Plant Noise Assessment

Client:	Chapman Ventilation Ltd
Project:	Proposed Tortilla Restaurant 144 Camden High Street NW1 0NE
Our Reference:	BS 33572/NIA
Date of Report:	29 July 2013
Prepared by:	Jon Stump

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1.0 Introduction

Noise Solutions Ltd has been commissioned by Chapman Ventilation Ltd to undertake a noise assessment for new plant at a proposed Tortilla Restaurant, 144 Camden High Street. The premises are currently occupied by a hair salon.

Noise levels for the proposed plant installations have been predicted at the nearest residential and commercial premises to the site and assessed using Camden Council's plant noise emissions criteria. Predicted plant noise levels have also been compared with noise emissions from the existing plant installation at the premises.

2.0 Details of proposed plant

The proposed restaurant is to occupy the ground and basement floors of an existing four-storey building on the east side of Camden High Street. The upper floors of the building are occupied by office spaces.

Proposals include for the installation of two AC units, a kitchen air supply system and small extract systems for the kitchen, toilet and general areas.

The AC units are to be located in a courtyard/lightwell area to the rear of the building, where there are currently two existing AC units (to be replaced). The small extract fans will also discharge through the external wall into this area.

The kitchen supply fan will be located internally, ducted to an intake louvre at the front of the restaurant, above and to the side of the main entrance door overlooking Camden High Street.

The proposed kitchen supply system (and extract systems, if appropriate) are to be fitted with suitable atmospheric-side attenuators. All proposed plant is to be fitted with suitable anti-vibration mounts to prevent structure-borne noise and vibration affecting the adjoined premises.

The proposed AC, extract and supply systems will operate only between 10.00 and 00.00 hours daily. The proposed refrigeration condensers will operate 24 hours a day. Appendix A contains noise data for the proposed plant.

3.0 Surrounding area and nearest noise sensitive receptors

The area surrounding the site is predominantly commercial and, therefore, not particularly noise sensitive. The nearest and most affected office windows (R1) to the ACs are located in the courtyard, approximately 2m from the nearest item of plant. These windows will have line of sight to the ACs and the extract ducts. The supply fan intake louvre, however, is on the other side of the building and will not affect these windows.

The nearest and most affected office window (R2) to the supply intake is directly above, at a distance of approximately 2m.

Appendix B contains plans showing the proposed plant layout and the locations of the nearest receptors.

4.0 Existing noise climate

An environmental noise survey was undertaken at a location representative of the nearest noise sensitive receptors. The results of the noise survey have been summarised in Table 1, below. The full set of measurement results and details of the survey methodology can be found in Appendix C.

Table 1 Summary of noise survey results

Measurement period	Range of noise levels over measurement period (dB)			
	$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
10.00 - 00.00 hours (restaurant open)	49 - 63	58 - 89	51 - 67	45 - 57
00.00 - 10.00 hours (restaurant closed)	46 - 58	53 - 81	50 - 56	39 - 51
10.00 - 19.00 hours (office hours)	52 - 63	62 - 89	54 - 67	48 - 57

As all nearby noise sensitive receptors are commercial (i.e. there are no nearby residential properties), it is considered appropriate to base the noise impact on typical office hours while the restaurant is operating (08.00 – 19.00).

5.0 Noise assessment criteria

Camden Council's Development Policy section DP28 states criteria for noise from plant and machinery as follows:

Table 2 Extract from Camden Development Policy DP28

Noise description and location of measurement	Period	Time	Noise level
Noise at 1m external to a sensitive façade	Day, evening and night	0000-2400	5dB(A)<LA90
Noise that has a distinguishable note (whine, hiss, screech, hum) at 1m external to a sensitive façade	Day, evening and night	0000-2400	10dB(A)<LA90
Noise that has distinct impulses (bangs, clicks, clatters thumps) at 1m external to a sensitive façade	Day, evening and night	0000-2400	10dB(A)<LA90
Noise at 1m external to sensitive façade were LA90>60dB	Day, evening and night	0000-2400	55dB L_{Aeq}

Based on the results of the noise survey detailed in Section 4.0, the cumulative plant noise rating level at 1m from any nearby noise sensitive premises (including offices) should not exceed;

- 43dB L_{Aeq} during office hours with restaurant open (10.00 – 19.00 hours)

6.0 Noise assessment

Cumulative noise emissions from the proposed plant have been predicted at the nearest commercial properties to the site based on the manufacturer noise data given in Appendix A. Noise emissions from all items of proposed plant have been predicted at receptors R1 and R2; the most affected nearby commercial premises. Only noise from the AC units has been predicted at receptor R1; the supply inlet louvre is at the front of the building and will not affect these offices. Likewise, AC noise has not been predicted at the receptors at the front.

