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BRUNEL UNIVERSITY SPORTS CENTRE

PLANT NOISE ASSESSMENT

Technical Report: R10230-1 Rev 0

Date: 15th September 2023

For: Brunel University,
London,
Kingston Lane,
Uxbridge,
UB8 3PH

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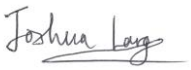
Prepared by	Joshua Large MEng AMIOA	Junior Consultant		15/09/2023
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CONTENTS **PAGE**

1.0	INTRODUCTION	4
2.0	SITE DESCRIPTION AND PROPOSALS	4
3.0	CRITERIA	4
4.0	ENVIRONMENTAL NOISE MEASUREMENTS	6
5.0	PLANT NOISE ASSESSMENT	7
6.0	CONCLUSIONS	9
REFERENCES		10
FIGURE 1	SITE OVERVIEW	11
FIGURE 2	PROPOSED PLANT LOCATION	12
APPENDIX A	ACOUSTIC TERMINOLOGY	13
APPENDIX B	ENVIRONMENTAL NOISE MEASUREMENTS	14

1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by Brunel University to undertake an assessment of noise from proposed new rooftop plant at the sports centre of Brunel University, Uxbridge.

1.2 This report presents the results of the assessment, following site visits and background noise surveys undertaken between 1st and 5th September 2023.

1.3 All noise levels in this report are presented in dB relative to 20 µPa.

2.0 SITE DESCRIPTION AND PROPOSALS

2.1 The site is located at the sports centre of Brunel University, Uxbridge, which falls under the jurisdiction of Hillingdon Borough Council. The sports centre is situated near the centre of the university, and is surrounded by other university facilities, roads, and student accommodation buildings.

2.2 The sports centre is to be developed, whereby the first-floor café will be replaced with a new gym. New services plant is proposed to serve the new gym, and will be located on the flat roof of the sports centre. As such, a noise assessment has been requested as part of the planning application.

2.3 A site overview is shown in Figure 1.

3.0 CRITERIA

NPPF & NPSE

3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should aim to:

- Mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development and avoid noise giving rise to significant adverse impacts on health and quality of life.
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life.

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'.

3.4 The Planning Practice Guidance (PPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.

3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.

<u>BS 4142: 2014+A1:2019 - Methods for Rating Industrial and Commercial Sound</u>

3.6 The documents described above do not refer to specific noise criteria, and no formal guidance has been published by Hillingdon Borough Council in relation to the assessment of noise from services plant. 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 4142:2014 [Reference 4] are adopted.

3.7 BS 4142: 2014+A1:2019 provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction of up to 15 dBA is applied.

3.8 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

Summary

3.9 Based on the above, and in line with similar proposals in the area, it is considered reasonable to target a BS 4142 plant noise rating level of at least 5 dBA below the typical background noise level during all periods at the nearest receptor locations.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

Measurement Instrumentation and Procedure

4.1 An environmental noise survey was undertaken between the 1st and 5th September 2023 in order to determine the typical background noise levels in the area.

4.2 The measurement equipment was located externally at 2nd floor level outside the student accommodation building immediately to the south of the proposed plant. The microphone was positioned in free-field conditions, and is representative of the nearest habitable receptors.

4.3 The instrumentation was set up to monitor background noise levels and store data in 5-minute intervals of the overall A-weighted L_{90} using fast time weighing. The following instrumentation was used during the survey:

- Rion NL52 Type 1 sound level meter;
- Brüel & Kjær type 4231 acoustic calibrator.

4.4 Calibration of the equipment was checked before and on completion of the measurements and no drift was recorded. Noise measurements were made in accordance with BS 7445: 1991 'Description and measurement of environmental noise Part 2 – Acquisition of data pertinent to land use' [Reference 5].

4.5 Weather conditions during the measurements were mostly dry, with short periods of rainfall. The measured noise levels were not significantly affected by the weather conditions.

4.6 The measured background noise levels are summarised in Table 1 and shown graphically in Appendix B. 24 Acoustics' interpretation of the typical background noise level is the average of the range of levels less one standard deviation.

