SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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45-54 Saffron Hill and 3 Saffron Street

Acoustic planning report

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A	29 Nov 23		Jessica Wright	Matthew Robinson
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C	20 Mar 24	Minor update to Section 4.1	Jessica Wright	Matthew Robinson

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Summary

Sandy Brown has been commissioned by Saffron Hill Investment Holdings Limited (the Applicant) to provide an assessment of noise in relation to the proposed development at 45-54 Saffron Hill and 3 Saffron Street, London.

An environmental noise survey has been carried out at the site. The unattended noise survey was carried out between 5 and 10 October 2023 with attended measurements carried out on 16 October 2023. Vibration measurements were carried out on 5 October 2023.

Representative background sound levels measured during the survey were $L_{A90,15min}$ 47 dB during the day and $L_{A90,15min}$ 44 dB at night.

Based on the requirements of London Borough of Camden (LBC) and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 40 dB during the day and $L_{Aeq,15min}$ 37 dB during the night. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

The average ambient noise levels measured during the survey were $L_{Aeq,16h}$ 52 dB during the day and $L_{Aeq,8h}$ 49 dB at night.

Assessment of tactile vibration concludes that it is unlikely to be problematic for the proposed development.

Contents

1 Introduction

Sandy Brown has been commissioned by Saffron Hill Investment Holdings Limited (the Applicant) to provide an assessment of noise in relation to the proposed development at 45-54 Saffron Hill and 3 Saffron Street, London.

An environmental noise survey has been carried out to establish:

- background sound levels around the site and by nearby noise sensitive premises
- ambient and maximum noise levels at the site
- vibration levels affecting the site.

The background sound levels measured during the survey are used as the basis for setting limits for noise emission from proposed building services plant. These limits are set in accordance with the requirements of the London Borough of Camden (LBC) set out in Section 4.

Vibration levels will be used to assess the degree to which the proposed development may be affected by ground-borne tactile vibration from the railway nearby to the site.

This report provides details of the noise and vibration surveys, including measurement results, and provides plant noise egress limits in line with the requirements of LBC.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1, outlined in red. The site is bounded on three sides with St Cross Street to the south, Saffron Hill to the west and Saffron Street to the north. Farringdon Road (A201) runs to the east.

The existing car park and offices will be demolished with a new office building proposed on the site. The neighbouring train and tube lines are Thameslink, Metropolitan, Hammersmith and City and Circle lines approximately 55 m to the east and Elizabeth line approximately 160 m to the south.

