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Premier Inn Welwyn Garden City, Extension

Whitbread plc

Noise Emission Assessment

Revision 00

11/04/2019

Scotch Partners LLP
Building Services Engineering | Sustainability | Acoustics

Scriptor Court
157 Farringdon Road
London EC1R 3AD

+44 (0) 203 544 5400
www.scotchpartners.com

Project Particulars

Client Name: Whitbread plc

Project Name: Premier Inn Welwyn Garden City, Extension

Disclaimer

Revision History

Revision	Date	Prepared By	Checked By
00	11 April 2019	Kial Jackson BSc MIET AMIOA	Jason Clouston BEng MSc MIOA

Contents

1 Introduction

1.1 Permission has been granted for the construction of a three-storey extension to the Premier Inn Welwyn Garden City hotel (Application Number: 6/2018/1922/FULL).

1.2 The development is subject to a series of planning conditions, one of which pertains to the control of plant noise at the nearest residential properties. The condition is presented below for reference:

> *2. Prior to commencement the applicant must submit to, for approval in writing by the Local Planning Authority, details relating to noise from plant and equipment to be installed at the premises with evidence in the form of an acoustic report showing that noise emissions from plant and equipment will be 5dB (LAeq) below the background noise level (LA90) at the nearest residential properties (10dB below the background noise level if the noise produced is tonal). The approved details must then be implemented in full on site prior to the first occupation of the extension, and then permanently maintained.*

1.3 An external noise survey has been carried out at the development site to determine the prevailing noise climate.

1.4 This report presents the results of the noise survey, details of the proposed plant, and serves to demonstrate that the above Planning Condition will be satisfied.

1.5 Manufacturer's noise data for the equipment, a selection of measurement data from the survey and a glossary of some of the terminology used in this report are presented in Appendices A – C respectively.

2 External noise survey

2.1 Site description

2.1.1 The hotel is located just off the A6129; to the north of Gosling Sports Park and to the west of the East Coast Main Line.

2.1.2 The proposed extension is to extend northwards into the existing carpark and will provide 24 additional keys.

2.2 Measurement methodology

2.2.1 Continuous, unattended measurements were carried out a single measurement position overlooking the hotel carpark. The measurement position is shown on a satellite image of the site in Figure 2-1.

2.2.2 The microphone was extended approximately 1-metre from a first-floor bedroom window and is considered to have been under the influence of façade-reflections. A -3dB correction can be applied to the data to correct for free-field conditions.

2.2.3 Statistical and spectral noise level data were obtained in 15-minute samples between 14:00 on Thursday 4th April and 15:30 on Friday 5th Aril 2019.

2.2.4 The measurement data are considered representative of prevailing background noise levels at the nearest residential properties.

2.2.5 The following equipment was used to undertake the survey.

Equipment	Type	Serial No.
Class 1 sound level meter	Norsonic 131	1313650
Environmental microphone	Norsonic 1218	1218
Portable sound calibrator	Norsonic 1251	34926

Table 2-1 Survey equipment

2.2.6 The calibration of the sound level meter and associated microphone was checked prior to and on completion of the measurement periods in accordance with recommended practice. No meaningful drift in calibration occurred during the measurement period. The accuracy of the calibrator can be traced to National Physical Laboratory Standards.

Image courtesy of Google
Figure 2-1 Measurement position

2.3 Weather

2.3.1 Weather conditions throughout the survey were observed to be clear, calm and dry. Measurement data are not believed to have been adversely affected by the weather.

2.4 Results

2.4.1 A selection of the measurement data are presented in Appendix A. A graph detailing the noise level history throughout the survey is presented below. The measurement data have been corrected to free-field conditions.

