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Acoustic Consultancy Report

Environmental Noise Survey Results and Noise Impact Assessment for Proposed Fixed Plant

Proposed A3/A5 Restaurant and Takeaway, 211 Broad Street Mall, Reading

Client:	Cascade Group
Project:	211 Broad Street Mall Reading RG1 7QH
Our Ref:	11429
Revision:	0
Report Prepared By	N. Fowler M.I.O.A.
Date:	25 th September 2019



1.0 Introduction

- 1.1 Acoustic Consultancy Partnership Ltd were appointed to undertake an environmental noise survey and carry out a noise impact assessment for the proposed fixed plant at 211 Broad Street Mall, Reading, RG1 7QH.
- 1.2 This report provides the results of our environmental noise survey and establishes the resultant noise levels for the proposed plant.
- 1.3 This site is within the Reading Borough Council area and will be subject to the external criteria confirmed later in this report.
- 1.4 This report provides a noise assessment and mitigation proposals that will achieve Condition 3 of the Grant of Full Planning Permission dated 2nd September 2019.

2.0 Environmental Noise Survey Measurement Procedure

- 2.1 The environmental noise survey adopted the procedure and methodology stated within BS4142:2014. This report has been prepared to provide Reading Borough Council with existing ambient and background noise levels covering the periods of operation of the proposed plant located on the Shopping Centre roof/car park deck facing over Oxford Road.

3.0 Site Description and Nearest Noise Sensitive Buildings

- 3.1 The premises would occupy the ground floor and basement areas within a parade of retail, commercial and food premises fronting the south side of Oxford Road at the junction with Broad Street and St Mary's Butts. Above, and to the rear of the premises, is the multi storey car parking attached to the Shopping Centre.
- 3.2 The proposed air conditioning and refrigeration condensers will be located within a lowered open top well area accessed from the car park flat roof at Level C and behind a 1.6m high parapet wall. The intake and discharges serving the kitchen/general extract and kitchen supply would terminate at upper roof level fairly adjacent to the open top well area.
- 3.3 The nearest residential to all the proposed plant will be the 2nd, 3rd and 4th floors above retail on the north side of Oxford Road and to the north west of the proposed plant locations.



- 3.4 Full details of the individual plant items, operating periods and plant locations relative to the receptor position are given in sections 4.0, 5.0 and 6.0.

4.0 Receptor Position

- 4.1 Based on our comments given in section 3.3 above, we have adopted one receptor position as the nearest noise sensitive properties to the proposed plant locations.

- 4.2 The adopted receptor is as follows:

RPA Upper floors to the residential on the north side of Oxford Road.

- 4.3 The distances and sight lines to the proposed plant items are given in Table 1 below.

Plant Unit No	Plant	Distance to RPA	Sight Line
1	Refrigeration Condenser No 1	30m	Partial Line of Sight
2	Refrigeration Condenser No 2	30m	Partial Line of Sight
3	A/C Condenser No 1	30m	Partial Line of Sight
4	A/C Condenser No 2	30m	Partial Line of Sight
5	A/C Condenser No 3	30m	Partial Line of Sight
6	Kitchen Supply Intake	38m	Line of Sight
7	Kitchen/General Extract Discharge	38m	Line of Sight

Table 1 – Distances and Sight Lines

5.0 Plant Information

- 5.1 The plant models and location are given below.

Unit No	Plant Item	Sound Pressure Level, dBA
1	Freezer Unit-Duet JEH2-0175	35 dBA at 10m
2	Chiller Unit-Duet JEHR-0050	30 dBA at 10m

Table 2 – Refrigeration Plant Sound Pressure Levels at 10m

Unit No	Plant Item	Sound Pressure Level, dB at 1m							
		63	125	250	500	1k	2k	4k	8k
3	Toshiba RAVGM1404ATP-E condenser	58	59	57	54	50	46	40	33
4	Toshiba RAVGM1404ATP-E condenser	58	59	57	54	50	46	40	33
5	Toshiba RAVGM1404ATP-E condenser	58	59	57	54	50	46	40	33

Table 3 – A/C Plant Sound Pressure Levels at 1m

- 5.2 The above manufacturers noise data for units 1,2,3,4 and 5, given in tables 2 and 3, are measured under free field conditions over a reflecting plane.