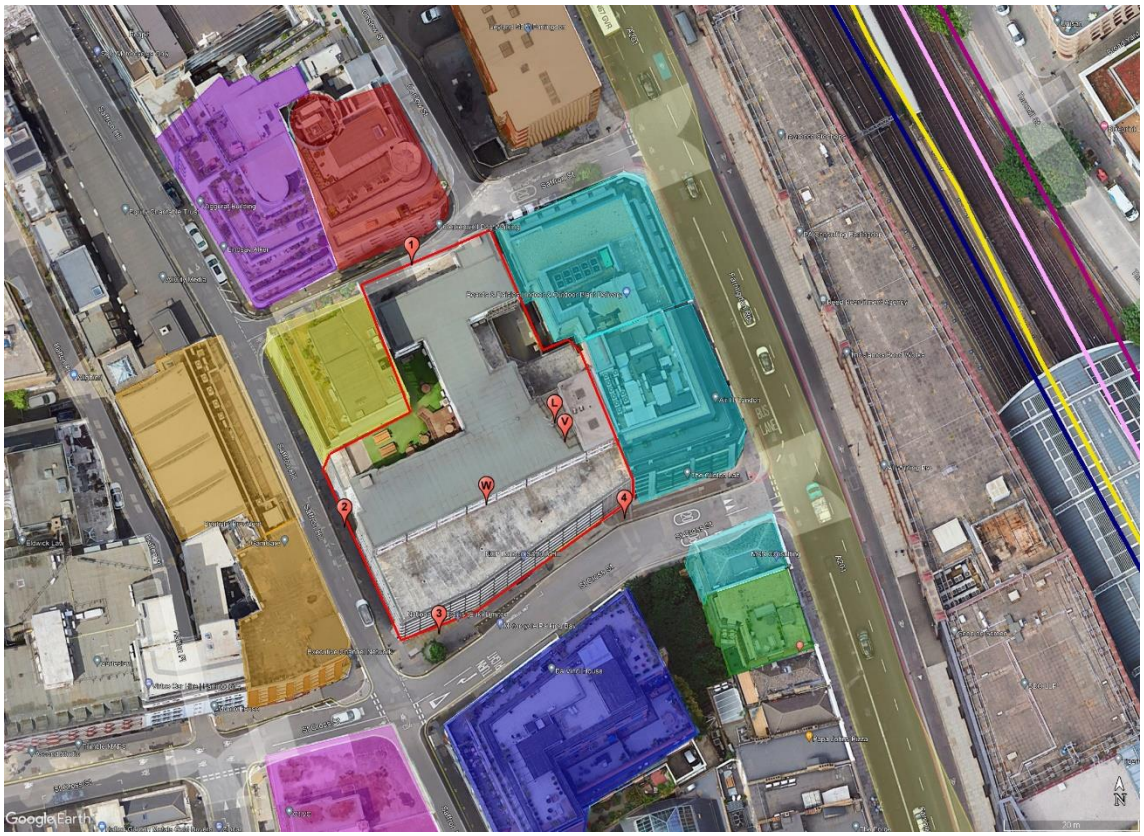


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The area surrounding the site is predominantly commercial. The identified noise sensitive receivers are set out below:

- Residential properties at 55-59 Saffron Hill in yellow
- Residential properties at 60-66 Saffron Hill in purple
- Residential properties at 1 Saffron Hill in red
- Residential properties at 44 Saffron Hill in navy blue
- Mixed use (residential and commercial) at 81-89 Farringdon Road with commercial premises in brown
- Mixed use (residential and commercial) on Farringdon Road with commercial premises in green
- Commercial premises on Kirby Street in pink
- Commercial properties on Saffron Hill in orange
- Commercial premises on Farringdon Road in blue.

3 Development proposals

The proposed scheme is a new build commercial office.

3.1 Hours of operation

The hours of operation are currently unknown.

3.2 Potential noise sources

The potential noise sources associated with the scheme can be broadly divided into two categories:

- Building services plant
- Internal activity in commercial units.

The potential impact of these sources has been assessed and mitigation measures have been proposed to minimise impact on existing noise sensitive premises around the development.

4 Assessment criteria

4.1 NPPF and NPSE

The National Planning Policy Framework, December 2023 (NPPF) sets out the UK government's planning policies for England. It supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF states:

> *'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> - *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 the 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.'*

and

> *'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'*

The NPSE states that its aims are as follows:

> *'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on 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.'*

As such, neither document sets out specific acoustic criteria for new residential developments, but they require consideration of the effect of existing noise on the new development and the effect of noise from the development on the surroundings.

4.2 Noise egress

4.2.1 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 the nearest 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.

4.2.2 Local Authority criteria

In relation to noise egress from industrial and commercial noise sources, London Borough of Camden's Local Plan (June 2017) states:

> '*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 10 dB below background (15 dB if tonal components are present) should be considered as design criterion.'*

Based on the extract from Camden Local Plan, all external plant must be such that the cumulative noise 1 m away from the windows of the nearest noise sensitive receptors is 10 dB below the representative measured background level ($L_{A90,\ 15\ min}$).

As per Camden Local Plan 2017, noise emissions from emergency plant items should be no greater than 10 dB above the background sound level ($L_{A90,\ 15\ min}$).

4.3 Entertainment noise

Camden Local Plan 2017 Appendix 3 Table D specifies target noise egress levels in outdoor living spaces and in internal spaces for activities associated with entertainment or leisure premises (including any amplified music).

4.4 Tactile vibration criteria

4.4.1 Standard guidance

Tactile vibration is that which is perceived as mechanical motion. BS 6472-1:2008 *Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1: Vibration Sources Other Than Blasting* provides procedures for assessing the potential human response to vibration.

Vibration is assessed in terms of the equivalent vibration dose value (VDV). This relates the level and duration of vibration.

The BS 6472-1:2008 assessment criteria are presented in Table 1.

Table 1 BS 6472-1: 2008 tactile vibration assessment criteria

VDV ($m/s^{1.75}$) above which might result in various probabilities of adverse comment within residential buildings.			
Place	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
Residential buildings 16 hr day	0.2 – 0.4	0.4 – 0.8	0.8 – 1.6
Residential building 8 hr night	0.1 – 0.2	0.2 – 0.4	0.4 – 0.8

Note that offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above VDV ranges for a 16 hr day.

It is important to note that people exhibit wide variations of vibration tolerance. Specific values are dependent upon social and cultural factors, psychological attitudes and expected degree of intrusion.

4.4.2 Local Authority requirements

Camden Local Plan 2017 Appendix 3 Table A specifies Vibration Dose Values (VDV) levels in internal spaces due to railways, roads, leisure/entertainment premises, plant and machinery.

For offices, during day, evening and night, the VDV should not exceed 0.4 $m/s^{1.75}$.

5 Survey method

5.1 Noise survey method

The survey included unattended and attended noise measurements.

5.1.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 6 days.

