

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Hatfield JLR, Beacon 62, Huyton

Acoustic planning report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds, Bristol

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Summary

Sandy Brown has been commissioned by McLean & Appleton (Holdings) Ltd to provide acoustic advice in relation to the proposed Jaguar Land Rover development within the Beacon 62 development at Cronton Road, Huyton.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was performed between 12:00 on 12 December 2024 and 13:45 on 17 December 2024.

The representative background sound levels from the noise survey corrected to be representative of the closest noise sensitive receptor were $L_{A90,15min}$ 66 dB during the day, and $L_{A90,15min}$ 47 dB during the night.

A BS4142 assessment has been carried out to assess the potential noise impact associated with the proposed noise generating operations and plant. This includes HGV movements, loading and deliveries to the site, vehicle valet services (jet washing) and noise associated with the proposed plant equipment.

At the nearest noise sensitive premises, cumulative noise egress from the proposed operations and plant noise associated with the development is predicted to result in noise rating levels (BS4142) no higher than $L_{Aeq,1hr}$ 40 dB during the day and $L_{Aeq,15min}$ 36 dB during the night. This indicates that the risk of noise impact is negligible.

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1 Introduction

Sandy Brown has been commissioned McLean & Appleton (Holdings) Ltd to provide acoustic advice in relation to the proposed Jaguar Land Rover development within the Beacon 62 development at Cronton Road, Huyton.

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing background sound levels in the vicinity of nearby noise sensitive premises and to set appropriate limits for noise egress from building services plant.

This report presents the survey method and results, and a discussion of acceptable limits for noise emissions from building services plant.

A noise impact assessment has been undertaken in line with BS 4142 based on the latest development proposals.

2 Site description

2.1 The site and its surroundings

The site currently comprises open land. It is bound to the north and east by Coppice Lane with the wider Beacon 62 development and Cronton Road beyond. The site is bound to the south by the M62 motorway, and to the west by farmland and a residential property. The site location in relation to its surroundings is shown in Figure 1.



Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

To the north-east, the wider Beacon 62 development comprises an Aldi, KFC, Highways England Depot, Starbucks, and a Shell Car wash.

The nearest premises considered to be noise sensitive receptors are:

- Residential farmhouse the west shown in blue in Figure 1.
- Residential dwellings on Sevenoak Grove to the west shown in green in Figure 1.

3 Development proposals

Proposals include for the construction of a vehicle servicing workshop and show room building for Jaguar Land Rover (JLR) with office and meeting spaces and a car park.

The construction of an additional preparation building situated within the carpark is included within the proposals.

Vehicle deliveries have been confirmed to occur anytime between 07:00 and 18:00 hrs throughout the week with a parts delivery proposed at 02:30 hrs Tuesday to Saturday.

4 Building services noise egress criteria

4.1 Standard guidance

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at nearby noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background sound level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

4.2 Local Authority criteria

The *Knowsley Local Plan Core Strategy January 2016* makes the following reference to protecting local amenity for new development:

'The design of new development should avoid unacceptable impacts which affect the amenity and living conditions of occupiers of buildings. Such effects can include the generation of noise...'

As such, it is considered that compliance with BS 4142:2014:+A1:2019 should be sufficient to demonstrate a reasonable protection of local amenity in relation to the proposed development.

5 Noise survey method

The survey included unattended and attended noise measurements.

5.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 5 days.

The unattended measurements were taken over 15-minute periods between 12:00 on 12 December 2024 and 13:45 on 16 December 2024.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'A'. A photograph showing the measurement position is provided in Figure 2. The microphone was installed at 1.8 m above local ground and the position was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

Details of the equipment used and the noise indices measured are provided in Appendix A.



Figure 2 Long-term measurement position 'A'

5.2 Attended measurements

Attended sample measurements were taken at 2 locations around the site. These are indicated in Figure 1 as positions 1 and 2. The measurements were carried out on 16 December 2024. All measurements were 15 minutes in duration.

At each position the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 3 m from any other reflective surface.

Measurement position 1 was chosen to be representative of noise levels at the closest noise sensitive receptor and is shown in Figure 3. Measurement position 2 was chosen to be representative of noise levels in the northern portion of the site and is shown in Figure 4.

Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.



Figure 3 Measurement position 1



Figure 4 Measurement position 2

5.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

6 Noise survey results

6.1 Observations

The dominant noise sources observed at the site during the survey were from road noise on the M62 motorway which is adjacent to the site.

Less significant noise sources included aeroplanes infrequently flying over the site.

6.2 Noise measurement results

6.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Thursday 12 December 2024	73 ^[1]	68
Friday 13 December 2024	73	68
Saturday 14 December 2024	73	68
Sunday 15 December 2024	72	68
Monday 16 December 2024	73 ^[1]	-
Average	73	68

^[1] Measurement not made over full period due to monitoring start and end time (the measurement on 12 December 2024 was over 11 hours, and on 16 December 2024 over 6.5 hours); not included in the average.

In line with BS 4142:2014+A1:2019, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Day and night statistical analysis of representative values for the site are given in Figure 5 and Figure 6.

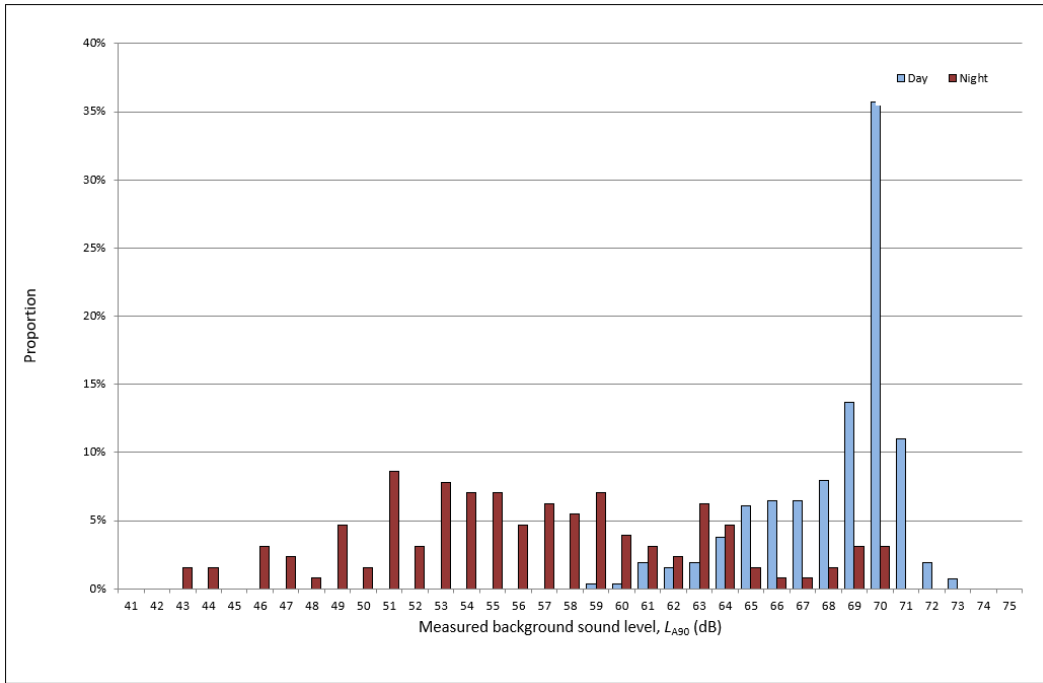


Figure 5 Background sound levels histogram

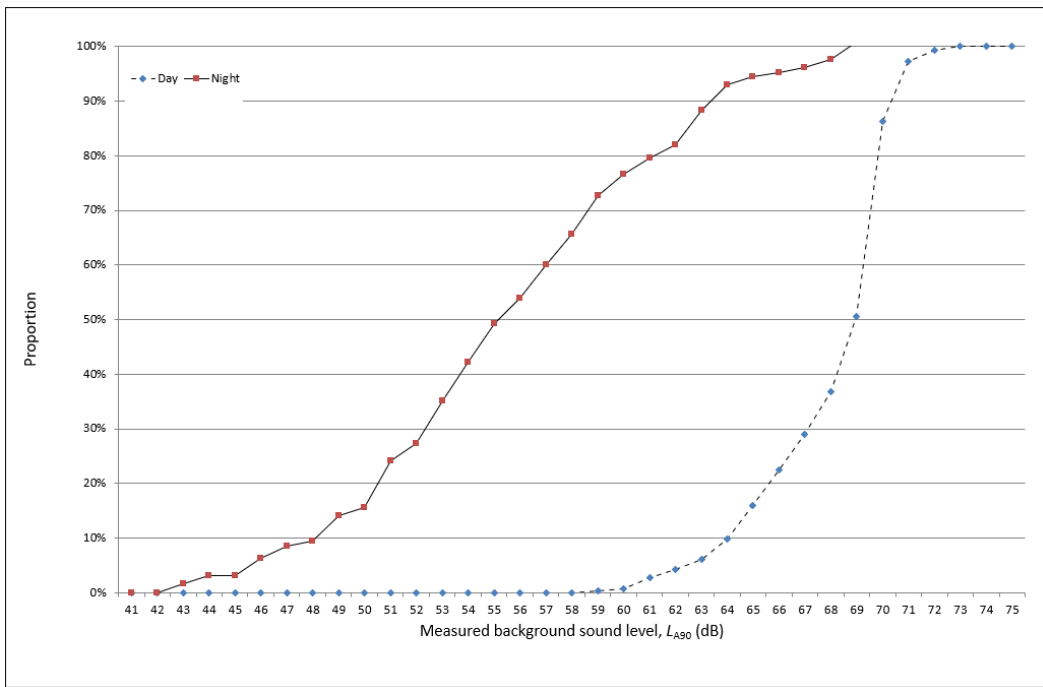


Figure 6 Cumulative background sound levels

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 70 dB during the day and $L_{A90,15min}$ 51 dB at night.

As measurement position A is located closer to the M62 than the closest noise sensitive receptor, these noise levels have been distance corrected to $L_{A90,15min}$ 66 dB during the day and $L_{A90,15min}$ 47 dB at night.

6.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 2.

