

# 74 Chancery Lane Holborn, London, WC2A 3UT

## Mechanical Services Plant Noise Impact Assessment

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**Issued to** ThirdWay Interiors

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#### 1. INTRODUCTION

Thirdway Interiors are seeking planning permission to install new mechanical services plant at 74 Chancery Lane, WC2A 3UT. The proposed new unit would be located externally on the roof at the rear of the building, which is in close proximity to a number of flats. Accordingly, a noise impact assessment is required.

Spectrum Acoustic Consultants have been instructed by Thirdway Interiors, to carry out a Noise Impact Assessment to support the application. This report is submitted with the intention of providing sufficient information to both inform and satisfy the requirements of the Local Planning Authority.

#### 2. SITE DESCRIPTION & PROPOSALS

The development site is located at 74 Chancery Lane, Holborn, London, WC2A 3UT. The five storey high property consists of a commercial unit at ground floor level, with flats directly above. Chancery Lane bounds the site to the east and has a number of commercial properties located along it. High Holborn bounds the site to the north. To the south and west are a mixture of commercial and residential properties off Chancery Lane and High Holborn. The nearest residential properties are flats located directly above at 75 Chancery Lane. To the rear of the building is a courtyard where a number of existing mechanical services plant items are located at roof level. An existing site location plan is included in Appendix A.

Proposals involve renovating the ground floor commercial unit within the building. This includes installing mechanical services plant equipment required to operate a cooled store in the basement of the building. The proposed mechanical services plant would consist of a new condenser unit located externally on the first floor roof to the rear of the building.

#### 3. NOISE CRITERIA

#### 3.1 BS 4142:2014 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

The noise impact assessment relating to mechanical plant will be carried out in accordance with the procedures set out in BS 4142:2014 *Methods for rating and assessing industrial and commercial sound*. The principle of BS 4142 is to determine an initial estimate of impact of industrial/commercial sound on nearby residents by comparing the Rating Level (sound level from the industrial/commercial source, with a correction applied for any acoustic features that characterise the sound) with the Background Sound Level (*L*<sub>A90</sub> as measured in absence of the industrial/commercial source).

Generally, the greater the difference by which the Rating Level exceeds the Background Sound Level, the greater the magnitude of impact. BS 4142 states that 'a difference of around +10 dB or more is likely to be an indication of a significant adverse impact [...]. A difference of around +5 dB is likely to be an indication of an adverse impact [...]. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.'

However, BS 4142 also advises that 'when making assessments and arriving at decisions [...] it is essential to place the sound in context' so in each case, the context in which the sound is placed must be considered and the initial estimate of impact should be modified accordingly. For example it advises 'Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.' It also indicates that impacts estimated during 'the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.'

#### 3.2 GUIDELINES FOR COMMUNITY NOISE - WORLD HEALTH ORGANIZATION, 1999 (WHO)

Table 4.1 of WHO references a guideline façade level of  $L_{Aeq,8 hour}$  45dB outside of bedrooms during the night time to avoid sleep disturbance. During the daytime and evening, Table 4.1 recommends a guideline noise level of  $L_{Aeq, 16 hour}$  55dB for outdoor living areas to avoid serious annoyance. Whilst noise levels outside of living rooms during the daytime are not listed in Table 4.1, a guideline internal level of  $L_{Aeq, 16 hour}$  35dB for habitable rooms is provided to avoid moderate annoyance. Given that a difference of 15dB(A) between noise levels outside and inside of bedrooms during the night time is stated, a guideline noise level of  $L_{Aeq, 16 hour}$  50dB outside of living rooms may be assumed.

#### 3.3 CAMDEN COUNCIL'S PLANT NOISE CRITERIA

#### **DP28.** Noise and Vibration

The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:

- a) Development likely to generate noise pollution; or
- b) Development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.

Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted.

The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds.

The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact.

Noise Description and Location of Measurement	Period	Time	Noise Level (dB)
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <la90< td=""></la90<>
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <la90< td=""></la90<>
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <la90< td=""></la90<>
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBLAeq'

Table 1 shows noise levels from plant and machinery at which planning permission will not be granted.