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

The unattended measurements were taken over 15 minute periods between 5 October 2023 and 10 October 2023.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter ‘L’. A photograph showing the measurement location is provided in Figure 2.This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

Figure 2 Photograph of noise logger location 'L'

The logger location was free field on the roof of the existing car park on the site on the eighth floor approximately 22 m above ground.

5.1.2 Attended measurements

Attended sample measurements were taken at 4 locations around the site. These are indicated in Figure 3as positions 1 to 4. The attended measurements were carried out on 16 October 2023 over 5 minute periods.

At each position the microphone was mounted on a tripod approximately 1.5 m above the ground level. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.

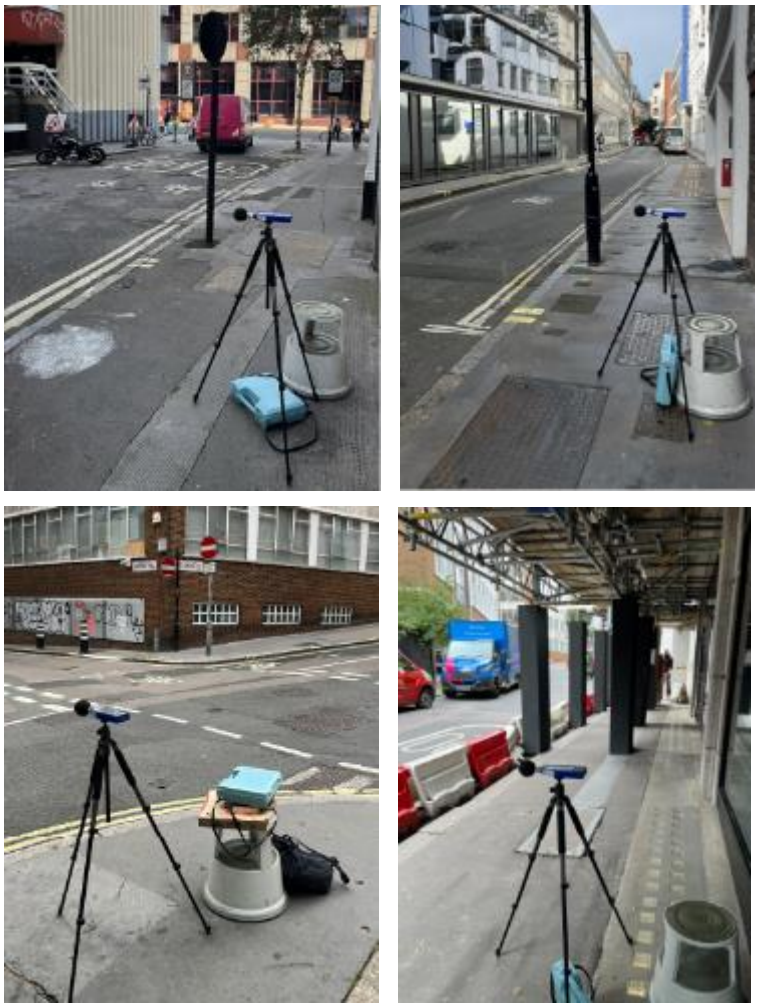


Figure 3 Photographs of attended locations (1 to 4 left to right)

5.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

5.3 Vibration survey method

Vibration measurements were taken at 2 locations around the site in order to determine the vibration levels resulting from the passage of trains on the railway tracks adjacent to the site and underground trains. The vibration measurement locations are indicated in Figure 1 as positions V and W.

The measurements were taken on 5 October 2023 by John Sails and Gunes Dincer between 12:00 and 14:10. Measurement periods containing multiple train events were obtained during the survey. The surveying method is considered to cover a representative hour during the day.

Vibration time histories were recorded using a tri-axial accelerometer and data recorder. The accelerometer was arranged on a mounting block that was connected to a ground-bearing concrete slab. The direction of the axis for each measurement location are presented in Table 2.

Table 2 Vibration measurement details

Location	Axis direction		
	X	Y	Z
V East of floorplate	Horizontal vibration approximately perpendicular to main line to Farringdon and parallel to the Elizabeth Line	Horizontal vibration approximately parallel to main line to Farringdon and perpendicular to the Elizabeth Line	Vertical vibration
W Centre of floorplate	Horizontal vibration approximately perpendicular to main line to Farringdon and parallel to the Elizabeth Line	Horizontal vibration approximately parallel to main line to Farringdon and perpendicular to the Elizabeth Line	Vertical vibration

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

The vibration measurements taken at locations V and W are considered to be reasonably representative of the vibration levels to be experienced by the proposed commercial premises. Location V was to the east of the floorplate. Location W was to the centre of the floorplate. Both locations were in the ground of the existing car park. The location of the measurements is shown in Figure 4.

