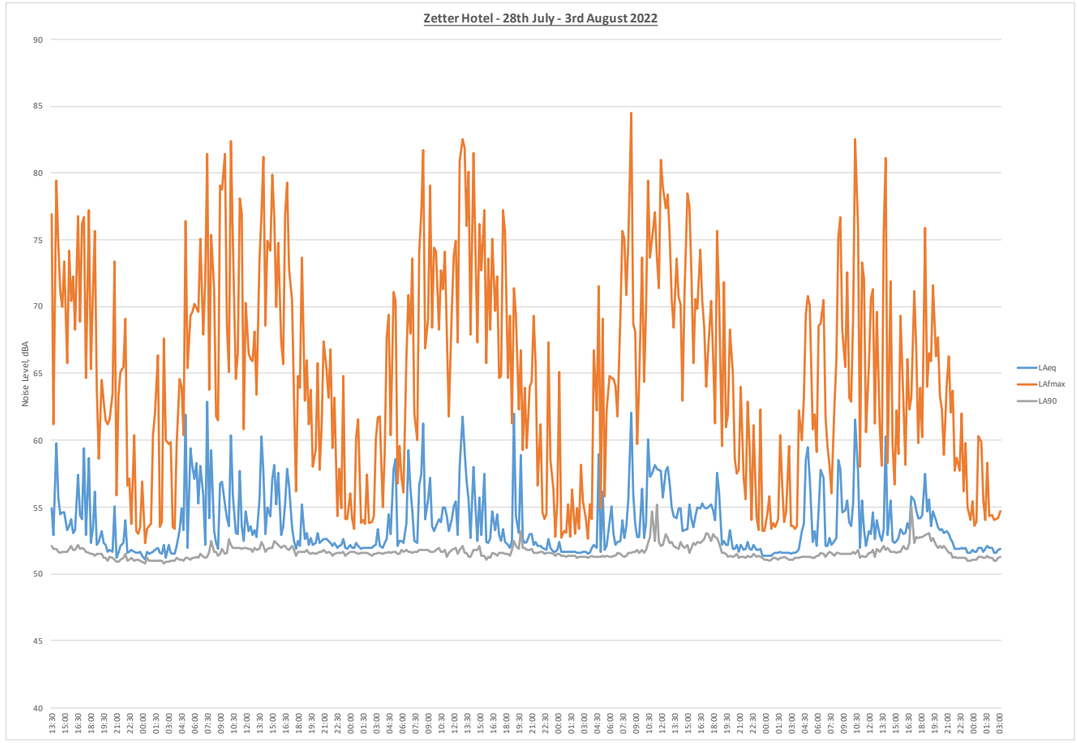
Noise levels that are more than 10dB below the measured background would equate to the No Observed Effect Level (NOEL).

Setting plant noise limits in accordance with the requirements of the LA will result in noise levels between the LOAEL and the NOEL.

This assessment is carried out over a one-hour period for the daytime and a fifteen-minute period for the night-time. Day or night are not defined in the standard but it states that night should cover the times when the general adult population are preparing for sleep or are actually sleeping. For the purposes of this assessment, it is assumed that daytime and night-time are 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

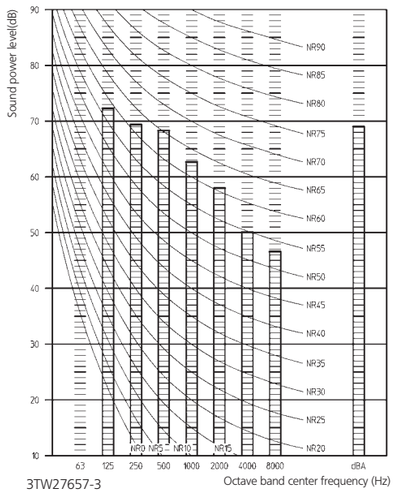
BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX C: NOISE MEASUREMENT DATA



APPENDIX D: MANUFACTURERS NOISE DATA

ERQ140AV1

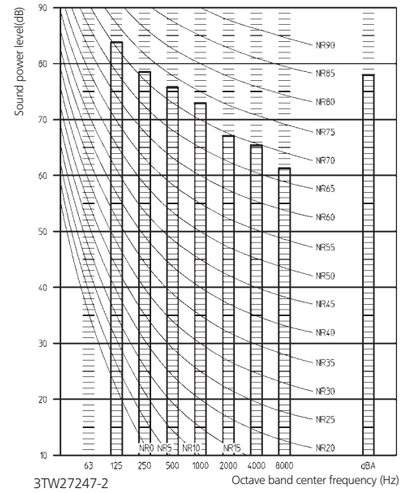


3TW27657-3

NOTES

1 dBA = A-weighted sound power level (A-scale according to IEC)
2 Refernece acoustic intensity 0dB = 10E-6μW/m²
3 Measured according to ISO 3744

