SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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75 Farringdon Road

Planning Condition 5 discharge report

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Version	Date	Comments	Authors	Reviewer
A	6 Feb 24	Initial issue	Byron Davies Ben Southgate	Daniel Stringer

Summary

Sandy Brown has been appointed to provide acoustic advice in relation to the redevelopment at 75 Farringdon Road, London.

In support of the planning application, Sandy Brown produced a detailed plant noise assessment report. This defined the existing background noise levels in the area and set plant noise egress limits based on London Borough of Camden's standard noise policy.

As part of the granted consent, Condition 5 sets out the requirements for a post commissioning noise survey to demonstrate compliance.

The lowest existing background noise level previously measured at the site was L_{A90} 53 dB at night. To meet the requirements of Condition 5, plant noise egress must be L_{Aeq} 48 dB or lower at the nearest noise-sensitive receptor.

The post commissioning survey was carried out on 17 January 2024 and included near field measurements of 17 external condenser units, an AHU, a WC extract fan, 2 smoke extract fans and a generator.

The measurements have been used to predict plant noise at 1 m from the facade of the nearest noise sensitive premises at 73 Farringdon Road resulting in the following cumulative levels:

- L_{Aeq} 42 dB – Normal operating plant
- L_{Aeq} 52 dB - Emergency operating plant.

The predicted level for normal operating plant is below the night time noise limit established at planning stage of L_{Aeq} 48 dB which demonstrates compliance with Condition 5.

Given their limited use during daytime testing or an emergency, it is common to apply a relaxation of 10 dB to the noise limits for emergency plant. On this basis, a reasonable limit of L_{Aeq} 58 dB is proposed. The predicted level for emergency plant is well below this limit, is not expected to result in adverse impact and is considered acceptable in context.

Contents

1 Introduction

Sandy Brown has been appointed by St James's Place Property Unit Trust to provide acoustic advice in relation to the redevelopment works at 75 Farringdon Road, London.

As part of this, assessments of noise egress from building services plant were undertaken to demonstrate compliance with the requirements of the London Borough of Camden (LBC). This was based on noise surveys undertaken at the site used to determine the existing background noise levels.

As part of the planning permission for the development (ref. 2016/5638/P), LBC set various planning conditions. This includes Condition 5, which set out limits for building services noise egress, including a requirement to undertake a post-installation assessment.

This report sets out details of the post-installation noise measurements and subsequent assessment, used to demonstrate compliance with Planning Condition 5.

2 Planning conditions

Planning Condition 5, set by the London Borough of Camden, states the following:

> '*Prior to commencement of the development, details shall be submitted to and approved in writing by the Council, of the external noise level emitted from plant/ machinery/ equipment and mitigation measures as appropriate. The measures shall ensure that the external noise level emitted from plant, machinery/ equipment will be lower than the lowest existing background noise level by at least 5dBA, by 10dBA where the source is tonal, as assessed according to BS4142:1997 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity. A post installation noise assessment shall be carried out where required to confirm compliance with the noise criteria and additional steps to mitigate noise shall be taken, as necessary. Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained.*'

This report details the post installation noise assessment undertaken to demonstrate compliance with Planning Condition 5.

3 Plant noise limits

Plant noise limits have been set based on the criteria set in Condition 5 and the results of the noise survey previously undertaken at the site.

Full details of previous survey undertaken at the site are detailed in the Planning noise and vibration report for the site, ref. 16327-R01-B, dated 7 September 2016 and provided as part of planning application no. 2016/5638/P. The lowest noise levels measured during the survey were:

- L_{A90} 54 dB during the day
- L_{A90} 55 dB during the evening
- L_{A90} 53 dB during the night.

Based on this, the cumulative noise level resulting from the operation of all new plant should not exceed the limits set out in Table 1 at 1 m from the worst affected windows of the nearest noise sensitive premises. This applies to all plant items running during normal operation.

Table 1 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)
Daytime (07:00-19:00)	49
Evening (19:00-23:00)	50
Night-time (23:00-07:00)	48

The limits set out in Table 1 do include any corrections for any attention catching features. These limits will be 5 dBA more stringent if the plant contains attention-catching features.

Emergency plant will only be operational in the case of an emergency or during routine testing, which will take place during weekday daytime hours (09:00-17:00). Given its limited use, it is common a apply a relaxation to noise limits during emergency operation. Based on this, a 10 dB relaxation is proposed for plant items that only operate during emergency mode (ie, so that noise emissions are not more than 5 dB above the existing background noise level).