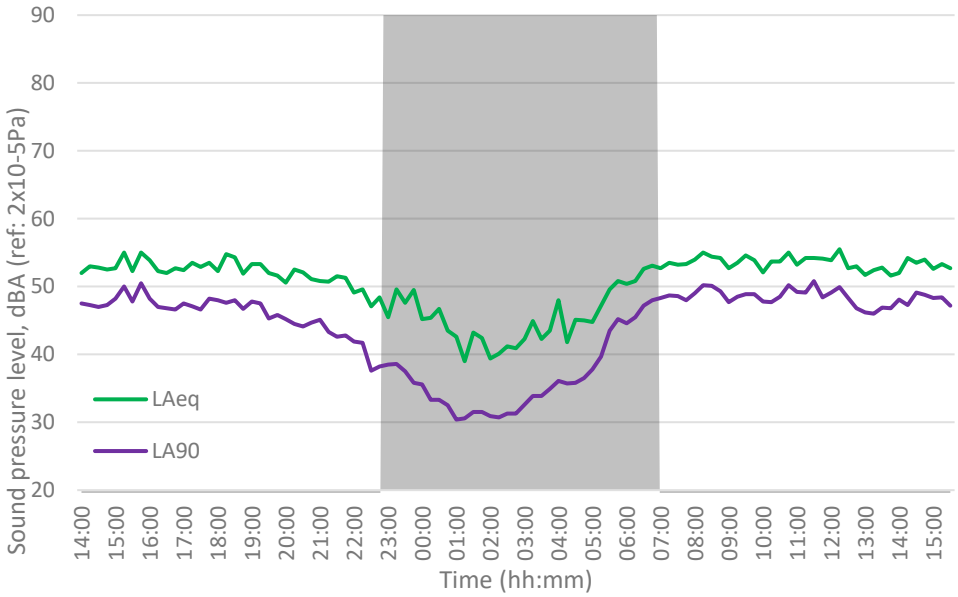

Figure 2-2 Noise level history

2.4.2 The lowest background noise levels measured during the daytime, evening and night-time periods are set down in Table 2-2.

Time	Lowest measured background noise level
Daytime (07:00-19:00)	46dB $L_{A90,15min}$
Evening (19:00-23:00)	38dB $L_{A90.15min}$
Night (23:00-07:00)	30dB $L_{A90,15min}$

Table 2-2 Lowest measured background noise levels

2.5 Commentary

2.5.1 The prevailing acoustic climate is predominantly influenced by road traffic along the A6129 with the occasional passing train or car in the hotel car park also contributing to the measured noise levels.

2.5.2 This is reflected by the measurement data which demonstrate a typical diurnal pattern. Noise levels are at their greatest during the daytime and at their lowest during the night when traffic in the area decreases and train activities cease.

3 Plant noise assessment

3.1 Plant details

3.1.1 External plant associated with the extension comprises the fresh air intakes and exhausts of MVHR units serving individual guestrooms, and the flue of a communal water heater located within a ground floor plant room.

3.1.2 All plant items are to be housed internally and casing breakout noise is expected to be negligible. It has therefore not been considered further within this assessment.

3.1.3 Table 3-1 presents a summary of the noise data for the equipment. The noise levels have been calculated from the manufacturers' noise data provided in Appendix A and assume the vents of the MVHR units are 125mm in diameter and have at least 1-metre of acoustic flexible ducting installed before the intake/exhaust.

Equipment	Noise level
MVHR units (Operating in trickle mode)	Extract: 14dB L_{pA} at 1 metre Supply: 22dB L_{pA} at 1 metre
MVHR units (Operating in boost mode)	Extract: 28dB L_{pA} at 1 metre Supply: 38dB L_{pA} at 1 metre
Water heater	57dB L_{pA} at 1 metre from flue

Table 3-1 Plant noise data

3.1.4 Noise emission from the equipment is expected to be broadband without any tonal qualities. Controlling noise levels at the nearest residential properties to 5dB below the prevailing background noise levels can therefore be expected to satisfy the Planning Condition.

3.2 Nearest residential properties

3.2.1 The nearest residential properties have been identified as the homes on Stanborough Mews; some 17-metres from the north-east façade of the hotel extension and 40-metres from the new plant room.

3.2.2 The location of the residential properties in relation to the hotel extension is shown on a site plan in Figure 3-1.