Table 2 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	12:30	70	75	66	Road noise on the M62
1	12:45	69	75	66	Road noise on the M62
2	13:15	60	65	59	Road noise on the M62
2	13:30	59	65	58	Road noise on the M62

7 Noise impact assessment

7.1 Operational noise

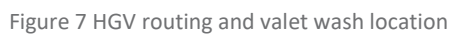
The assessment considers operational noise from the development, including:

- A worst case 1 hour period of the day including for 5 no. HGV deliveries
- 2 x power washers operating simultaneously (assumed 50% on-time during a 1-hour period) within the carpark during the day.

It has been confirmed by the client that 1 no. HGV delivery is proposed to take place within the night period. The sound pressure levels of items generating operational noise are as follows:

- HGV arrival / departure – L_{Aeq} 65 dB at 10 m
- HGV reversing with alarms - L_{Aeq} 75 dB at 10 m
- HGV Unloading - L_{Aeq} 82 dB at 1 m
- Jetwash - L_{Aeq} 86 dB at 1 m

The proposed HGV routes are shown in red, and the valet wash is highlighted in blue in Figure 7. The unloading position has been modelled at the end of the HGV route adjacent to the proposed JLR building.



A plant terrace is proposed on level 1 and includes the following equipment:

- VRF AHU First Floor AM200AXVGGR/EU – L_{wA} 87 dB
- VRF AHU Ground Floor AM240AXVGGR/EU – L_{wA} 84 dB
- 2 x DX AHU Condensers AM160AXVGGH/EU – L_{wA} 81 dB
- DX Split system AC071RXADKG/EU – L_{wA} 65 dB
- Hydro ASHP AM160AXVGGH/EU- L_{wA} 81 dB
- Dalair AHU Supply – L_{wA} 94 dB
- Dalair AHU Exhaust – L_{wA} 90 dB
- Swegon Gold AHU which is internal with intake/exhaust terminations to the terrace facade.