Figure 4 Vibration measurement location (V – left and W – right)

6 Measurement results

6.1 Observations

6.1.1 Noise

The dominant noise source was the road traffic from Farringdon Road which was noted to be constant. There was audible plant from an adjacent roof around 40 m which was audible when there was a lull in road traffic. This wasn't noted to be tonal.

Construction noise was noted to northwest of site (around 50 m away) and to the east of site (around 25 m away). The construction noise was occasional bangs and sawing, however wasn't dominant.

There was occasional road traffic on St Cross Street, with the majority of traffic being to the NCP car park itself.

The noise logger was adjacent to a small plant room that contained boilers and the lift mechanism. The lift mechanism was audible at times but dominant above the road traffic noise.

6.1.2 Vibration

At location V, subjectively, low frequency noise from trains was audible (Thameslink and Elizabeth line) when other sources were low. At location W, the low frequency noise from passing trains could also be heard and was slightly higher than at location V1. The Thameslink services were slightly louder than the Elizabeth line.

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 3.

Table 3 Ambient noise levels measured during the unattended survey (Day and night)

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 5 Oct 2023	53[1]	49
Friday 6 Oct 2023	53	51
Saturday 7 Oct 2023	52	48
Sunday 8 Oct 2023	50	49
Monday 9 Oct 2023	54	49
Tuesday 10 Oct 2023	55[1]	-
Average	52	49

[1] Measurement not made over full period due to monitoring start and end time (the measurement on 5 October 2023 was over 11 hours, and on 10 October 2023 over 8 hours); not included in the average.

For the purpose of setting entertainment noise limits, the noise levels measured for day, evening and night are set out in Table 4.

Table 4 Ambient noise levels measured during the unattended survey (Day, evening and night)

Date	Day (07:00 – 19:00) $L_{Aeq,12h}$ (dB)	Evening (19:00 – 23:00) $L_{Aeq,4h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Thursday 5 Oct 2023	53[1]	51	49
Friday 6 Oct 2023	53	52	51
Saturday 7 Oct 2023	52	52	48
Sunday 8 Oct 2023	51	49	49
Monday 9 Oct 2023	54	50	49
Tuesday 10 Oct 2023	55[1]	-	-
Average	53	51	49

[2] Measurement not made over full period due to monitoring start and end time (the measurement on 5 October 2023 was over 7 hours, and on 10 October 2023 over 8 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.