Figure 3-1 Location of nearest residential properties

3.3 Predicted plant noise

3.3.1 Based on the noise data presented in Table 3-1 and assuming all of the MVHR units operating in trickle mode, plant noise at the nearest residential properties is predicted to be 20dB L_{Aeq}. This is 10dB below the lowest measured background noise level.

3.3.2 Assuming a worst-case scenario, with all MVHR units operating in boost mode, the predicted level of plant noise at the residential properties is 25dB L_{Aeq}. This is 5dB below the lowest measured background noise level.

3.3.3 It should be noted that this worst-case scenario is unlikely to occur, as it would require all rooms to be occupied and for all guests to use the en-suite bathrooms simultaneously, but it does serve to demonstrate that there is little to no risk of the limits set out in the Planning Condition being exceeded.

4 Conclusion

4.1 An external noise survey has been carried out at the development site and the measurement data have been used to establish prevailing background noise levels.

4.2 Details of the proposed building services plant have been provided and the manufacturers' noise data is presented in Appendix A.

4.3 Noise is expected to be broadband in character and, in accordance with the Planning Condition, should be controlled at the nearest residential properties to a level no greater than 5dB below the prevailing background noise levels.

4.4 Plant noise at the nearest residential properties is predicted to be between 20dB L_{Aeq} and 25dB L_{Aeq}. These levels are 5dB to 26dB below the lowest background noise levels measured throughout the day and night.

4.5 It can therefore be concluded that the plant proposals will readily satisfy the requirements of Condition 2.

Appendix A – Equipment noise data

Whole House Mechanical Ventilation with Heat Recovery - MVHR

WHHR Mini DC

vectaire

TECHNICAL CHARACTERISTICS

Model	Airflow l/sec					Power - Watts				
	maxboost	max trickl	80%	60%	40%	max boost	max trickl	80%	60%	40%
WHHR Mini DC	34	32	28	18	12	80	68	46	24	15

RESULTS FOR SAP CALCULATIONS
ENERGY LEVEL PERFORMANCE - using rigid ducting only

Exhaust Terminal Configuration	Specific Fan Power (W/l/s)	Heat Exchange Efficiency	Airflow Rate (l/sec)
Kitchen + 1 additional wet room	1.11	83 %	15.0
Kitchen + 2 additional wet rooms	1.4	82 %	21.0

Figures from BRE test results at minimum flow rate conditions

WHHR Mini DC		Sound Power Levels, L_w (dB) - Octave Bands Frequency Hz.								Sound Pressure dBA @3m
Curve Ref		63	125	250	500	1k	2k	4k	8k	
Max Boost (34 l/sec)	Extract	65	58	61	63	55	46	36	27	37
	Supply	66	64	70	73	67	64	55	45	
	Breakout	73	59	62	58	49	35	32	24	
Max Trickle (32 l/sec)	Extract	64	56	60	62	54	45	35	26	36
	Supply	65	63	69	72	66	63	54	44	
	Breakout	72	58	61	57	48	34	31	23	
80% (28 l/sec)	Extract	54	54	59	54	45	34	24	22	30
	Supply	55	57	65	62	56	51	42	31	
	Breakout	62	53	57	48	39	31	21	21	
60% (18 l/sec)	Extract	46	50	53	45	37	26	20	21	24
	Supply	50	55	58	48	47	42	33	26	
	Breakout	56	51	50	41	31	23	18	20	
40% (12 l/sec)	Extract	39	46	47	39	29	19	15	21	18
	Supply	45	54	51	47	39	34	23	21	
	Breakout	49	49	44	34	23	16	16	20	

Vectaire Ltd can supply all accessories for use with these units, including air filter cassettes, silencers, fire ampers, air valves, ducting, outside grilles and wall cowls. Additionally, Vectaire offers a design service to ensure that the unit installed is the best possible to provide efficient, effective, low energy and low running cost ventilation. Vectaire can also organise installation, commissioning and maintenance of these products