4 Plant installation

4.1 Plant items

The building services plant installation at roof level includes the following:

- 17 external condenser units
- 1 Air handling unit within a screened enclosure
- 1 WC extract fan termination
- 1 Lift smoke extract fan (emergency use only)
- 1 Large smoke extract fan (emergency use only)
- 1 Generator unit within a screened enclosure (emergency use only).

All of these plant items are located at roof level.

4.2 Plant layout

The layout of the plant items at roof level, in relation to the nearest noise sensitive receptor (73 Farringdon Road) is shown in Figure 1. Where there are large groups of similar or identical plant items, these have been grouped for the purposes of the assessment, as shown in Figure 1 and Table 2.

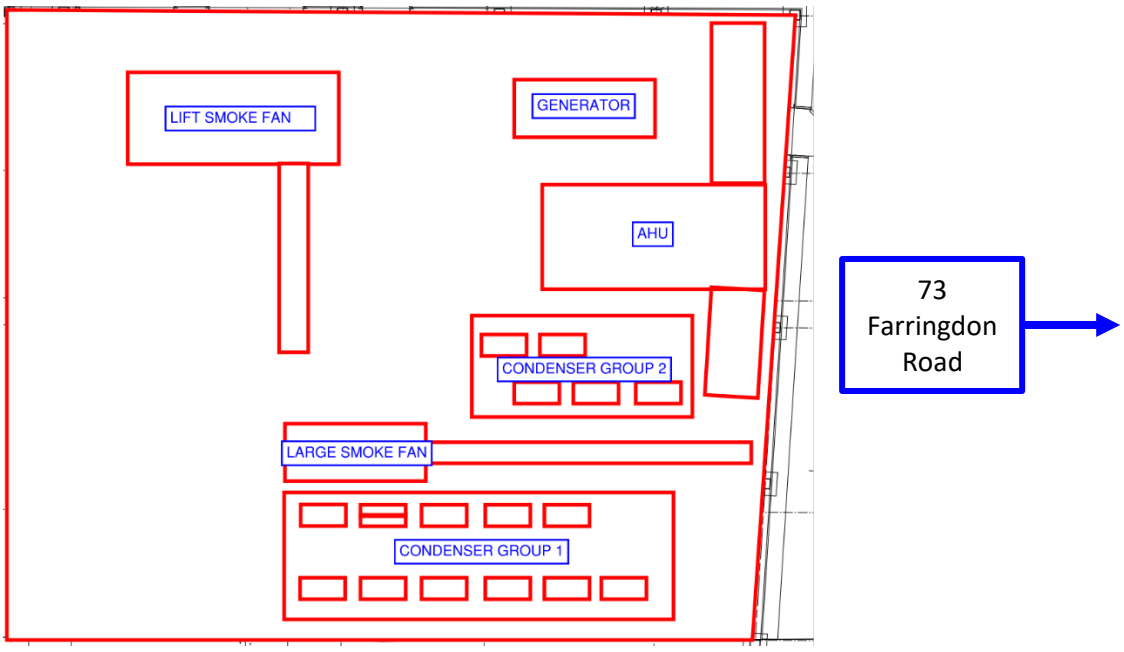

Figure 1 Layout of plant items on roof of 75 Farringdon Road

Table 2 Installed building services units

Building services	No. units	Normal/ emergency
AHU	1	Normal
Condenser group 1	12	Normal
Condenser group 2	5	Normal
Large smoke fan	1	Emergency
Lift smoke fan	1	Emergency

4.3 Operating times

The office building is expected to primarily operate between 08:00 and 18:00 on weekdays. However, as occupation is not limited to these hours, 24 hour operation has been considered to assess worst case.

4.4 Attenuation measures

Duct attenuators are applied to all fans and air handling plant.

5 Measurements

Measurements of building services plant noise were undertaken by Byron Davies on Wednesday 17 January 2024. Details of the equipment used are provided in Appendix A.

To meet the relevant noise criteria, noise emissions from building services plant must be at least 5 dB lower than the existing background noise level at the nearest noise-sensitive receptor, which it is not possible to accurately measure. Therefore, measurements were taken locally to each plant item and corrections were applied to predict the noise levels at the noise-sensitive receptor.

All measurements were taken over a 30-second time period, at distances of 0.5-1.0 m from the side of the unit (dependent on available space), and at a height of 1.5 m above roof level.

Where possible, plant items were individually isolated to undertake measurements of each unit. Where this was not possible, some measurements may have been affected by adjacent plant items. Based on this, the measurements and subsequent assessment are considered to be worst-case.

For larger plant items (eg, smoke fan/generator) multiple measurements were taken around the units to ensure that all relevant noise sources were measured.

None of the plant items were determined to be tonal in their operation. As such, no penalty corrections have been applied as part of the assessment.