Date (September 2023)	**Measured Typical Background Noise Level**	
	Daytime (07:00 to 23:00) dB $L_{A90\ 1\ hour}$	**Night-time (23:00 to 07:00) dB $L_{A90\ 15\ min}$**
Friday 1st	48	46
Saturday 2nd	48	46
Sunday 3rd	47	47
Monday 4th	47	46
Tuesday 5th	48	-
Representative Level	**47**	**46**

Table 1 - Measured background noise levels

4.7 The background noise climate at the measurement location is influenced by existing plant on the roof of the sports centre, and other areas of the university.

4.8 With reference to the criteria outlined in Section 3, Table 2 sets out the proposed maximum external plant noise rating levels for daytime and night-time operational periods, to be achieved by the new plant at the nearest noise-sensitive receptors.

Maximum External Plant Noise Rating Levels	
Daytime (07:00 to 19:00 hours) dB $L_{Ar\ 1\ hour}$	**Night-time (23:00 to 07:00 hours) dB $L_{Ar\ 15\ min}$**
42	41

Table 2 - Recommended maximum plant noise rating levels

5.0 PLANT NOISE ASSESSMENT

5.1 The new plant will comprise a single mechanical ventilation and heat recovery (MVHR) unit, located on the southern boundary of the sport centre's flat roof, as shown in Figure 2. It is assumed that the plant will be in operation on a 24-hour basis.

5.2 The nearest receptors are located at the student accommodation to the south of the sports centre building. The nearest habitable windows are approximately 30m from the proposed plant location.

5.3 The proposed MVHR unit is a Nuaire XBC55HA-EHN-E-LS1W. Table 3 shows the manufacturer's published sound power level data for the proposed MVHR unit.

MVHR Unit - Manufacturer's Stated Sound Power Level (dB) Octave Band Centre Frequency (Hz)										dBA
Unit	**Component**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Nuaire XBC55HA-EHN-E-LS1W	Intake	78	71	70	58	59	56	47	36	66
	Discharge	83	78	79	66	67	66	60	58	74
	Breakout	69	62	56	42	40	38	34	23	52

Table 3 - Manufacturer's sound power level data for proposed plant unit

5.4 The new plant is not expected to contain tonal or otherwise distinctive noise characteristics that are sufficiently perceptible at the nearest residential property.

5.5 Calculations have been undertaken, based on the manufacturer's stated plant noise levels, to determine the cumulative level of noise from new plant at the nearest residential properties. Calculations include distance and in-duct losses where appropriate. As a worst-case scenario, it has been assumed that the sports centre building will not provide any acoustic screening from the plant to the nearest receptors.

5.6 The resultant plant noise level at the nearest residential properties is 39 dB $L_{Aeq\ T}$.

5.7 Based on the above predicted plant noise level, a BS 4142 assessment has been undertaken, the results of which are summarised in Table 4.

BS 4142 Plant Noise Assessment 24-hour Operation	
Representative Background Noise Level	46 dB $L_{A90\ 15\ min}$
Specific Source Noise Level	39 dB $L_{Aeq\ 15\ min}$
Rating Correction	0 dB
Rating Noise Level	39 dB $L_{Ar,\ 15\ min}$
BS 4142 Assessment Level	-7

Table 4 - BS 4142 plant noise assessment results (24-hour operation)

5.8 The assessment in Table 4 demonstrates that the proposed plant will achieve the established noise criterion (5 dB below the typical background noise level) at all times and is therefore acceptable.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd have been instructed by Brunel University to undertake a noise assessment for new rooftop plant at the university's sports centre.

6.2 An environmental noise survey has been undertaken to determine the existing background noise levels representative of nearby residential properties.

6.3 Calculations have been undertaken, based on manufacturers' noise data, to determine the plant noise levels at the nearest noise-sensitive receptors.

6.4 The assessment demonstrates that the proposed plant will achieve the established noise criterion (5 dB below the typical background noise level) at all times, and is therefore acceptable.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, July 2021.