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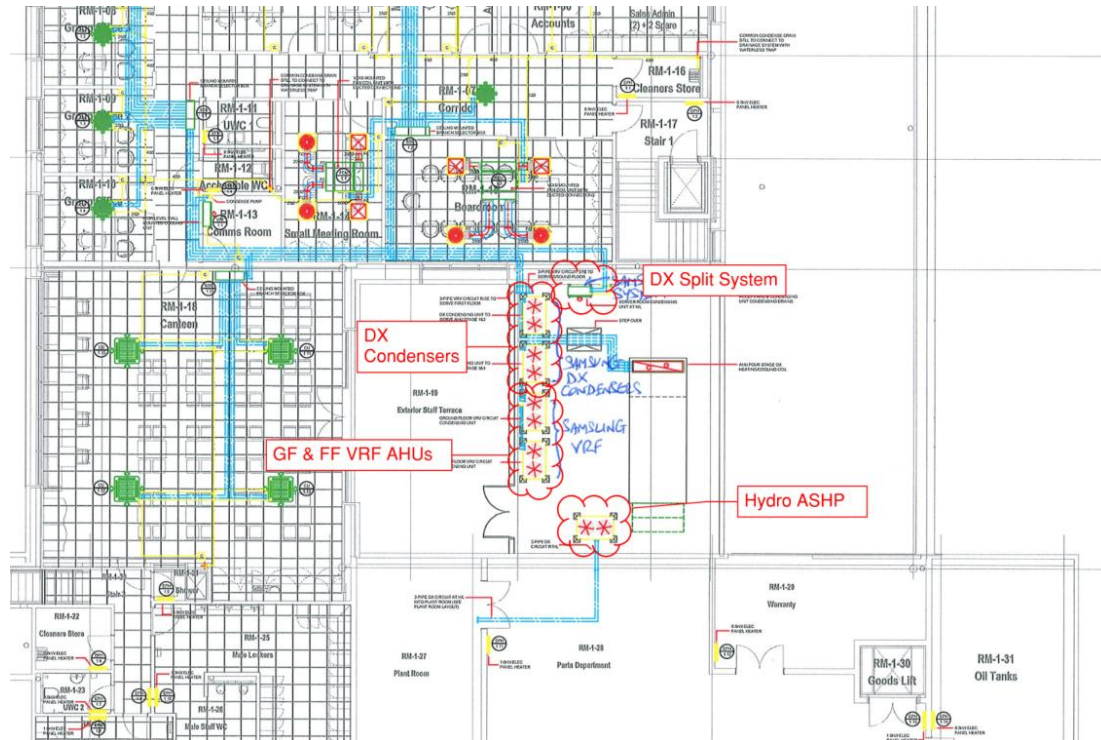