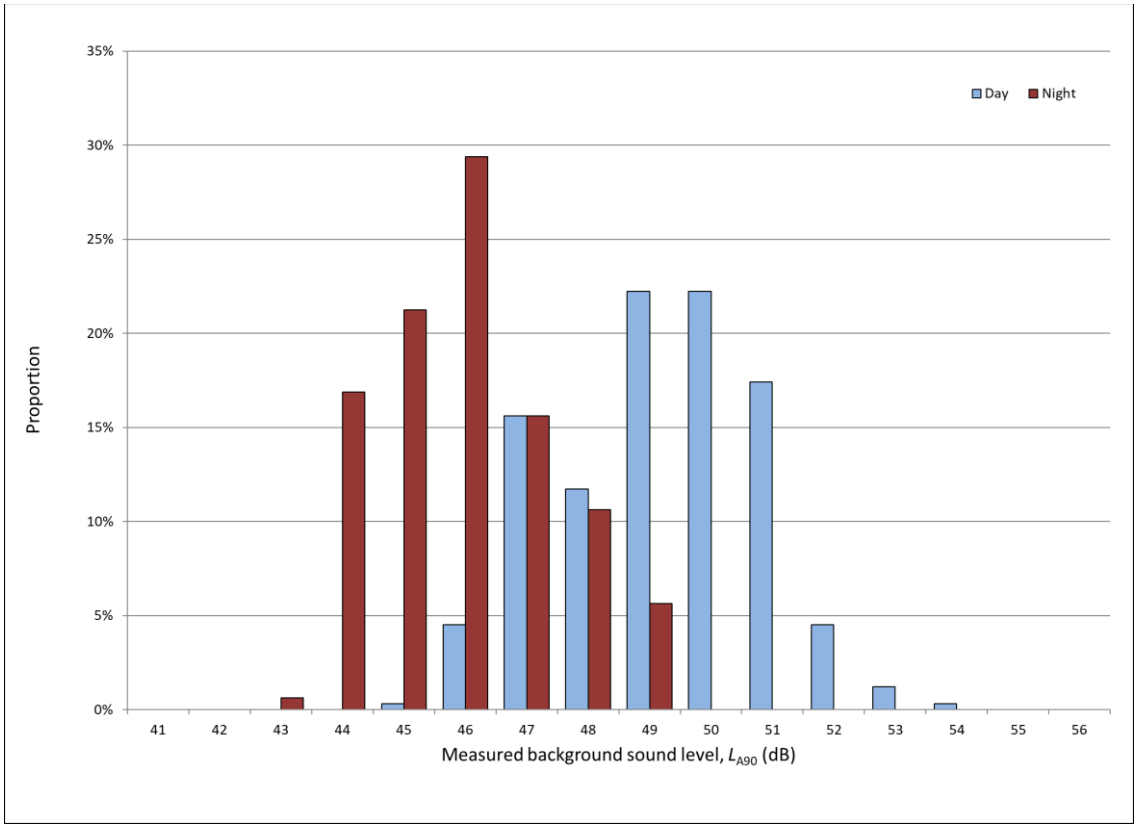


Figure 5 Statistical analysis of background sound level (Day and night)

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 47 dB during the day and $L_{A90,15min}$ 44 dB at night.

6.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 5.

Table 5 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{A1,5min}$	$L_{A90,5min}$	
1	12:24	64	74	55	Facade measurement
	12:32	62	70	59	Road traffic noise from Farringdon Road was the dominant noise source, however this was screened. Motorbikes along the road typically caused the maximum noise level. There was also intermittent construction noise which was screened but did affect the maximum noise level. Some noise from pedestrians, however this was not significant.
	12:37	62	67	61	
	14:06	63	72	58	
	14:12	62	68	58	
	14:17	69	76	58	
	15:25	62	72	58	
	15:31	60	68	57	
	15:36	60	64	57	
2	12:47	58	68	53	Facade measurement
	12:53	55	60	53	Road traffic from Farringdon Road and other side roads dominated the noise climate
	12:59	58	67	52	
	14:24	62	70	58	
	14:31	64	74	57	
	14:37	67	80	57	
	15:42	60	69	51	
	15:47	62	74	51	
	15:52	59	70	49	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{A1,5min}$	$L_{A90,5min}$	
3	13:12	70	76	67	Free field measurement
	13:17	68	74	65	Construction noise dominated the noise climate. Some noise from road traffic which affected the maximum noise level.
	13:22	68	74	66	
	14:44	66	73	64	
	14:49	68	75	65	
	14:55	70	74	68	
	15:59	62	73	52	
	16:04	64	75	54	
	16:09	63	75	54	
4	13:29	67	75	59	Facade measurement
	13:37	64	70	61	Noise from constant and heavy road traffic dominated the noise climate. Some noise from pedestrians which wasn't significant. Distant construction noise which affected the maximum noise level.
	13:43	64	71	58	
	15:02	71	76	63	
	15:07	68	76	60	
	15:13	66	74	59	
	16:15	67	73	61	
	16:20	64	74	56	
	16:25	64	74	58	

6.3 Vibration measurement results

6.3.1 Measurement location V

VDVs measured at location V are presented in Table 6. The maximum VDVs measured for each of the directions are highlighted in red. The time period of all measurements is 1 minute. Measurements of RMS acceleration are presented in Appendix C.

Table 6 VDVs measured at location V

Start time	VDV ($m/s^{1.75}$)		
	X	Y	Z
12:06	0.00015	0.00013	0.00073
12:07	0.00016	0.00014	0.00131
12:08	0.00017	0.00016	0.00147
12:09	0.00019	0.00017	0.00144
12:10	0.00014	0.00013	0.00091
12:12	0.00015	0.00014	0.00106
12:13	0.00014	0.00014	0.00071
12:14	0.00019	0.00016	0.00139
12:15	0.00014	0.00013	0.00115
12:17	0.00014	0.00012	0.00098
12:18	0.00014	0.00013	0.00111
12:19	0.00017	0.00015	0.00142
12:20	0.00016	0.00016	0.00124
12:21	0.00016	0.00015	0.00108
12:22	0.00014	0.00013	0.00105
12:23	0.00013	0.00013	0.00114
12:25	0.00015	0.00014	0.00104
12:26	0.00016	0.00015	0.00129
12:27	0.00014	0.00014	0.00107
12:28	0.00015	0.00012	0.00130
12:29	0.00017	0.00015	0.00122
12:30	0.00015	0.00015	0.00135
12:31	0.00016	0.00015	0.00121
12:32	0.00014	0.00015	0.00115
12:33	0.00014	0.00013	0.00080
12:34	0.00017	0.00016	0.00121