ERQ200AW1



3TW27247-2

NOTES

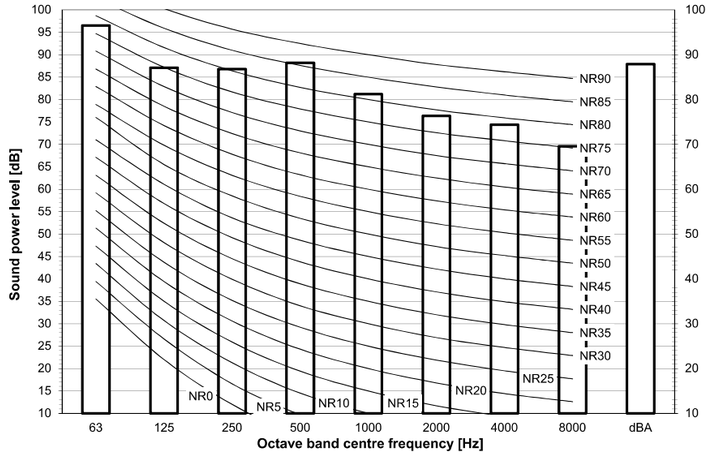
1 dBA = A-weighted sound power level (A-scale according to IEC)
2 Reference acoustic intensity 0dB = 10E-6μW/m²
3 Measured according to ISO 3744

11 Sound data

11 - 1 Sound Power Spectrum

11

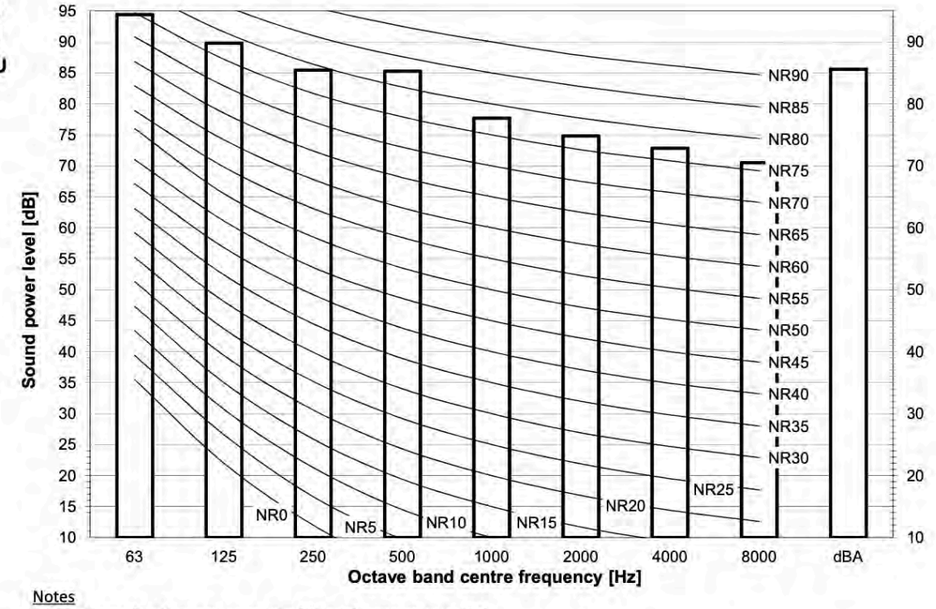
REYQ20U
RXYQQ20U
RXYQ20U
RYYQ20U
RYMQ20U



Notes
dBA = A-weighted sound power level (A scale according to IEC).
Reference acoustic intensity 0dB = 10E-6µW/m²
Measured according to ISO 3744

3D119534

REYQ16U
RXYQQ16U
RXYQ16U
RYYQ16U
RYMQ16U



Notes
dBA = A-weighted sound power level (A scale according to IEC).