Figure 8 Plant item locations

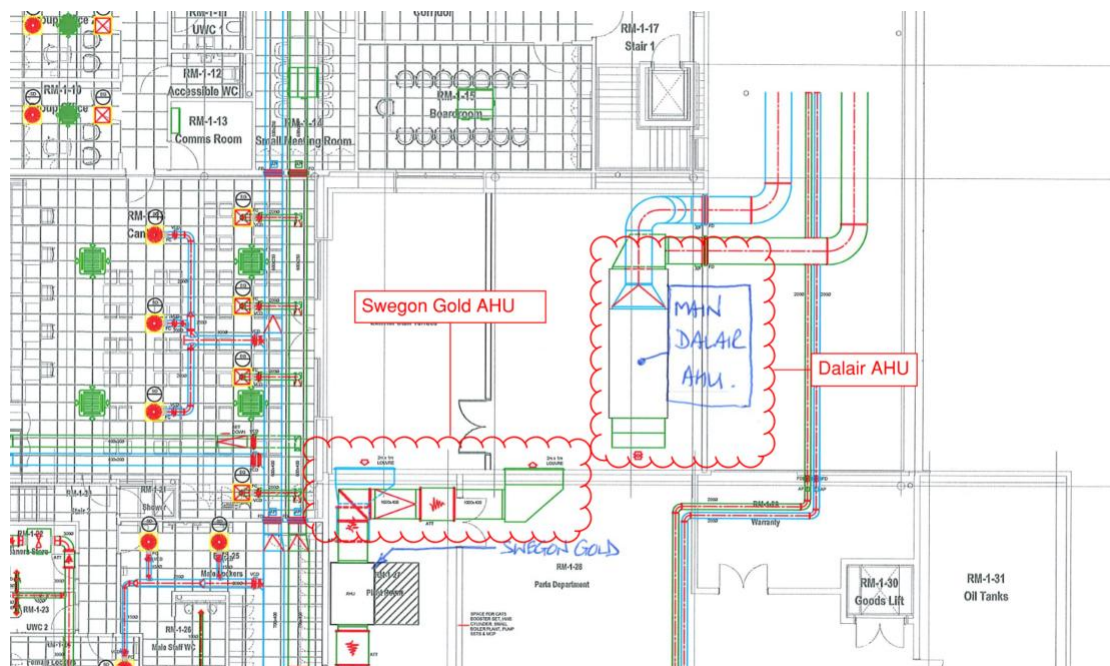


Figure 9 Plant item locations

The octave band sound power levels for relevant items of plant are shown below in Table 3.

Table 3 Plant items sound power octave band spectrum - Dalair

Plant item	Sound power levels, L_w (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Dalair Supply	82	94	91	89	88	89	85	79
Dalair Exhaust	81	90	85	86	85	85	81	76

The octave band sound pressure levels for relevant items of plant are shown in Table 4.

Table 4 Plant items sound pressure octave band spectrum – other plant items

Plant item	Sound pressure levels at 1 m, L_{Aeq} (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
VRF AHU	67	60	59	61	55	50	47	40
DX AHU	60	59	60	57	52	46	45	39
DX Split	55	49	52	47	44	38	34	23
ASHP Hydro	60	59	60	57	52	46	45	39

At the time of writing no data for the Swegon Gold AHU units has been made available, as such the supply and exhaust louvres are both assumed to have a worst-case sound power level of L_{WA} 110 dB for this assessment. Atmosphere side attenuators are proposed for the AHU and so it is likely that the noise levels will be significantly lower than this in practice.

7.3 3D acoustic modelling

A 3D environmental noise model of the proposed development has been generated using CadnaA software by Datakustic. This allows assessment of noise ingress to incorporate the screening that the proposed development will provide when completed.

The software carries out calculations using a ray tracing technique. This takes account of the effects of topography, reflections, screening and distance attenuation for the noise sources to predict noise levels in three dimensions. Calculations are carried out in accordance with ISO 9613 *Attenuation of sound during propagation outdoors*.

The model was calibrated using the noise levels for each plant item detailed above, including operational on-time and the following BS 4142 corrections for attention catching characteristics, as per Appendix C:

- HGV reversing with alarms - including for 'just perceptible' BS 4142 character corrections for impulsivity and tonality
- HGV Unloading - including for 'just perceptible' BS 4142 character correction for impulsivity
- Jetwash - including for 'just perceptible' BS 4142 character correction for impulsivity.

Images from the 3D environmental noise model are provided in Figure 10 and 11.