Start time	VDV ($m/s^{1.75}$)		
	X	Y	Z
12:35	0.00014	0.00012	0.00073
12:36	0.00017	0.00015	0.00121
12:37	0.00014	0.00014	0.00095
12:38	0.00013	0.00013	0.00075
12:39	0.00014	0.00013	0.00078
12:40	0.00016	0.00014	0.00091
12:42	0.00018	0.00014	0.00097
12:44	0.00014	0.00014	0.00109
12:45	0.00014	0.00015	0.00113
12:46	0.00016	0.00014	0.00067
12:47	0.00017	0.00015	0.00134
12:50	0.00015	0.00014	0.00090
12:51	0.00014	0.00014	0.00095
12:52	0.00015	0.00014	0.00090
12:53	0.00014	0.00014	0.00085
12:54	0.00017	0.00016	0.00134
12:55	0.00015	0.00015	0.00097
12:56	0.00014	0.00013	0.00101
12:57	0.00012	0.00013	0.00056
12:58	0.00012	0.00012	0.00064
12:59	0.00013	0.00011	0.00062
13:00	0.00014	0.00012	0.00081
13:01	0.00016	0.00015	0.00109
13:02	0.00019	0.00024	0.00187
13:03	0.00013	0.00013	0.00059
13:04	0.00018	0.00016	0.00115
13:05	0.00016	0.00068	0.00116

6.3.2 Measurement location W

VDVs measured at location W are presented in Table 6. The maximum VDVs measured for each of the directions are highlighted in red. The time period of all measurements is 1 minute.

Table 7 VDVs measured at location W

Start time	VDV ($m/s^{1.75}$)		
	X	Y	Z
13:10	0.00015	0.00014	0.00172
13:11	0.00016	0.00014	0.00251
13:12	0.00013	0.00013	0.00213
13:13	0.00017	0.00016	0.00281
13:14	0.00016	0.00016	0.00298
13:15	0.00017	0.00014	0.00282
13:16	0.00016	0.00014	0.00293
13:18	0.00014	0.00014	0.00174
13:20	0.00014	0.00013	0.00211
13:21	0.00013	0.00013	0.00180
13:23	0.00015	0.00013	0.00334
13:24	0.00014	0.00015	0.00262
13:25	0.00014	0.00013	0.00146
13:26	0.00012	0.00014	0.00157
13:29	0.00017	0.00014	0.00295
13:31	0.00012	0.00013	0.00122
13:32	0.00015	0.00015	0.00260
13:33	0.00015	0.00014	0.00343
13:36	0.00014	0.00013	0.00147
13:37	0.00017	0.00016	0.00291
13:38	0.00015	0.00016	0.00239
13:39	0.00016	0.00014	0.00273
13:41	0.00019	0.00017	0.00285

Start time	VDV ($m/s^{1.75}$)		
	X	Y	Z
13:42	0.00016	0.00016	0.0036
13:43	0.00015	0.00016	0.00207
13:44	0.00014	0.00014	0.00292
13:45	0.00014	0.00012	0.00115
13:46	0.00015	0.00013	0.00270
13:47	0.00014	0.00014	0.00274
13:48	0.00014	0.00013	0.00148
13:49	0.00016	0.00015	0.00333
13:50	0.00013	0.00014	0.00140
13:51	0.00015	0.00015	0.00352
13:52	0.00015	0.00013	0.00262
13:53	0.00013	0.00012	0.00130
13:54	0.00013	0.00014	0.00183
13:55	0.00013	0.00013	0.0024
13:57	0.00015	0.00014	0.00310
13:58	0.00014	0.00014	0.00189
13:59	0.00017	0.00015	0.00342
14:00	0.00013	0.00013	0.00138
14:01	0.00015	0.00014	0.00241
14:02	0.00015	0.00014	0.00307
14:03	0.00014	0.00014	0.00208
14:04	0.00014	0.00013	0.00194
14:05	0.00012	0.00013	0.00075
14:06	0.00016	0.00015	0.00303
14:07	0.00014	0.00013	0.00268
14:08	0.00017	0.00015	0.00369

7 Plant noise egress

7.1 Normally operating plant noise limits

Based on the above criteria and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 8.
The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1). In this case these limits would apply at locations detailed in Section 2.2.

Table 8 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Day (07:00-23:00)	40
Night (23:00-07:00)	37

[1] The limits set out in Table 8 do not include any attention catching features. The penalty corrections for attention catching features may be significant, and will need to be considered as the building services design progresses. This is discussed in Appendix C.

7.2 Emergency plant noise limits

Based on the above criteria and the measurement results, the cumulative noise level from the operation of all new emergency plant should not exceed the limits set out in Table 8.
The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels.

Table 9 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Day (07:00-23:00)	60
Night (23:00-07:00)	57

[1] The limits set out in Table 8 do not include any attention catching features. The penalty corrections for attention catching features may be significant, and will need to be considered as the building services design progresses. This is discussed in Appendix C.