 Table 1: Camden Council DP28 Criteria - Noise levels from plant and machinery at which planning permission will not be granted

#### 4. BACKGROUND NOISE MEASUREMENT SURVEY

To inform the noise impact assessment, measurements of existing background noise levels were carried out during a noise survey conducted at the site from Friday 2 to Tuesday 6 August 2019. Weather conditions during the survey were warm and dry, with low wind speeds, presenting good conditions for noise measurement purposes.

Measurements of noise were carried out on the roof of the building at first floor level, in accordance with BS 4142:2014 using an unattended noise logger. The monitoring location is considered representative of the nearest noise sensitive residential receptor locations to the proposed condenser unit. Measurements consisted of continuous 15 minute periods. The microphone was mounted on a pole at second floor level. The location of the microphone is shown on the existing site location plan included in Appendix A.

The following instrumentation was used during the survey.

- Bruel & Kjaer Type 2250 Sound Level Meter s/n 3023840
- Bruel & Kjaer Type 4189 Microphone s/n 3130623
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 3020229

Before and after the survey, the sound level meter was field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The meter, microphone and field calibrator are laboratory calibrated biennially in accordance with UKAS procedures or to traceable National Standards.

Measurements made were of the following parameters:

- Maximum Noise Level defined as the maximum (LAmax the maximum noise level)
- Residual Noise Level defined as the Energy Average Level of a period, in the absence of noise from the proposed development (*L*<sub>Aeq</sub>)
- Background Noise Level defined as level exceeded for 90% of a period, in the absence of the noise from the proposed development (L<sub>A90</sub>)

The measured noise profile at the noise monitoring location is shown in the following chart.



Chart 1: Ambient noise profile - Friday 2 to Tuesday 6 August 2019.

When determining the representative background  $L_{A90,T}$  level for the relevant period, BS 4142<sup>1</sup> guidance states "a representative level ought to account for the range in background levels and ought not automatically to be assumed to be either the minimum or modal value." With this in mind, statistical analysis has been used to determine the typical background  $L_{A90,T}$  noise level. This analysis derives the Mode, Mean and Mean -1 standard deviation values. Once these three values have been established, a judgement is made as to which value is considered representative. In this instance, both the mean and modal values were the same. Therefore this value is regarded as being representative.

<sup>&</sup>lt;sup>1</sup> BS 4142:2014 Methods for rating and assessing industrial and commercial sound

Table 2 shows the representative background noise level measured at the nearest noise sensitive receptor location, during the sensitive night-time period when the condenser unit would be operating.

Measurement Location	Period	Background Noise Level
Nearest Flat - No.75 Chancery Lane.	23:00 - 05:00	L <sub>A90,15min</sub> 48 dB

 
 Table 2:
 Summary of the representative background noise level measured during the sensitive nighttime period

As shown in Table 2, the representative background noise level at the nearest noise sensitive receptors to the proposed mechanical plant is  $L_{A90,15min}$  48dB during the night-time when the unit would still be operating. This reflects a typical steady noise profile controlled by other nearby mechanical plant in the area.

#### 5. ASSESSMENT OF NOISE IMPACT

#### 5.1 PROJECTED NOISE FROM MECHANICAL PLANT

The proposed condenser unit would be located at the rear of the building. The manufacturer's data sheet is included in Appendix B. The noise output (sound power level) generated by the unit is set out in Table 3 below.

Plant Item	Sound Pressure Level at 10m dB(A)	Overall Sound Power Level dB(A)	
JEHR-0100-B1-M-1 single phase	30	58	

Table 3: Sound power level of the proposed external mechanical plant

The condenser unit operates on thermostatic, speed and timer controls according to heat loads and occupation rates and so would not be operating 100% of the time. Whilst a typical on-time for this type of equipment might only 20-35%, a conservative and therefore more robust assessment assumes a 100% on-time for a typical worst-case scenario. Note that although the unit can operate intermittently, the fan speed ramps up and down slowly. Therefore, there would be no sudden on/off characteristics attributable to the noise produced by the new plant.

Predictions of how the noise from the condenser unit propagates to the nearest sensitive receptor (5m from the unit) has been undertaken. The detailed calculations are included in Appendix C.