Unit No	Plant Item	Sound Power Level, dB							
		63	125	250	500	1k	2k	4k	8k
6	SMB550/4 Kitchen Supply	76	77	81	68	66	66	64	58
7	SMB550/4 Kitchen/General Extract	79	76	82	74	73	70	66	59

Table 4 – Plant Sound Power Levels

6.0 Plant Operating Periods

- 6.1 We note that the proposed operating hours are detailed in Condition 5 of the Grant of full planning permission dated 2nd September 2019 relating to Application No 191104. The Class A3/A5 premises can be used by members of the public between 09.00 to 23.00 hours on Sunday to Thursday and 09.00 to 23.30 hours Friday and Saturday.
- 6.2 We have allowed for the HVAC plant to operate for up to 30minutes after the premise shut. The refrigeration plant, items 1 and 2 serving the Freezer and Chiller coldrooms, will operate 24 hours a day, 7 days a week upon demand.

7.0 Environmental Noise Survey Monitoring Position

- 7.1 The adopted monitoring position was at pavement level on the north side of Oxford Road at the junction with Cheapside. This position was considered representative of the noise climate at the front façade of the residential. The monitoring position is confirmed on the site plan in Appendix 2.

8.0 Monitoring Equipment

- 8.1 The noise monitoring equipment comprised of a Svantek 957 type 1 real time analyser, serial number 20607, with a weatherproof microphone protection system. The microphone was mounted on a tripod at a height of 1.5m above ground level and at least 3.5m from any vertical reflecting surface. A weatherproof windshield and bird spike were used.
- 8.2 The meter calibration was verified before and after the measurement period by a Svantek SV31 acoustic calibrator, serial number 24688. Any deviation was within an acceptable tolerance.
- 8.3 The meter and calibrator have current calibration certificates available upon request.



9.0 Noise Monitoring Period and Survey Weather Conditions

- 9.1 The survey was carried out between 23.00 to midnight and 02.00-03.00 hours on Wednesday 19th September and Thursday 20th September 2019.
- 9.2 The weather during the survey was dry, still with clear skies and a light breeze of 0.4m/sec. The temperature was steady at 12°C throughout the survey periods.
- 9.3 The weather was acceptable for environmental noise monitoring.

10.0 Noise Measurement Parameters

- 10.1 The survey established the prevailing L_{AFmax} , $L_{Aeq,T}$, $L_{A10,T}$, and $L_{A90,T}$ noise levels, measured using F time weighting, with a 15 minute reference time period.

11.0 Monitoring Observations and Results

- 11.1 We consider the survey results to be representative of the typical background and ambient noise levels affecting the nearest noise sensitive properties as detailed in Section 4.0.
- 11.2 There was regular traffic movements during the evening survey with frequent buses and taxis. There was also regular pedestrian activity and traffic on St Mary's Butts was also busy and clearly audible. During the night time period there were still frequent taxi movements but only one bus. Pedestrian activity was very light. Plant noise was audible from further down Cheapside.
- 11.3 The results of the survey are provided in Appendix 1 and the lowest measured background noise levels for the operating periods of the plant are summarised below.

Plant 1and 2 (continuous operation)	46dB $L_{A90,15min}$
Plant 3-8 (operating only up to 00.00 hours)	52dB $L_{A90,15min}$



12.0 Local Authority Criteria for Proposed Plant

- 12.1 We are in receipt of a Reading Borough Council Grant of full planning permission dated 2nd September 2019 relating to Application No 191104. Condition 3 states “No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by this Council. The assessment shall be carried out for in accordance with BS4142:2014 methodology. The predicted specific sound level ($L_{Aeq,TR}$) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level $LA_{90,T}$ when all plant/equipment (or any part of it) is in operation. The predicted rating level $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall not exceed the existing background sound level, $LA_{90,T}$ when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment.”
- 12.2 Based on the requirements given above, and the results of our environmental noise survey given in Appendix 1, the plant specific sound level to be achieved at the façade of the nearest noise sensitive properties, as detailed in Section 4.0 of this report, would be:

Plant 1 and 2	Cumulative Continuous Plant	36 dB $L_{Aeq,T(15min)}$
Plant 3-8	Cumulative Plant running up to 00.00 hours	42 dB $L_{Aeq,T(15min)}$

- 12.3 Achievement of these external criteria would ensure compliance with the external criteria required by Reading Borough Council and stated in Condition 3.