Figure 10 Image from 3D acoustic model

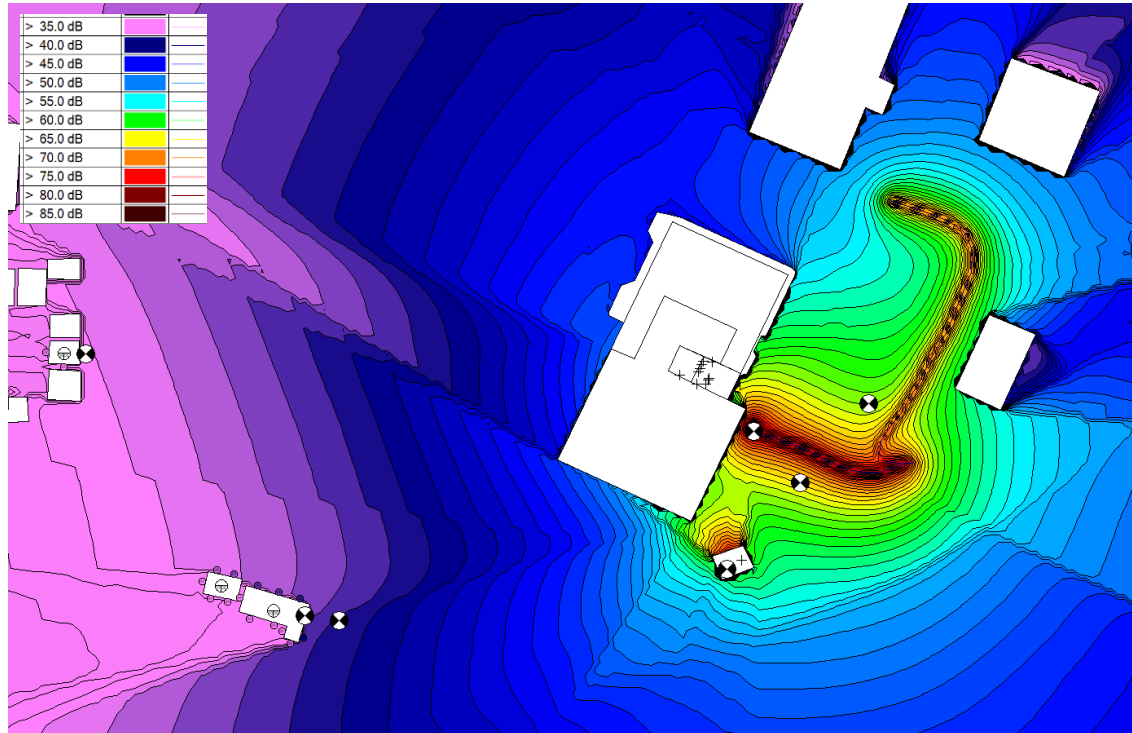


Figure 11 2D Noise contours at 1.5 m above ground

The predicted noise egress levels associated with the development at the nearest noise sensitive premises from operational noise and plant noise are summarised in Table 5.

Table 5 Predicted noise egress levels at the nearest noise sensitive premises

Noise sensitive premises	Predicted plant noise egress level at 1 m from the noise sensitive premises, L_{Aeq} (dB)	
	Day (07:00 - 23:00)	Night (23:00 - 07:00)
Residential farmhouse	40	36
Residential houses on Sevenoak Grove	36	33

Assuming the Swegon Gold AHU Supply and Exhaust louvres do not exceed a sound power level of L_{WA} 110 dB each, the predicted noise levels at the nearest residential premises are well below the representative background noise levels.

As such, it is predicted that the cumulative noise impact associated with operational and plant noise will be negligible at existing noise sensitive receptors.

8 Conclusion

The representative background sound levels from the noise survey corrected to be representative of the closest noise sensitive receptor were $L_{A90,15min}$ 66 dB during the day, and $L_{A90,15min}$ 47 dB during the night.

At the worst affected noise sensitive premises, noise egress from operational and plant noise associated with the development would result in noise levels of L_{Aeq} 40 dB during the day and L_{Aeq} 36 dB during the night.

The predicted noise levels at the nearest residential premises are well below the representative background noise levels. As such, it is predicted that the cumulative noise impact associated with operational and plant noise will be negligible at existing noise sensitive receptors.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-52 sound level meter and a B&K 2250 sound level meter, respectively.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
<i>Rion NL-52</i>				
Sound level meter	NL-52/01010788	Rion	20 Sep 25	TCRT23/1666
Microphone	UC-59/20416	Rion	20 Sep 25	TCRT23/1666
Pre-amp	NH-25/11436	Rion	20 Sep 25	TCRT23/1666
Calibrator	SV30A/10559	Svantek	20 Sep 25	TCRT23/1665
<i>B&K 2250</i>				
Sound level meter	2250/3011964	Brüel & Kjær	11 Sep 25	UCRT23/2163 UCRT23/2167
Microphone	4189/3100176	Brüel & Kjær	11 Sep 25	UCRT23/2163 UCRT23/2167
Pre-amp	ZC0032/26376	Brüel & Kjær	11 Sep 25	UCRT23/2163 UCRT23/2167
Calibrator	4231/3019123	Brüel & Kjær	11 Sep 25	UCRT23/2162

[1] Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg, L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS 7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Weather conditions