6 Assessment

6.1 Assessment method

The assessment has been undertaken based on the groups of plant items shown in Figure 1 and Table 2.

In cases where are multiple measurements or multiple plant items within the group, a logarithmic average of all measurements has been undertaken. This has then been corrected to account for the total number of units where there are multiple plant items within the group. Where units were not operational at the time of the measurements (eg, due to redundancy in the system), they were still included in the corrections for the number of plant items. This is therefore considered to represent a worst-case assessment.

The assessment included corrections for distance attenuation, the number of plant items in each group, screening from the edge of the building and facade reflections.

Full calculations are presented in Appendix B.

The assessment has been undertaken to the nearest noise-sensitive receiver, which is identified as 73 Farringdon Road.

6.2 Predicted noise levels

The predicted noise levels at the nearest noise sensitive receptor for all the rooftop plant items are shown in Table 3, for both normal and emergency operation. These meet the requirements of Condition 5.

Table 3 Predicted sound pressure levels at the nearest noise sensitive receptor from rooftop plant noise

Plant item	Predicted noise level, L_{Aeq} (dB)	
	Normal operation	Emergency operation
AHU	27	27
Condenser group 1	40	40
Condenser group 2	37	37
Large smoke fan	-	51
Lift smoke fan	-	44
Generator	-	32
Cumulative noise level	42	52
Plant noise limit (night time)	48	58

7 Conclusion

Following completion of the development works, a post completion noise survey was carried out in accordance with Condition 5. This included near field measurements of 17 external condenser units, an AHU, a WC extract fan, 2 smoke extract fans and a generator.

The measurements have been used to predict plant noise at 1 m from the facade of the nearest noise sensitive premise at 73 Farringdon Road resulting in the following cumulative levels:

- L_{Aeq} 42 dB – Normal operating plant
- L_{Aeq} 52 dB – Emergency operating plant.

The predicted level for normal operating plant is below the night time noise limit established at planning stage of L_{Aeq} 48 dB which demonstrates compliance with Condition 5.

Given their limited use during daytime testing or an emergency, it is common to apply a relaxation of 10 dB to the noise limits for emergency plant. On this basis, a reasonable limit of L_{Aeq} 58 dB is proposed. The predicted level for emergency plant is well below this limit, is not expected to result in adverse impact and is considered acceptable in context.

Appendix A

Plant noise survey equipment details

The 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	2250/3011096	Brüel & Kjær	14 Mar 25	UCRT23/1329, UCRT23/1331
Microphone	4189/3060575	Brüel & Kjær	14 Mar 25	UCRT23/1329, UCRT23/1331
Pre-amp	ZC0032/25430	Brüel & Kjær	14 Mar 25	UCRT23/1329, UCRT23/1331
Calibrator	4231/3017675	Brüel & Kjær	13 Mar 25	UCRT23/1325

Calibration of the meter used for the tests is traceable to national standards. The calibration certificates are available upon request.

The sound level meter and measurement chain was calibrated at the beginning and end of the measurements using the sound level calibrator. No significant calibration deviation occurred.

Appendix B

Plant noise assessment calculations

Comments	Octave band centre frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	dBA
AHU - breakout									
Sound pressure level at 0.5m	70	61	59	57	55	55	48	38	61
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 0.5m	70	61	59	57	55	55	48	38	61
Losses									
Distance attenuation - Point source, r=21m	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
Screening loss - Path difference = 0.322m	6.8	8.2	10.3	12.8	15.7	18.7	21.7	24.0	
Total losses	*39*	*41*	*43*	*45*	*48*	*51*	*54*	*56*	
Sound pressure level after losses	31	20	16	12	7	4	-6	-18	14
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	34	23	19	15	10	7	-3	-15	17
AHU - exhaust									
Sound pressure level at 0.5m	70	61	58	63	54	51	50	55	63
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 0.5m	70	61	58	63	54	51	50	55	63
Losses									
Distance attenuation - Point source, r=21m	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
Screening loss - Path difference = 0.068m	5.4	5.8	6.6	7.8	9.7	12.2	15.0	18.0	
Total losses	*38*	*38*	*39*	*40*	*42*	*45*	*47*	*50*	
Sound pressure level after losses	32	23	19	23	12	6	3	5	21
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	35	26	22	26	15	9	6	8	24
AHU - intake									
Sound pressure level at 0.5m	70	62	59	57	53	49	45	42	59
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 0.5m	70	62	59	57	53	49	45	42	59
Losses									
Distance attenuation - Point source, r=21m	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
Screening loss - Path difference = 0.068m	5.4	5.8	6.6	7.8	9.7	12.2	15.0	18.0	
Total losses	*38*	*38*	*39*	*40*	*42*	*45*	*47*	*50*	
Sound pressure level after losses	32	24	20	17	11	4	-2	-8	18
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	35	27	23	20	14	7	1	-5	21
Condenser units group 1									
Sound pressure level at 0.5m	87	79	75	74	70	67	67	65	77
Correction for 12 units	11	11	11	11	11	11	11	11	
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 0.5m	97	90	86	85	81	78	78	75	87
Losses									
Distance attenuation - Point source, r=21m	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
Screening loss - Path difference = 0.993m	9.4	11.8	14.6	17.6	20.6	23.6	24.0	24.0	
Total losses	*42*	*44*	*47*	*50*	*53*	*56*	*56*	*56*	
Sound pressure level after losses	56	46	39	35	28	22	22	19	37
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	59	49	42	38	31	25	25	22	40