Noise level predictions for the proposed AC condenser units take into account directivity of sound propagation, distance attenuation and screening between source and receiver. Noise levels for the proposed kitchen supply system have been predicted taking into account ductwork system losses, aperture size, directivity of sound propagation and distance attenuation. The noise level predictions have been based upon the installation of the following attenuators;

Table 3 Proposed attenuator selections

Attenuator	Insertion loss of acoustic treatment							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Kitchen supply (atmospheric-side)	-5	-8	-15	-25	-32	-31	-28	-22

Note: alternative attenuator selections may be suitable provided the cumulative emissions criteria are achieved

Predicted noise levels between 10.00 and 19.00 hours (representing typical office hours while the restaurant is open) are based upon all plant operating simultaneously at maximum capacity.

In order to comply with Camden Council's requirements, the +5dB feature correction detailed in BS4142 should be applied, where applicable, to noise level predictions for proposed plant items which are anticipated to exhibit tonal, sufficiently intermittent or impulsive characteristics to establish the predicted noise rating level. The feature correction has not been applied to noise level predictions for the AC units which will be inverter driven (i.e. will ramp up and down gently to cope with demand) and will not exhibit any tonal/impulsive characteristics provided they are well maintained.

Noise emissions from the proposed smaller extract systems have not been predicted. These smaller systems will be fitted with suitable atmospheric-side attenuators as required such that, cumulatively, compliance with the Council's noise criteria will be achieved.

Table 4, below, summarises the assessment of predicted noise rating levels. The full set of calculations can be found in Appendix D.

Table 4 Assessment of predicted noise levels

Receptor	Assessment period	Predicted noise level, L_{Aeq} (dB)	Design criterion (dBA)	Difference (dB)
R1 (commercial)	10:00 – 19:00 hours (all plant)	54	43	+9
R2 (commercial)	10:00 – 19:00 hours (all plant)	35	43	-8

It should be noted that there are currently two AC units serving the existing hair salon (to be replaced by the restaurant). Manufacturer's data for these units shows them to be 57dB(A) and 49dB(A) each, at 1m. Cumulatively, these existing units are 1dB louder than those proposed. The Tortilla restaurant plant, including suitable attenuation to the small extract ductwork, will, therefore, result in a marginal reduction in noise level at the nearby office windows.

Table 5 compares the proposed plant installation with the existing equipment.

Table 5 Comparison of proposed/existing noise levels

Receptor	Existing plant noise level, L_{Aeq} (dB)	Predicted noise level, L_{Aeq} (dB)	Improvement (dB)
R1 (commercial)	55	54	1dB (quieter)

7.0 Mitigation measures

All ventilation plant will be fitted with suitable atmospheric-side attenuators to ensure the cumulative emissions criteria are achieved (see Table 2 for insertion losses for suitable kitchen supply system attenuation). All plant, including the fans and condenser units, will be fitted with suitable anti-vibration mounts/hangers, as appropriate, to prevent structure-borne noise and vibration affecting the adjoined premises.

Noise Solutions Ltd can provide further advice relating to the above upon request.

8.0 Summary

Noise Solutions Ltd has been commissioned by Chapman Ventilation Ltd to undertake a noise assessment for new plant at a proposed Tortilla Restaurant, 144 Camden High Street. Noise levels for the proposed plant installations have been predicted at the nearest commercial premises to the site and assessed using Camden Council's plant noise emissions criteria Predicted plant noise levels have also been compared with noise emissions from the existing plant installation at the premises.

The worst case noise level predictions demonstrate that cumulative noise from the proposed plant will be in excess of Camden Council's criteria; however, the proposed plant installation is predicted to be quieter than the existing

equipment currently installed at the site, assessed at the nearest noise sensitive property.