13.0 Predicted Plant Noise Levels

- 13.1 The predicted **un-attenuated** cumulative free field plant noise levels are given below.

Receptor Position	Plant Operating Period	Predicted Total Plant Noise Level $L_{Aeq(15min)}$ dB	Target Plant Noise Level $L_{Aeq(15min)}$ dB
RPA	Continuous	22	36
	Up to 00.00	51	42

Table 5 – Cumulative Plant Noise Levels at Receptor Position

14.0 Mitigation Measures

- 14.1 Based on the assessed locations of the nearest noise sensitive properties, it will be necessary to provide mitigation measures to the atmosphere side of the Kitchen Supply and the Kitchen/General Extract fans to ensure the external criteria detailed in section 12.2 is achieved for the operating hours of each plant item.



14.2 The proposed mitigation measures are as detailed below:

A) In duct attenuators on the atmosphere side of the Kitchen Supply and the Kitchen/General Extract fans. The minimum attenuation performance figures are detailed below:

Plant	Minimum Required Insertion Loss, dB							
	63	125	250	500	1k	2k	4k	8k
Unit 6-Kitchen Supply intake	4	6	14	27	24	16	12	9
Unit 7-Kitchen/General Extract Discharge	4	6	14	27	24	16	12	9

Table 6– Fan Minimum Attenuator Insertion Loss Requirements

14.3 No other mitigation measures are required for the remaining plant items.

14.4 The predicted **attenuated** cumulative plant noise levels, allowing for the mitigation measures detailed in Table 6 above, are given below.

Receptor Position	Plant Operating Period	Predicted Total Plant Noise Level L_{AeqT} dB	Target Plant Noise Level L_{AeqT} dB
RPA	continuous	22	36
	Up to 00.00	37	42