TYPICAL SPECIFICATION

Supply and install a Vectaire WHHR Mini DC energy efficient MVHR as manufactured by Vectaire Ltd, Lincoln Road, Cressex Business Park, High Wycombe, Bucks, HP12 3RH. The unit is to give low level, continuous ventilation to a kitchen and one other wet room. The unit should be for loft or void installation and recover up to 83% of heat from extracted air separating the airflows using a counter flow heat exchanger. The unit should incorporate a low energy EC motor with sealed for life bearings for low noise levels and low energy consumption, and have as standard: variable adjustment; boost setting with integral overrun timer; optional delay-on timer; integral frost-stat; and a water level sensor. It should also have the facility for: change of ductwork handing; purge boost; BMS connections; integral proportional dynamic humidistat; and an automatic summer bypass. The unit should be capable of being fitted to 125mm dia ducting without the need for adaptors, have EPS lining for low noise levels and low heat loss. The upit should comply with Part L1 2013 and Part F 2013 of Building Regulations, be EU RoHS Directive Compliant, conform to the requirements of EC Council directives relating to Electromagnetic Compatibility and Electrical Safety: 2006/95/CE (LVD), 2004/108/CE (EMC), EN 60335-2-80, be CE marked and SAP Q Eligible

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Figure A-1 Noise data for MVHR units

Model Reference CWH	30/200	60/200	90/200	120/200
	30/300	60/300	90/300	120/300
Input gross Hs min/max	6.7–31.1 kW	13.4–62.2 kW	20.1–93.3 kW	26.8-124.4 kW
Input nett Hi min/max	6.0–28.0 kW	12.0–56.0 kW	18.0-84.0 kW	24.0-112.0 kW
Output (tank set point = 60°C) min/max	6.5–30.5 kW	13.0–61.0 kW	19.5-91.6 kW	26.0-122.1 kW
Natural Gas, G20				
Gas Consumption	2.96 m^3/h	5.93 m^3/h	8.89 m^3/h	11.85 m^3/h
Minimum Dynamic Gas Supply Pressure	18 mbar	18 mbar	18 mbar	18 mbar
Propane, G31				
Gas Consumption	2.18 Kg/h	4.35 Kg/h	6.53 Kg/h	8.71 Kg/h
Minimum Dynamic Gas Supply Pressure	37 mbar	37 mbar	37 mbar	37 mbar
Efficiency (gross)	98%	98%	98%	98%
Efficiency (nett)	109%	109%	109%	109%
Standby Heat Loss		780 Mj per month		
NO_X level @ 0% O^2	25ppm	25ppm	25ppm	25ppm
NO_X level @ 0% O^2	44mg/kWh	44mg/kWh	44mg/kWh	44mg/kWh
Noise level *	51dBA	51dBA	51dBA	51dBA
Ionisation current – max	6.0µA	6.0µA	6.0µA	6.0µA
Ionisation current – min	4.0µA	4.0µA	4.0µA	4.0µA
HSI resistance	1.0 – 1.4 kΩ	1.0 – 1.4 kΩ	1.0 – 1.4 kΩ	1.0 – 1.4 kΩ
Max recovery thru 50°C	480 l/h	960 l/h	1440 l/h	1920 l/h
Max recovery thru 56°C	429 l/h	856 l/h	1284 l/h	1712 l/h
Time to recover tank thru 50°C rise				
200 litre capacity	25 mins	13 mins	9 mins	7 mins
300 litre capacity	38 mins	19 mins	13 mins	10 mins
Flue size (concentric) Internal/External	80/125	80/125	130/200	130/200
Flue Size (conventional)	80	80	130	130
Max flue run – concentric **	14	12	14	14
Max flue run – conventional ***	50	20	50	40
Max flue static pressure	140 Pa	140 Pa	140 Pa	140 Pa
Inlet/Outlet connections	1½" BSP	1½" BSP	1½" BSP	1½" BSP
Return connection	1" BSP	1" BSP	1" BSP	1" BSP
Nominal operating water pressure	3.5 bar	3.5 bar	3.5 bar	3.5 bar
Maximum water pressure	6.0 bar	6.0 bar	6.0 bar	6.0 bar
Minimum water pressure	1.0 bar	1.0 bar	1.0 bar	1.0 bar
Gas connection (gas cock supplied)	n/a	n/a	n/a	n/a
Electrical supply		All models: 230/50V/Hz		
Power consumption	170 W	340 W	510 W	680 W
Weight – empty (200 litre)	155 kg	170 kg	185 kg	200 kg
Weight – empty (300 litre)	165 kg	180 kg	195 kg	210 kg
Weight – full (200 litre)	355 kg	370 kg	385 kg	400 kg
Weight – full (300 litre)	465 kg	480 kg	495 kg	513 kg
Shipping weight (200 litre)	178 kg	193 kg	208 kg	213 kg
Shipping weight (300 litre)	188 kg	203 kg	218 kg	233 kg
Shipping depth	1040 mm	1040 mm	1040 mm	1040 mm
Shipping width	880 mm	880 mm	880 mm	880 mm
Shipping height (200 litre)	1653 mm	1653 mm	1653 mm	1653 mm
Shipping height (300 litre)	2077 mm	2077 mm	2077 mm	2077 mm