7.3 Assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, no information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

8 Entertainment noise egress

As per the Camden Local Plan 2017 criteria and the average ambient noise levels based on measured noise levels entertainment noise from customer activities should not exceed the following levels at within gardens used for amenity of the nearest noise sensitive premises. Where residential properties don't have a garden for amenity use, it is proposed that the same limits should apply at 1 m from the facade of the building.

Table 10 Entertainment noise egress criteria (free field level)

Location of residential NSP	Entertainment noise limit, $L_{Aeq,5min}$ (dB) to meet LOAEL		
	Day (07:00 – 19:00)	Evening (19:00 – 23:00)	Night (23:00 – 07:00)
All NSPs[1]	55	50	45

[1] Based on logger location L

For entertainment noise from amplified sound the noise limits in internal spaces are summarised in Table 11.

Table 11 Summary of Camden Local Plan 2017 guidance on entertainment noise

Room	Period	Noise limit
Bedrooms	23:00-07:00	NR 25 ($L_{eq,15min}$)
All habitable rooms	07:00-23:00	NR 35 ($L_{eq,15min}$)

8.1.1 Operational noise limits

Operational noise limits within the commercial units will be set as the design progresses to control noise transfer to nearby noise sensitive premises.

Based on the limits set out in Table 10 and Table 11, a minimum overall facade sound insulation performance of R_w+C_{tr} 28 dB and control of noise transfer internally, internal operational noise limits within the commercial units are set out in Table 12.

The limits are provided for guidance only. The exact amplified noise limits should be determined in-situ along with setting of electronic limiters. These limits would typically be included in a tenant lease agreement in order to control noise egress and noise transfer.

Table 12 Operational noise limit in commercial units

	Operational noise limit, L_{eq} (dB) Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
Commercial unit	72	78	81	80	81	75	75

Maximum operational noise levels (L_{Fmax}) should be limited to 10 dB above those set out in Table 12.

If higher noise levels are required by the tenant, then the enhancement works to improve the sound insulation performance of the building envelope will be required.

9 Tactile vibration assessment

BS 6472 states that the assessment should be based on the axis along which the highest VDV is measured. The highest VDV measurement at each location were:

- Location V – z axis
- Location W – z axis.

Published timetables indicate that approximately 15 trains pass the site per hour for Thameslink and around 52 train pass the site per hour on the tube lines during the day. The Elizabeth line has not been included as this is unlikely to contribute due to the distance from the line to the site boundary. This will result in approximately 1072 trains passing on the tracks between 07:00 – 23:00.

Based on the maximum vibration values from Table 6 and on the number of trains passing on the tracks between 07:00 – 23:00, the equivalent VDVs over a 16 hour day are given in Table 13.

Table 13 Equivalent vibration dose values

Location	Maximum VDV measured ($m/s^{1.75}$)	Equivalent VDV ($m/s^{1.75}$) Day (07:00 – 23:00)
V	0.00187	0.00637
W	0.00369	0.01492

These predicted equivalent VDVs, during the day are lower than the thresholds of the ‘low probability of adverse comment’ categories in Table 1.

Levels experienced may vary depending on the type of train and position of the future buildings. However, the measured vibration levels were below the lowest BS 6472 threshold, and a significant increase in the number of trains would be required for the threshold to be exceeded. Based on this, tactile vibration due to trains is unlikely to be problematic for this development.

10 Conclusion

The representative measured background sound levels were $L_{A90,15min}$ 47 dB during the day, and $L_{A90,15min}$ 44 dB during the night. Based on the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are $L_{Aeq,15min}$ 40 dB during the day, and $L_{Aeq,15min}$ 37 dB during the night. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1). These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be more stringent.

Assessment of tactile vibration concludes that it is unlikely to be problematic for the proposed development.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using Rion NL-52 sound level meters.

The VDV and 1/3 octave band RMS acceleration measurements were carried out using a Rion VM-56.

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
Sound level meter	NL-52/00320633	Rion	9 Jun 24	TCRT22/1368
Microphone	UC-59/12576	Rion	9 Jun 24	TCRT22/1368
Pre-amp	NH-25/10641	Rion	9 Jun 24	TCRT22/1368
Calibrator	NC-74/34125430	Rion	8 Jun 24	TCRT22/1361
Sound level meter	NL-52/00375679	Rion	24 Jul 25	TCRT23/1543
Microphone	UC-59/11168	Rion	24 Jul 25	TCRT23/1543
Pre-amp	NH-25/65806	Rion	24 Jul 25	TCRT23/1543
Calibrator	SV30A/10576	Svan	24 Jul 25	TCRT23/1540
Data recorder	VM-56 / 34310135	Rion	18 Oct 23	TCRT21/1720
Accelerometer	PV-83D / 90136	Rion	18 Oct 23	TCRT21/1720

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.*

Vibration indices

For each measurement period the vibration dose value (VDV) in each of three axes with the appropriate frequency weightings (as defined in BS 6472-1:2008) was recorded.