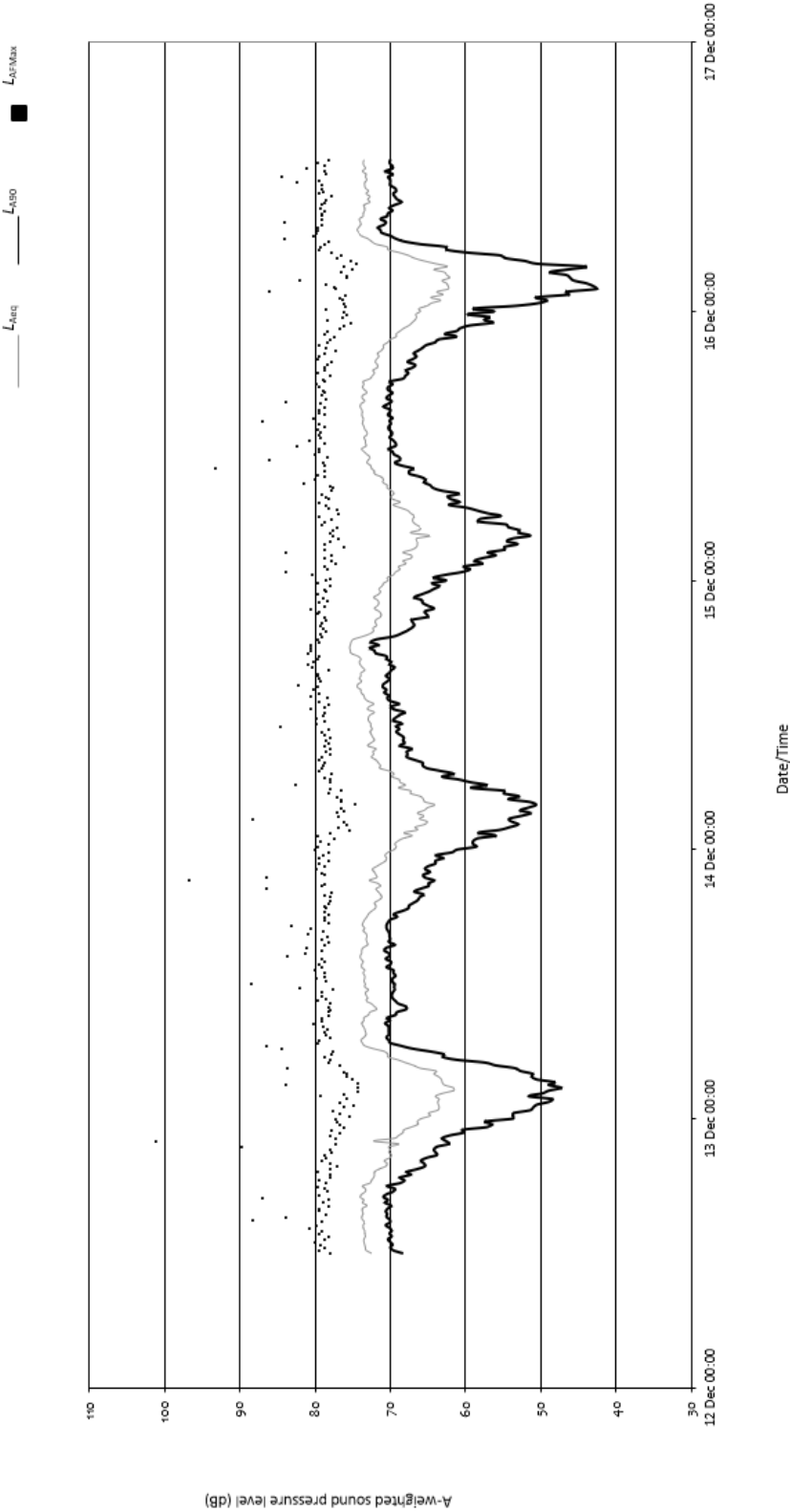
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 5°C at night and 12°C during the day, and the wind speed was less than 5 m/s. During the noise measurements, the weather was generally clear and dry and no rain occurred.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Position A

Hatfield JLR
Results of noise logging survey at Position A
12 December 2024 to 16 December 2024



Appendix C

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.