#### 5.2 MECHANICAL PLANT NOISE IMPACT ASSESSMENT

The proposed condenser unit would run throughout the daytime and night-time periods. Therefore, the predicted plant rating levels will be compared with the representative  $L_{A90, 15min}$  background noise level measured during the night-time at the nearest sensitive receptor location.

Table 4 shows a BS 4142 assessment covering the mechanical plant noise impact during the night-time. The plant item does not emit any distinct impulses or tones. As the background noise environment is controlled by existing plant nearby, the plant does not emit other characteristics that are distinctive against the existing residual acoustic environment. Therefore, a no feature correction has been included in the rating level.

Residential Location	Specific Level (dB)	Character Correction (dB)	Rating Level (dB)	Background L <sub>A90</sub> Noise Level (dB)	Assessment Level (dB) (Background excess)
R1. Nearest flat at 75 Chancery Lane	41	0	41	48	-7

 Table 4:
 Predicted rating level from the proposed condenser unit at the nearest sensitive receptor location, compared with the representative background L<sub>A90,15min</sub>

As indicated in Table 4, the predicted rating level from the mechanical services plant would be 41dB(A) at the nearest sensitive receptor location.

The predicted plant rating level would be 7dB(A) lower than the background  $L_{A90, 15min}$  level at the nearest sensitive receptor location, which is comfortably lower than the guideline limit set by Camden Council. Consequently, in line with BS 4142:2014, the noise impact would be very low.

The difference between the rating level and the background level is such that any uncertainty would have no significance on the outcome of the assessment. Furthermore, the predicted mechanical plant noise level would be comfortably lower than the annoyance criteria specified in the WHO guidelines.

In view of the above, noise levels from the proposed new mechanical services plant would have a low impact and would therefore be acceptable.

#### 6. CONCLUSIONS

At the request of the Local Planning Authority, a noise assessment has been completed relating to the potential impact of noise produced by the operation of proposed mechanical services plant at 74 Chancery Lane, WC2A 3UT.

A background noise measurement survey has been conducted at a location representative of the nearest noise sensitive receptors to the proposed plant and predictions of noise have been completed.

Noise limits for the proposed mechanical plant have been established for the sensitive night-time period, based on the representative background noise level and taking account of BS 4142, WHO and Camden Council's criteria for noise. Predictions have indicated that noise levels from mechanical services plant would have a low impact and would therefore be acceptable.

