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55 VASTERN ROAD, READING
DESKTOP ACOUSTIC REVIEW

Technical Report: R10314-26 Rev 0

Date: 22nd September 2026

For: Berkeley Homes (Oxford & Chiltern) Ltd

24 Acoustics Document Control Sheet**Project Title:** 55 Vastern Road, Desktop Acoustic Review**Report Ref:** R10314-26 Rev 0**Date:** 22nd September 2026

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Berkeley Homes to provide a desktop acoustic report in connection with planning application PL/26/0298 and the proposed amended wording of Condition 45 for Block B, The Goods Warehouse.
- 1.2 The purpose of this report is to consolidate the acoustic information already submitted to Reading Borough Council and confirm, at design stage, that the proposed mechanical ventilation with heat recovery (MVHR) arrangement is capable of achieving the low frequency internal noise criteria in NANR 45 for noise arising from the adjacent electricity substation.
- 1.3 This is not the final completion verification report. The proposed condition requires the detailed MVHR scheme and demonstration of compliance to be submitted prior to first occupation. That later submission can include calculation and/or measurement of the completed installation across the full 10 Hz to 160 Hz frequency range stated in the condition.

2.0 BACKGROUND

- 2.1 The acoustic position was considered extensively during the 2021 planning appeal. The Statement of Common Ground records that transportation noise, including road traffic on Vastern Road, can be satisfactorily mitigated. The outstanding acoustic issue related to noise from the adjacent SSE substation. NANR 45 was agreed as the appropriate means of assessing the low frequency component of that source.
- 2.2 Two subsequent 24 Acoustics submissions directly address the proposed MVHR transmission path:
- R10314-22 Rev 0, dated 31st May 2025: desktop assessment of transmission of SSE equipment noise through the proposed MVHR system.
 - R10314-23 Rev 1, dated 27th February 2026: further information, including an empirical transmission test using an installed MVHR system at Kenavon Drive.
- 2.3 The present report brings that existing evidence together against the wording now proposed for Condition 45. It does not reopen matters already agreed at appeal.

3.0 ASSESSMENT CRITERIA

- 3.1 The proposed condition requires the internal low frequency noise levels in habitable rooms to comply with the criterion levels in Table 2 of NANR 45 Revision 1, assessed in one third octave bands from 10 Hz to 160 Hz. The assessment is to assume continuous operation of the adjacent electricity substation. The proposed wording is given below:

Prior to the first occupation of the relevant residential unit (s) within Block B - The Goods Warehouse, details of a scheme for the design, installation and ongoing maintenance of the mechanical ventilation with heat recovery (MVHR) system shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall demonstrate, by calculation and/or measurement, that when the MVHR system is in operation with windows closed, the internal low frequency noise levels within all habitable rooms will not exceed the criterion levels set out in Table 2 of NANR 45 revision 1 (Procedure for the assessment of low frequency noise complaints, Defra, December 2011), assessed in 1/3 octave bands between 10 Hz and 160 Hz. The assessment shall assume continuous operation of the adjacent electricity substation over a 24 hour period and no daytime relaxation (5 dB correction) shall be applied under all operating conditions. The approved MVHR system shall thereafter: be installed in accordance with the approved details prior to occupation; permanently retained and maintained in accordance with the manufacturer's specification; and, operated so as to ensure the above internal noise criteria are achieved at all times.

- 3.2 The relevant NANR 45 criterion curve is summarised in Table 1.

Sound Pressure Level (dB) per 1/3 Octave Band Frequency (Hz)						
40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
49	43	42	40	38	36	34

Table 1: NANR 45 Criteria

4.0 PREVIOUS WORK

- 4.1 Report R10314-22 Rev 0 assessed the proposed MVHR arrangement with inlet and outlet attenuators fitted. The source levels represented the SSE equipment at the nearest part of the building with the transformer cooling fans operating.
- 4.2 Calculations have been undertaken using the source levels and attenuation assumptions set out in R10314-22 Rev 0. Resultant values are shown in Table 2 below.

Sound Pressure Level (dB) per 1/3 Octave Band Frequency (Hz)						
40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
31	35	26	27	24	19	15

Table 2: Resultant SPLs

- 4.3 The predicted internal levels are below the NANR 45 criterion in each one third octave band, with margins of 8 - 19 dB. The previous assessment demonstrated that the proposed MVHR arrangement, incorporating the specified attenuation, is capable of controlling the relevant low frequency substation noise.
- 4.4 R10314-23 Rev 1 provided further evidence following a transmission test on an operating MVHR installation at the Kenavon Drive development. A powered external loudspeaker was adjusted to reproduce the relevant external SSE cooling fan noise level and internal sound levels were measured at 1 m from the MVHR terminal, without contribution from the façade.
- 4.5 The measured levels were below the NANR 45 criteria levels throughout the assessed range and are lower than the corresponding desktop predictions. This provides practical confirmation that sound transmission through a normally installed and attenuated MVHR path is low.