RXYQQ14U
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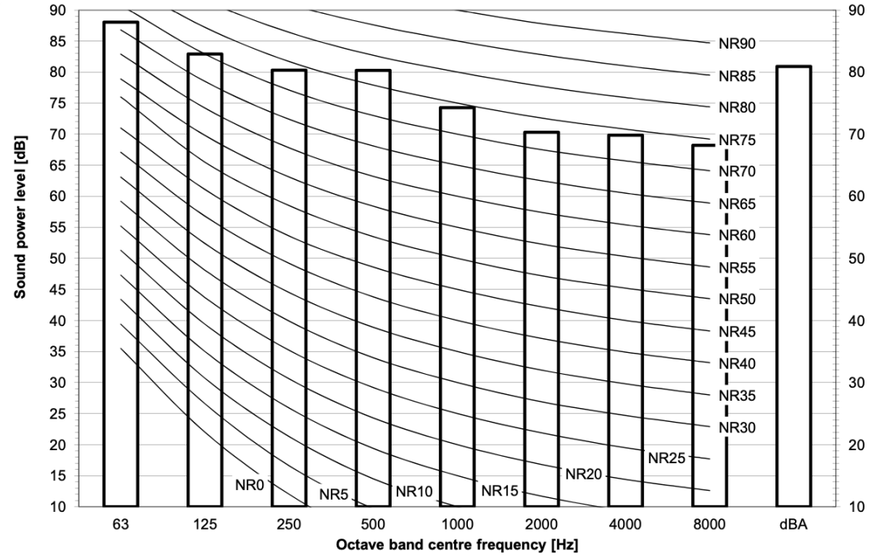
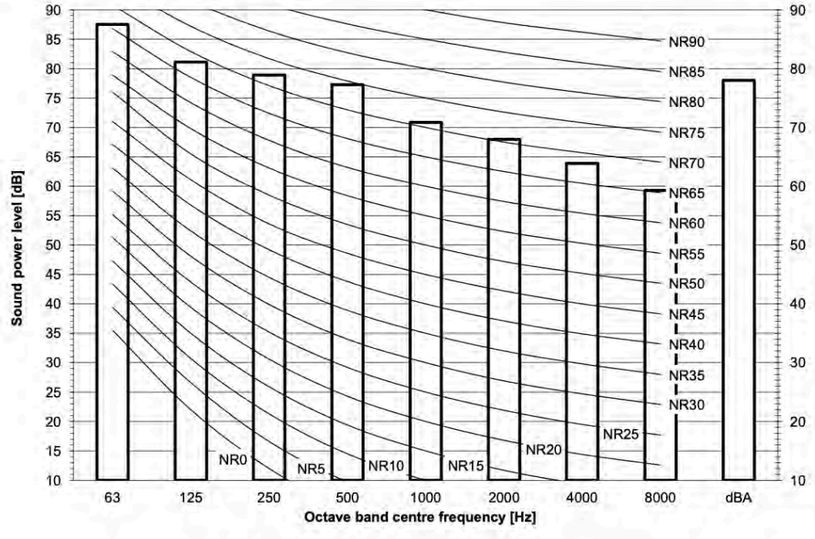
RYMQ14U



Notes
dBA = A-weighted sound power level (A scale according to IEC).
Reference acoustic intensity 0dB = 10E-6µW/m²

RXYQQ8U
RXYQ8U
RXYTQ8UYF
RYYQ8U
RYMQ8U



Notes
dBA = A-weighted sound power level (A scale according to IEC).
Reference acoustic intensity 0dB = 10E-6µW/m²
Measured according to ISO 3744

APPENDIX E: CALCULATION PROTOCOL

Point Source, ISO 9613, Name: "5_In", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	30699353.19	5711567.38	1.00	0	DEN	32	-44.4	0.0	0.0	0.0	0.0	40.5	0.0	-3.0	0.0	0.0	7.8	0.0	0.0	-89.7
1	30699353.19	5711567.38	1.00	0	DEN	63	60.8	0.0	0.0	0.0	0.0	40.5	0.0	-3.0	0.0	0.0	7.8	0.0	0.0	15.5
1	30699353.19	5711567.38	1.00	0	DEN	125	58.9	0.0	0.0	0.0	0.0	40.5	0.0	-1.4	0.0	0.0	6.3	0.0	0.0	13.5
1	30699353.19	5711567.38	1.00	0	DEN	250	62.4	0.0	0.0	0.0	0.0	40.5	0.0	0.1	0.0	0.0	4.9	0.0	0.0	16.9
1	30699353.19	5711567.38	1.00	0	DEN	500	67.8	0.0	0.0	0.0	0.0	40.5	0.1	0.3	0.0	0.0	5.0	0.0	0.0	22.0
1	30699353.19	5711567.38	1.00	0	DEN	1000	63.0	0.0	0.0	0.0	0.0	40.5	0.1	-1.1	0.0	0.0	6.8	0.0	0.0	16.7
1	30699353.19	5711567.38	1.00	0	DEN	2000	59.2	0.0	0.0	0.0	0.0	40.5	0.3	-1.5	0.0	0.0	7.9	0.0	0.0	12.0
1	30699353.19	5711567.38	1.00	0	DEN	4000	58.0	0.0	0.0	0.0	0.0	40.5	1.0	-1.5	0.0	0.0	9.1	0.0	0.0	8.9
1	30699353.19	5711567.38	1.00	0	DEN	8000	54.9	0.0	0.0	0.0	0.0	40.5	3.5	-1.5	0.0	0.0	10.8	0.0	0.0	1.6
1	30699353.19	5711567.38	1.00	0	DEN	A	71.3	0.0	0.0	0.0	0.0	40.5	0.2	-0.7	0.0	0.0	6.0	0.0	0.0	25.3