Weather conditions

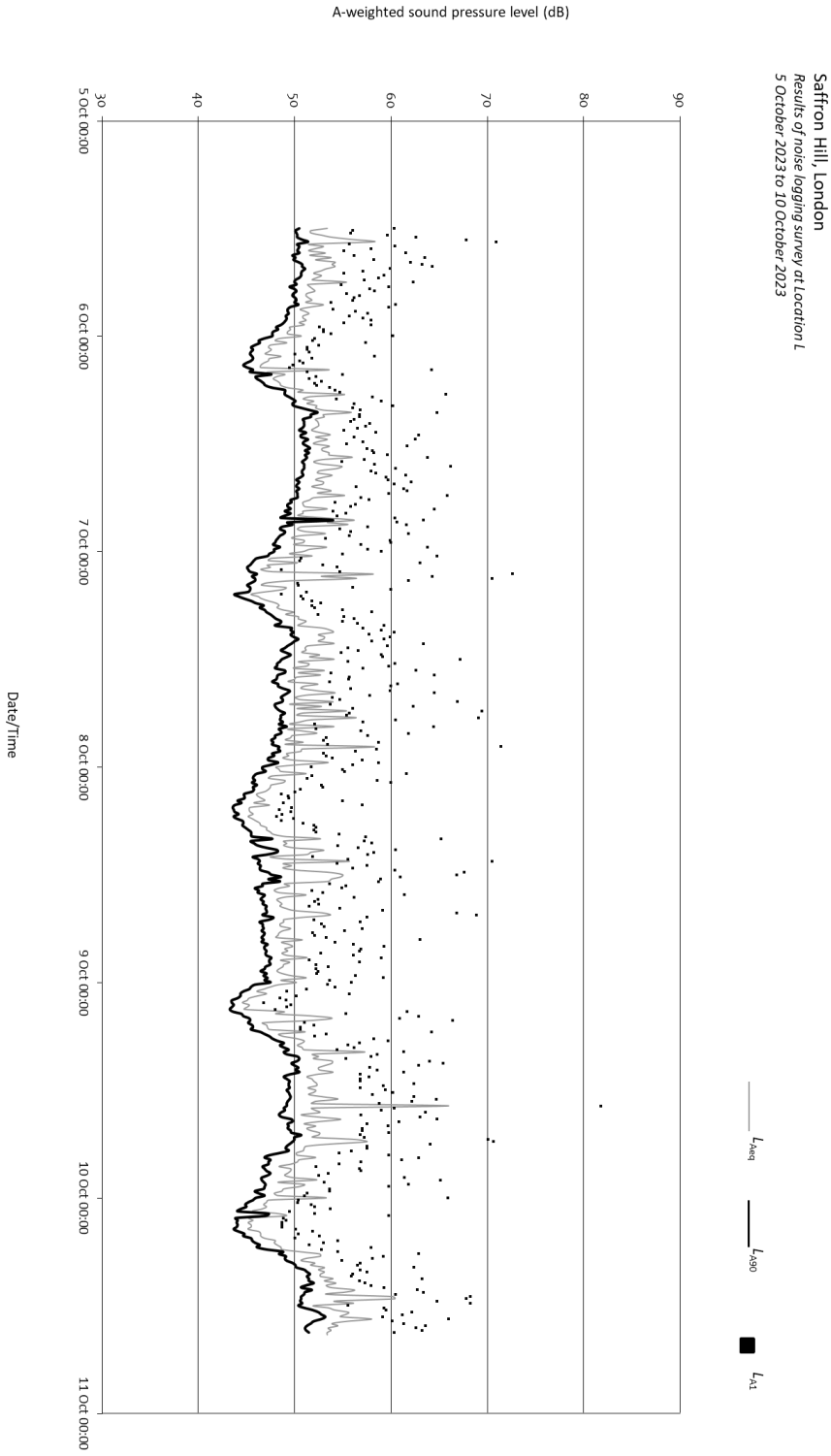
During the attended noise measurements, the weather was generally clear and dry and no rain occurred. Wind speeds were generally less than 5 m/s.

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 14°C at night and 25°C during the day, and the wind speed was generally less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location L


Saffron Hill, London
Results of noise logging survey at Location L
5 October 2023 to 10 October 2023
A-weighted sound pressure level (dB)
30
40
50
60
70
80
90
5 Oct 00:00
6 Oct 00:00
7 Oct 00:00
8 Oct 00:00
9 Oct 00:00
10 Oct 00:00
11 Oct 00:00
Date/Time
L_{Aeq}
L_{A90}
L_{A1}

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.