* Noise level measured at 2m from flue terminal
** Reduce flue length by 1.2m for 90° bend, 0.7m for 45° bend and 1.5m for condensate trap
*** Reduce flue length by 4m for 90° bend, 2m for 45° bend and 4m for condensate trap

The MAXXflo range features stainless steel tanks with external heat exchanger(s) and fully automatic electronic control with BEMS interface as standard. The heaters must be installed with a minimum water pressure of 1 bar. The heaters are factory fitted with temperature and pressure relief valve(s). A gas cock, water draw-off cock and comprehensive instruction manual are also included. The water heaters can be fitted with concentric flue for room sealed applications; horizontal or vertical flue kits must be ordered separately – see pages 20 and 23.

Conventional flue, suitable for condensing applications can be used if the plantroom is ventilated.

Figure A-2 Noise data for water heater

Appendix B – Survey noise level data

A selection of the measured noise level data over a representative 24-hour period are presented in the tables in this appendix. The full set of data are available in electronic form on request.

All values are sound pressure levels in dB re $2x10^{-5}$ Pa.

Time	L_{Aeq}	L_{A90}
14:00	52.0	47.5
14:15	53.0	47.3
14:30	52.8	47.0
14:45	52.5	47.3
15:00	52.7	48.2
15:15	55.0	50.0
15:30	52.3	47.8
15:45	55.0	50.5
16:00	53.9	48.2
16:15	52.3	47.0
16:30	52.0	46.8
16:45	52.7	46.6
17:00	52.4	47.5
17:15	53.5	47.1
17:30	52.9	46.6
17:45	53.5	48.2
18:00	52.3	48.0
18:15	54.8	47.6
18:30	54.3	48.0
18:45	51.9	46.7
19:00	53.3	47.8
19:15	53.3	47.5
19:30	52.0	45.3
19:45	51.6	45.8
20:00	50.6	45.2
20:15	52.5	44.5
20:30	52.1	44.1
20:45	51.1	44.7
21:00	50.8	45.1
21:15	50.7	43.3
21:30	51.5	42.6
21:45	51.3	42.8
22:00	49.1	41.9
22:15	49.6	41.7
22:30	47.1	37.6
22:45	48.4	38.2
23:00	45.5	38.5
23:15	49.6	38.6
23:30	47.6	37.5
23:45	49.5	35.8
00:00	45.2	35.6
00:15	45.4	33.3
00:30	46.7	33.3
00:45	43.5	32.5
01:00	42.6	30.4
01:15	39.0	30.6
01:30	43.2	31.5
01:45	42.4	31.5
02:00	39.4	30.9
02:15	40.1	30.7
02:30	41.2	31.3
02:45	40.9	31.3
03:00	42.3	32.6
03:15	44.9	33.9
03:30	42.3	33.9
03:45	43.5	34.9
04:00	48.0	36.1
04:15	41.8	35.7
04:30	45.1	35.8
04:45	45.0	36.5
05:00	44.8	37.8
05:15	47.2	39.7
05:30	49.6	43.5
05:45	50.8	45.2
06:00	50.4	44.6
06:15	50.8	45.5
06:30	52.6	47.2
06:45	53.1	48.0
07:00	52.7	48.3
07:15	53.5	48.7
07:30	53.2	48.6
07:45	53.3	48.0
08:00	54.0	49.0
08:15	55.0	50.2
08:30	54.4	50.1
08:45	54.2	49.3
09:00	52.7	47.7
09:15	53.5	48.5
09:30	54.6	48.9
09:45	53.9	48.9
10:00	52.1	47.8
10:15	53.7	47.7
10:30	53.7	48.5
10:45	55.0	50.2
11:00	53.2	49.2
11:15	54.2	49.1
11:30	54.2	50.8
11:45	54.1	48.4
12:00	53.9	49.1
12:15	55.5	49.9
12:30	52.7	48.3
12:45	53.0	46.8
13:00	51.7	46.2
13:15	52.4	46.0
13:30	52.8	46.9
13:45	51.6	46.8
14:00	52.0	48.1
14:15	54.2	47.3
14:30	53.5	49.1
14:45	54.0	48.8
15:00	52.6	48.3
15:15	53.3	48.4
15:30	52.7	47.2