Comments	Octave band centre frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	dBA
Condenser units group 2									
Sound pressure level at 1m	78	70	69	69	66	59	55	51	70
Correction for 5 units	7	7	7	7	7	7	7	7	
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 1m	85	77	76	76	73	66	62	58	77
Losses									
Distance attenuation - Point source, r=21m	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	
Screening loss - Path difference = 0.691m	8.4	10.5	13.1	16.0	19.0	22.0	24.0	24.0	
Total losses	*35*	*37*	*40*	*42*	*45*	*48*	*50*	*50*	
Sound pressure level after losses	50	40	36	33	28	18	11	7	34
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	53	43	39	36	31	21	14	10	37
Large smoke extract fan - breakout									
Sound pressure level at 1m	79	90	89	87	81	76	68	61	87
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 1m	79	90	89	87	81	76	68	61	87
Losses									
Distance attenuation - Point source, r=21m	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	
Screening loss - Path difference = 2.189m	12.2	15.0	18.0	21.0	24.0	24.0	24.0	24.0	
Total losses	*39*	*41*	*44*	*47*	*50*	*50*	*50*	*50*	
Sound pressure level after losses	40	49	45	40	31	26	18	11	41
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	43	52	48	43	34	29	21	14	44
Large smoke extract fan - exhaust									
Sound pressure level at 1m	84	86	84	81	74	71	68	65	82
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 1m	84	86	84	81	74	71	68	65	82
Losses									
Distance attenuation - Point source, r=21m	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	
Screening loss - Path difference = 0.068m	5.4	5.8	6.6	7.8	9.7	12.2	15.0	18.0	
Total losses	*32*	*32*	*33*	*34*	*36*	*39*	*41*	*44*	
Sound pressure level after losses	52	54	51	47	38	32	27	21	47
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	55	57	54	50	41	35	30	24	50

Comments	Octave band centre frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	dBA
Lift smoke extract fan - breakout									
Sound pressure level at 1m	79	90	89	87	81	76	68	61	87
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 1m	79	90	89	87	81	76	68	61	87
Losses									
Distance attenuation - Point source, r=21m	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	
Screening loss - Path difference = 2.98m	13.5	16.4	19.4	22.4	24.0	24.0	24.0	24.0	
Total losses	*40*	*43*	*46*	*49*	*50*	*50*	*50*	*50*	
Sound pressure level after losses	39	47	43	38	31	26	18	11	40
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	42	50	46	41	34	29	21	14	43
Lift smoke extract fan - exhaust									
Sound pressure level at 1m	84	86	84	81	74	71	68	65	82
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 1m	84	86	84	81	74	71	68	65	82
Losses									
Distance attenuation - Point source, r=21m	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	
Screening loss - Path difference = 2.98m	13.5	16.4	19.4	22.4	24.0	24.0	24.0	24.0	
Total losses	*40*	*43*	*46*	*49*	*50*	*50*	*50*	*50*	
Sound pressure level after losses	44	43	38	32	24	21	18	15	34
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	47	46	41	35	27	24	21	18	37
Generator									
Sound pressure level at 0.5m	82	80	77	75	70	70	70	62	78
Additional source directivity; Q = 1	0	0	0	0	0	0	0	0	
Total sound pressure level at 0.5m	82	80	77	75	70	70	70	62	78
Losses									
Distance attenuation - Point source, r=21m	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	
Screening loss - Path difference = 0.691m	8.4	10.5	13.1	16.0	19.0	22.0	24.0	24.0	
Total losses	*41*	*43*	*46*	*48*	*51*	*54*	*56*	*56*	
Sound pressure level after losses	41	37	31	26	18	16	14	5	29
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	44	40	34	29	21	19	17	8	32