Report Code: E/C/FD

## APPENDIX A

Existing Site Location Plan



## APPENDIX B

Manufacturer's Data Sheet



# R134a TECHNICAL DATA Small, Medium, Large & Twin Fan

### MEDIUM TEMPERATURE

asing	Unit Model	Compressor Model	R134a Cooling Capacity (Watts) @ Te				SPL @ Unit 10m Connections dB(A)			Dry Weight	Dry Dimensions (mm) Weight (W x D x <u>H)</u>				
			-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	ad(A)	Liquid	Suction	(kgs)		
	JEHR-0050-B1-M-1	AE 4460Z-FZ1C								30	1/4	3/8	45	876 x 420 x 607	
	JEHR-0067-B1-M-1	CAJ 9480Z								30	3/8	1/2	53		
S.	JEHR-0100-B1-M-1	CAJ 9510Z								30	3/8	1/2	53		
	JEHR-0113-B1-M-1	CAJ 9513Z								30	3/8	1/2	54		
	JEHR-0140-B2-M-1	CAJ 4517Z								34	3/8	1/2	68		
	JEHR-0140-B2-M-3	TAJ 4517Z								34	3/8	1/2	68		
	JEHR-0150-B2-M-1	MTZ18-5	-	1320	1769	2266	2910	3634	4776	37	3/8	5/8	68		
	JEHR-0150-B2-M-3	MTZ18-4		1320	1769	2266	2910	3634	4776	37	3/8		68		
	JEHS-0200-B2-M-1	ZB15KQE-PFJ	1730	2170	2700	3310	4020	4850	5770	33	3/8	3/4	70		
<u>د</u>	JEHS-0200-B2-M-3	ZB15KQE-TFD	1730	2170	2700	3310	4020	4850	5770	33	3/8		70	1101 x 444 x 662	
Med	JEHS-0250-B2-M-1	ZB19KQE-PFJ	1980	2480	3070	3770	4570	5510	6550	36	3/8	3/4	72		
	JEHS-0250-B2-M-3	ZB19KQE-TFD	1980	2480	3070	3770	4570	5510	6550		3/8		72		
	JEHS-0300-B2-M-1	ZB21KQE-PFJ	2460	3060	3790	4620	5600	6740	7990	36	3/8	3/4	74		
	JEHS-0300-B2-M-3	ZB21KQE-TFD	2460	3060	3790	4620	5600	6740	7990	36	3/8		74		
	JEHS-0350-B2-M-1	ZB26KQE-PFJ	2800	3480	4300	5240	6320	7610	9010	40	3/8	3/4	74		
	JEHS-0350-B2-M-3	ZB26KQE-TFD	2800	3480	4300	5240	6320	7610	9010	40	3/8		74		
	JEHS-0350-M-1	ZB26KQE-PFJ	2950	3700	4550	5600	6800	8150	9650	35	1/2	3/4	114	1000 x 554 x 001	
	JEHS-0350-M-3	ZB26KQE-TFD	2950	3700	4550	5600	6800	8150	9650	35	1/2			1332 x 330 x 004	
	JEH2-0400-M-3	MTZ50-4	2917	3925	5143	6571	8209	10057	12115	37	1/2	7/8	120		
O O	JEHS-0400-M-1	ZB29KQE-PFJ	3400	4300	5300	6500	7850	9400	11100	34	1/2				
arg	JEHS-0400-M-3	ZB29KQE-TFD	3400	4300	5300	6500	7850	9400	11100	34	1/2	7/8	121		
-	JEH2-0500-M-3	MTZ64-4	3593	4823	6273	7943	9833	11943	14273	40	1/2		120	1347 x 556 x 884	
	JEHS-0500-M-3	ZB38KQE-TFD	4100	5150	6350	7750	9300	11100	13050	35	1/2	7/8	126		
	JEHS-0600-M-3	ZB45KQE-TFD	4950	6150	7600	9250	11100	13150	15300	40	1/2				
	JEHS-0680-M-3	ZB48KQE-TFD	5588	6928	8420	10082	11959	14015	15972	40	1/2	7/8	129		
	JEH2-0825-M-3	MTZ100-4	5322	7083	9110	11401	13958	16779	19866	42	1/2		205		
. <u></u> ⊆.	JEHS-0800-M-3	ZB58KCE-TFD	6300	7800	9550	11650	13750	16300	19000	44	1/2	1 1/8	201	10415041425	
l₹	JEH2-1000-M-3	MTZ125-4	6615	8667	10980	13552	16385	19477	22830	42	1/2		205	1201 X 374 X 1433	
	JEHS-1000-M-3	ZB76KCE-TFD	8050	9900	12050	14450	17100	20000	23100	44	1/2	1 3/8	201		

Rating Condition: Suction Gas Superheat 10K / Subcooling 0K / 32°C Ambient

Capacity data presented in accordance with BS EN 13215:2000

Sound Pressure Level (SPL) @ 10m free field at (-10/+32°C) MT & (-25/+32°C) LT conditions. Alternative conditions may produce different results.



## APPENDIX C

Mechanical Plant Noise Prediction Model

# Simple noise propagation calculation



Project:	
Project number:	
Date:	

74 Chancery Lane, WC2A 3UT 19247 06/08/2019

 Operating condition/scenario:
 Normal Operation

 Receptor:
 Nearest Flat at 75 Chancery Lane

					Attenuation			
Source	Sound Power Level, dB(A)	Distance to 1m from receptor (m)	Directivity Index, dB	Geometric spreading, dB(A)	Screening, dB(A)	Total attenuation, dB(A)	% On-Time	Predicted noise level, dB(A)
JEHR-0100-B1-M-1 single phase	58	4	6	17	0	17	100%	41
Total								41

 $L_p = L_{wA} - 20\log(r) + 11 - DI - A_{misc}$ 

where  $L_p$  is the predicted noise level;  $L_{wA}$  is the sound power level; r is distance; DI is the directivity index; and  $A_{misc}$  is the attenuation from other miscellaneous factors (i.e. screening/ground effect/atmospheric absorption/foliage).

N.B. If attenuation values for both screening and ground effect are entered, only the higher value is used in the calculation of total attenuation.

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