Table B-1 Statistical noise level data, 4th – 5th April 2019

Appendix C – Glossary

This appendix provides an explanation of some of the terms used in this report.

A-weighting **L_A or L_{pA}, L_{WA},**	The human ear does not sense all frequencies of sound equally. Our sensitivity is at a maximum at around 2 kHz and steadily decreases above and below. Below 20 Hz and above about 20 kHz we can't hear at all. Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would actually hear. The A-weighting is an electronic filter that matches the response of a sound level meter to that of the human ear. When A-weighted the Sound Pressure Level L_p becomes L_{pA} (or L_A) and the Sound Power Level L_W becomes L_{WA}.
L_p	*The instantaneous sound pressure level* (L_p)
L_{pA} (or L_A)	*The A-weighted instantaneous sound pressure level* (L_{pA} or L_A) This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125 s (FAST time constant) or the previous 1 s (SLOW time constant).
L_{AF}, L_{AS}	The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.
L_{max}	*The maximum instantaneous sound pressure level* (L_{max}),
L_{Amax}	*The A-weighted maximum instantaneous sound pressure level* (L_{Amax})
L_{AFmax}	*The A-weighted maximum instantaneous sound pressure level with a FAST time constant* (L_{AFmax}).
L_{min} , L_{Fmin}	The opposite of the L_{max} is the *minimum instantaneous sound pressure level* or L_{min} etc. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.

$L_{N,T}$	*The percentage exceedance sound pressure level ($L_{N,T}$),*
$L_{AN,T}$ $L_{AFN,T}$ N = %age value, 0-100 T = measurement time eg. L_{A90}, L_{A10}, $L_{AF90,\ 5\ min}$	*The A-weighted percentage exceedance sound pressure level ($L_{AN,T}$), the A-weighted percentage exceedance sound pressure level with a FAST time constant ($L_{AFN,T}$).* This is the sound pressure level exceeded for *N*% of time period *T*. eg. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as $L_{A10,1hr}$ = x dB. L_{A0} (the level exceeded for 0 % of the time) is equivalent to the L_{Amax} and L_{A100} (the level exceeded for 100 % of the time) is equivalent to the L_{Amin}. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{eq,T}$	The *equivalent continuous sound pressure level over period T ($L_{eq,T}$),*
$L_{Aeq,T}$ T = measurement time eg. $L_{Aeq,5min}$	*The A-weighted equivalent continuous sound pressure level over period T ($L_{Aeq,T}$).* This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the L_{eq} is not a simple arithmetic mean value. The L_{eq} is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation

Scotch Partners LLP
Building services engineering | Sustainability | Acoustics

Scriptor Court,
157 Farringdon Road,
London, EC1R 3AD

T 0203 544 5400

www.scotchpartners.com