5.0 CURRENT PLANNING APPLICATION

- 5.1 For the current application, the relevant assessment is low frequency noise arising from the adjacent electricity substation. Additional information and assumptions regarding the calculated resultant internal noise levels, assuming plane wave transmission, are shown in Appendix A.
- 5.2 This demonstrates that low frequency sound transmission via the proposed MVHR arrangement is capable of meeting the NANR 45 internal criteria.

6.0 CONCLUSIONS

- 6.1 This desktop assessment demonstrates that the proposed MVHR design is capable of achieving the NANR 45 criteria. The revised condition can therefore appropriately be expressed as a compliance condition, with final verification of the completed installation undertaken prior to first occupation.

APPENDIX A

24 Acoustics has reviewed the potential transmission of low frequency sound from the SSE transformer (during cooling mode) into a furnished room through an MVHR intake and associated ductwork. The assessment considers external sound entering a 90 mm x 225 mm rigid duct, passing through an in duct attenuator, breaking out from approximately 4 m of ductwork within the ceiling void and then transmitting through a single 12.5 mm plasterboard ceiling into the room below. The purpose of this section is to provide a standalone technical assessment of this transmission path for the planning application.

Assessment basis

The receiving room is approximately 3 m x 4 m x 2.4 m high. A reverberation time of 0.5 seconds has been adopted for the spatial average assessment. The ductwork is fitted with inlet and outlet attenuators. The ceiling comprises a single layer of 12.5 mm plasterboard.

Parameter	Assessment basis
Duct cross section	90 mm x 225 mm
Duct construction	2 mm rigid plastic
Ceiling	Single 12.5 mm plasterboard
Receiving room	3 m x 4 m x 2.4 m (worst case)
Room reverberation time	0.5 seconds

Duct propagation and entrance coupling

The first transverse mode cut off frequency for the 225 mm duct dimension is approximately 762 Hz. The 40 Hz to 160 Hz assessment range is therefore well below cut off and propagation within the duct can be represented by the fundamental plane mode.

At low frequency, the acoustic impedance at a small duct termination is poorly matched to the characteristic impedance of the duct. CIBSE Guide B4 describes the resulting loss as end reflection loss. For the reciprocal case considered here, where an external sound field excites the same duct mode in the reverse direction, the same coupling loss is applied at the intake. This follows from acoustic reciprocity for a passive linear system. The loss is applied once at the external air to duct mode interface and is not applied again to duct wall breakout after the in duct pressure field has been established.

For the 90 mm x 225 mm opening the equivalent circular diameter is 0.161 m. Using the CIBSE Guide B4 expression for a flush termination gives entrance coupling losses of approximately 21.3, 19.5, 17.7, 15.8, 14.0, 12.3 and 10.4 dB from 40 Hz to 160 Hz respectively.

Prediction method

The predicted room level has been determined by applying, in sequence, the entrance coupling loss, the specified attenuator insertion loss, duct breakout loss and the low frequency transmission loss of the plasterboard ceiling. A simple mass law estimate based on a nominal plasterboard surface density of 9 kg/m² has been used for the ceiling. The room volume is 28.8 m³ and the adopted 0.5 second reverberation time gives an equivalent absorption area of approximately 9.27 m².

Predicted internal low frequency levels

The external source spectrum supplied for assessment and the resulting spatial average internal sound pressure levels are set out below. The calculation addresses the 40 Hz to 160 Hz range for which source data have been measured directly and which contains the key low frequency components of interest.

Parameter	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
External source level, dB	59	66	59	61	61	57	55
Entrance coupling loss, dB	21.3	19.5	17.7	15.8	14	12.3	10.4
Attenuator insertion loss, dB	2	4	6	6.5	7.5	8	10
Duct breakout loss, dB	2	2.5	2.5	3	4.5	5	5
12.5 mm plasterboard loss, dB	4.1	6.1	8.1	10.1	12.1	14	16.2
Room area correction, dB	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1
Total reduction, dB	28.3	31.0	33.2	34.3	37	38.2	40.5
Predicted internal level, dB	31	35	26	27	24	19	15
NANR45 night reference, dB	49	43	42	40	38	36	34
Margin below reference, dB	18	8	16	13	14	17	19

The predicted spatial average level is approximately 35 dB at 50 Hz, compared with a NANR 45 reference level of 43 dB. The resulting margin is approximately 8 dB. Greater margins are predicted in all other assessed bands.