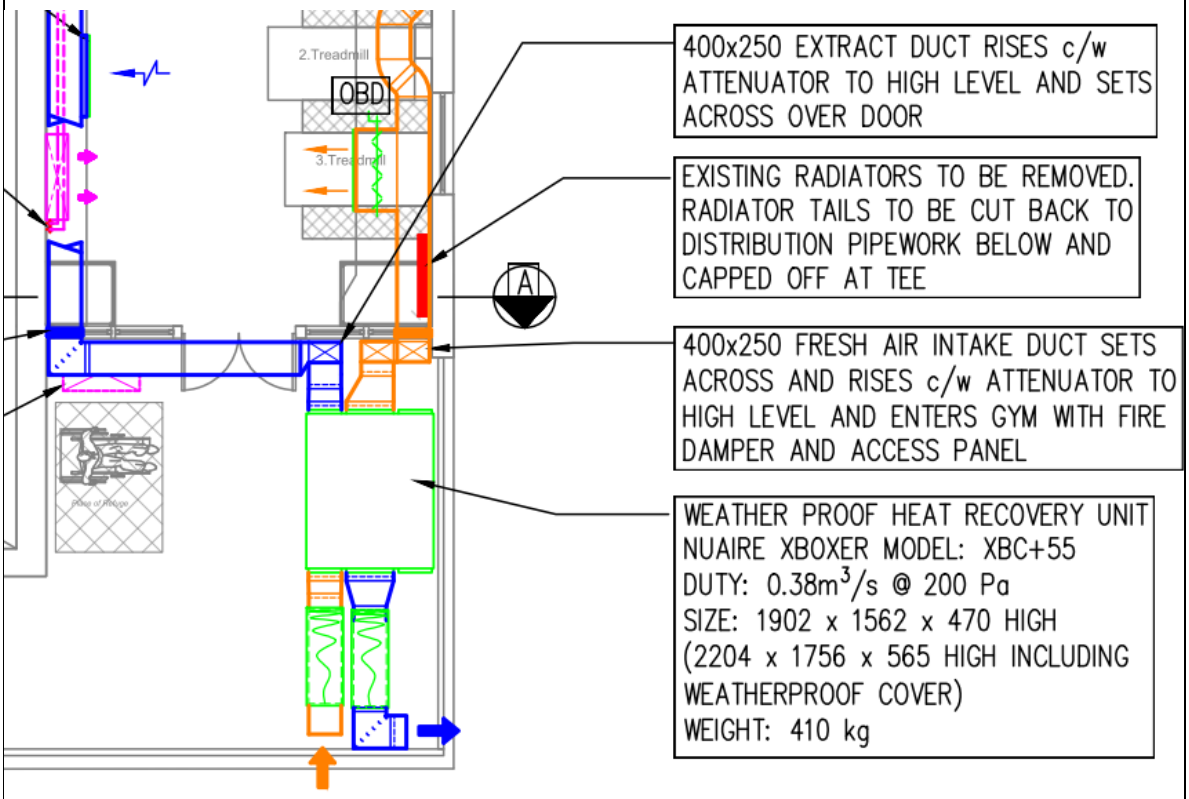
2. DEFRA, Noise Policy Statement for England, March 2010.

3. Planning Practice Guidance - Noise, Department of Communities and Local Government (revised July 2019).

4. British Standards Institution. British Standard 4142: Methods for rating and assessing commercial and industrial sound, 2014. BS 4142:2014+A1:2019

5. British Standards Institution. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use.

Project: Brunel University Sports Centre	**Title:** Site overview		
DWG No: Figure 1	**Scale:** N.T.S.	**Rev: -**	
Date: September 2023	**Drawn By:** JL	**Job No:** 10230	



Project: Brunel University Sports Centre	**Title:** Proposed plant location		24Acoustics
DWG No: Figure 2	**Scale:** N.T.S.	**Rev: -**	
Date: September 2023	**Drawn By:** JL	**Job No:** 10230	

APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – ENVIRONMENTAL NOISE MEASUREMENTS