Table 7 – Cumulative Plant Noise Levels at Receptor Position

14.5 The mitigated plant noise level calculations are given in Appendix 3.

15.0 Conclusions

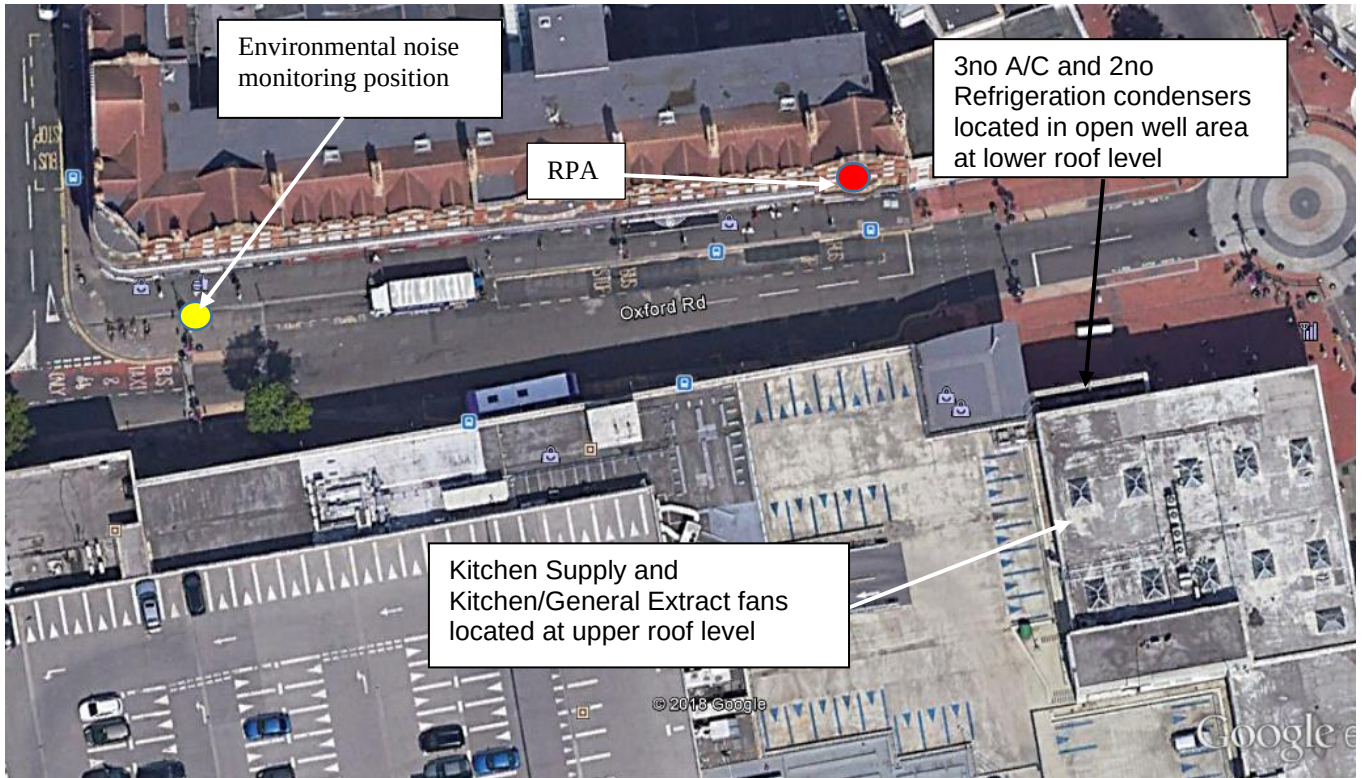
15.1 Providing the mitigation measures detailed in section 14.2 are implemented in full, the Reading Borough Council Planning Condition No 3 will be achieved for all plant operation at the receptor position.



Appendix 1 – Survey Results

Time			Measured Sound Pressure Level, dB			
			L _A F _{max}	L _A eq,T	L _A 10,T	L _A 90,T
23.00	to	23.15	95.4	65.7	67.8	55.6
23.15	to	23.30	78.8	63.6	66.5	53.6
23.30	to	23.45	78.4	62.8	64.8	51.9
23.45	to	00.00	83.6	62.7	65.9	52.2
02.00	to	02.15	87.2	63.3	63.6	48.2
02.15	to	02.30	78.1	57.4	60.7	45.7
02.30	to	02.45	75.6	58.4	61.6	46.4
02.45	to	03.00	77.0	57.9	61.7	47.2

Appendix 2 – Site Plan



Appendix 3 – Plant Noise Level Calculations – RPA (Plant Operating up to 00.00 hours)

Plant Calcs for Octave Band Sound Pressure Level												
Project: Taco Bell - Broad Street Mall, Reading PLANT OPERATING UP TO 00.00 HOURS												
Date: 26 09 2019												
Section Total, dBA		Day	32.0					Night	32.0			
ALL PLANT TOTAL		Day	37.4					Night	37.4			
RPA												
Condenser No 1											Day	Night
											"y"	"y"
Lp at 1m, Q=2		58	59	57	54	50	46	40	33	y	y	
A weight		-26	-16	-8.6	-3.2		1.2	1	-1.1			
Directivity	Q=	2	0	0	0	0	0	0	0			
Barrier (enter as +ve)	b	5	5	5	5	5	5	5	5			
Distance correction	m	30	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5			
Other Correction (+ve or -ve)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Other Correction (+ve or -ve)												
Resultant dBA		3	14	20	22	21	19	12	3			
Overall dBA		27.2										
528.6586382		2.12	27.3	97	169	140	73.6	17.7	2.17	528.7	528.7	
RPA												
Condenser No 2											Day	Night
											"y"	"y"
Lp at 1m, Q=2		58	59	57	54	50	46	40	33	y	y	
A weight		-26	-16	-8.6	-3.2		1.2	1	-1.1			
Directivity	Q=	2	0	0	0	0	0	0	0			
Barrier (enter as +ve)	b	5	5	5	5	5	5	5	5			
Distance correction	m	30	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5			
Other Correction (+ve or -ve)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Other Correction (+ve or -ve)												
Resultant dBA		3	14	20	22	21	19	12	3			
Overall dBA		27.2										
528.6586382		2.12	27.3	97	169	140	73.6	17.7	2.17	528.7	528.7	
RPA												
Condenser No 3											Day	Night
											"y"	"y"
Lp at 1m, Q=2		58	59	57	54	50	46	40	33	y	y	
A weight		-26	-16	-8.6	-3.2		1.2	1	-1.1			
Directivity	Q=	2	0	0	0	0	0	0	0			
Barrier (enter as +ve)	b	5	5	5	5	5	5	5	5			
Distance correction	m	30	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5	-29.5			
Other Correction (+ve or -ve)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Other Correction (+ve or -ve)												
Resultant dBA		3	14	20	22	21	19	12	3			
Overall dBA		27.2										
528.6586382		2.12	27.3	97	169	140	73.6	17.7	2.17	528.7	528.7	
RPA												

Plant Calcs for Broadband Sound Pressure Level														
Project: Taco Bell - Broad Street Mall, Reading PLANT OPERATING UP TO 00.00 HOURS														
Date: 26 09 2019														
Section Total, dBA				Day	27.7	Night	27.7							
ALL PLANT TOTAL				Day	37.4	Night	37.4							
RPA														
Item	Lp, Q=2	Data Distance	Assessment Distance		Barrier Attenuation (enter +ve)	Directivity Q=		Night Reduction (enter +ve)	Other Correction (+ve or -ve)	Resultant Day dBA	Day "y"	Night "y"		
Refrig Condenser No 1	35	10	30	-9.54	5	2	0		6	26.5	y	y	##	##
Refrig Condenser No 2	30	10	30	-9.54	5	2	0		6	21.5	y	y	##	##

Fan Calcs for In duct Sound Power Levels											
Project: Taco Bell - Broad Street Mall, Reading PLANT OPERATING UP TO 00.00 HOURS											
Date: 26 09 2019											
Section Total, dBA		Day	35.2			Night	35.2				
ALL PLANT TOTAL		Day	37.4			Night	37.4				
RPA											
Kitchen Supply Intake									Day "y"	Night "y"	
Induct Lw		76	77	81	68	66	66	64	58	y	y
End reflection loss (enter +ve)		9	5	1							
Directivity (enter +ve)		4	5	6	7	8	9	9	9		
Distance correction	38	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6		
Barrier attenuation	a										
Other correction (enter + or -)		6	6	6	6	6	6	6	6		
Other correction (enter + or -)											
A weighting		-26.2	-16.1	-8.6	-3.2		1.2	1	-1.1		
Attenuation IL (enter +ve)		4	6	14	27	24	16	12	9		
Resultant dBA		4.2	18.3	26.8	8.2	13.4	23.6	25.4	20.3		
Overall dBA		31.0									
1263.883821			2.64	67.8	480	6.63	21.9	230	348	107	1264
										RPA	
Kitchen/General Extract Discharge									Day	Night	
Induct Lw		79	76	82	74	73	70	66	59	y	y
End reflection loss (enter +ve)		9	5	1							
Directivity (enter +ve)		4	5	6	7	8	9	9	9		
Distance correction	38	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6	-42.6		
Barrier attenuation	a										
Other correction (enter + or -)		6	6	6	6	6	6	6	6		
Other correction (enter + or -)											
A weighting		-26.2	-16.1	-8.6	-3.2		1.2	1	-1.1		
Attenuation IL (enter +ve)		4	6	14	27	24	16	12	9		
Resultant dBA		7.2	17.3	27.8	14.2	20.4	27.6	27.4	21.3		
Overall dBA		33.1									
2063.141667			5.26	53.9	604	26.4	110	577	551	133	2063
										RPA	



Appendix 3 – Plant Noise Level Calculations – RPA (Plant Operating Continuously)

Plant Calcs for Broadband Sound Pressure Level									
Project: Taco Bell - Broad Street Mall, Reading CONTINUOUS OPERATION PLANT									
Date: 26.09.2019									