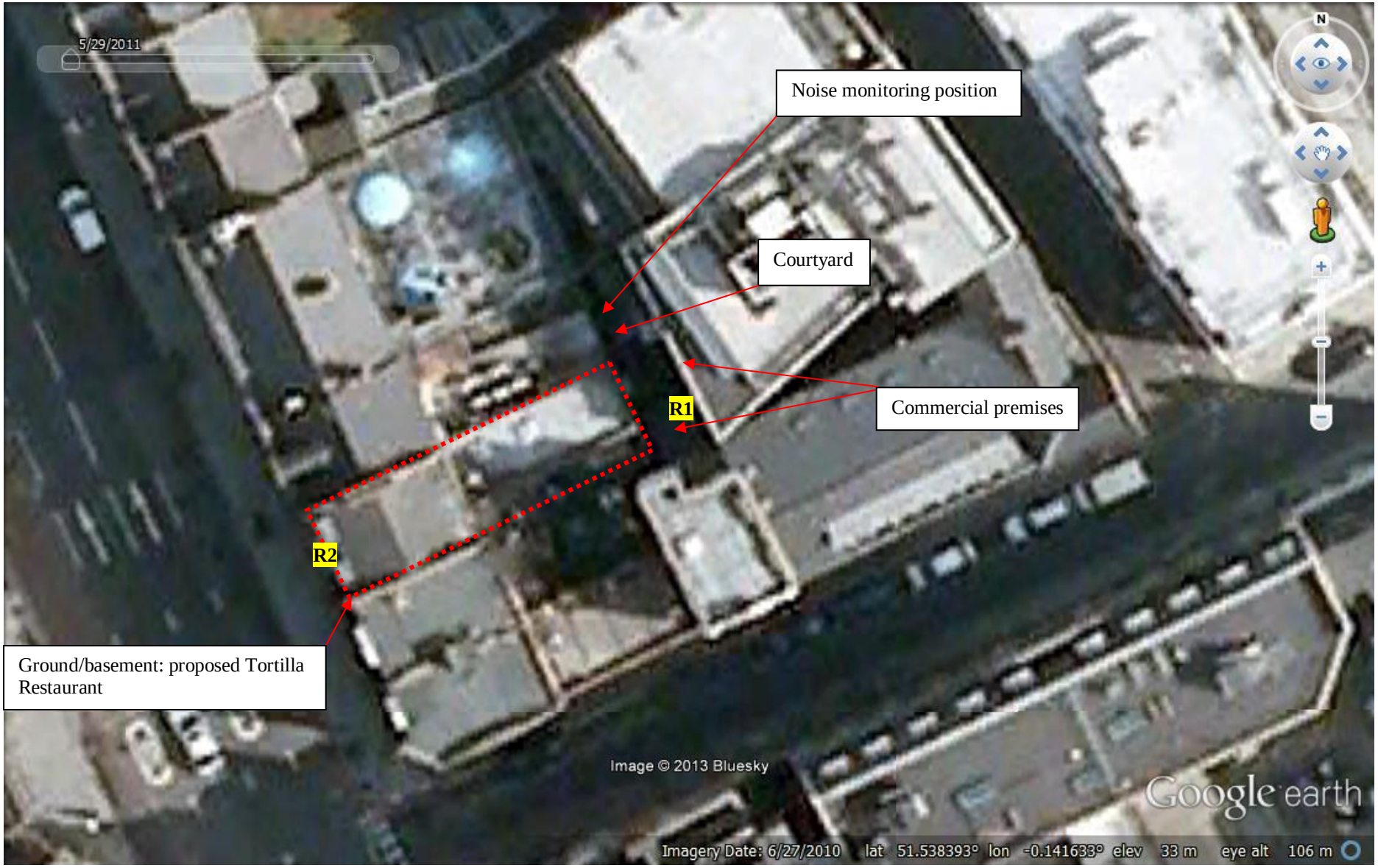
Given the results of the above assessment, it is recommended that noise should not be grounds for refusal of planning permission.

APPENDIX A
Manufacturer plant noise data

Description	Make/model	Quantity	Notes	dB								dBA
				63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
AC Condensers	Toshiba/RAV-SM1403AT-E	2	Heating (L_p @ 1m)	60	54	54	53	49	44	38	29	54
			Cooling (L_p @ 1m)	54	52	52	49	48	44	35	27	52
Supply fan	Gigabox 500/4/4	1	In-duct L_w	-	73	75	72	74	69	63	56	77

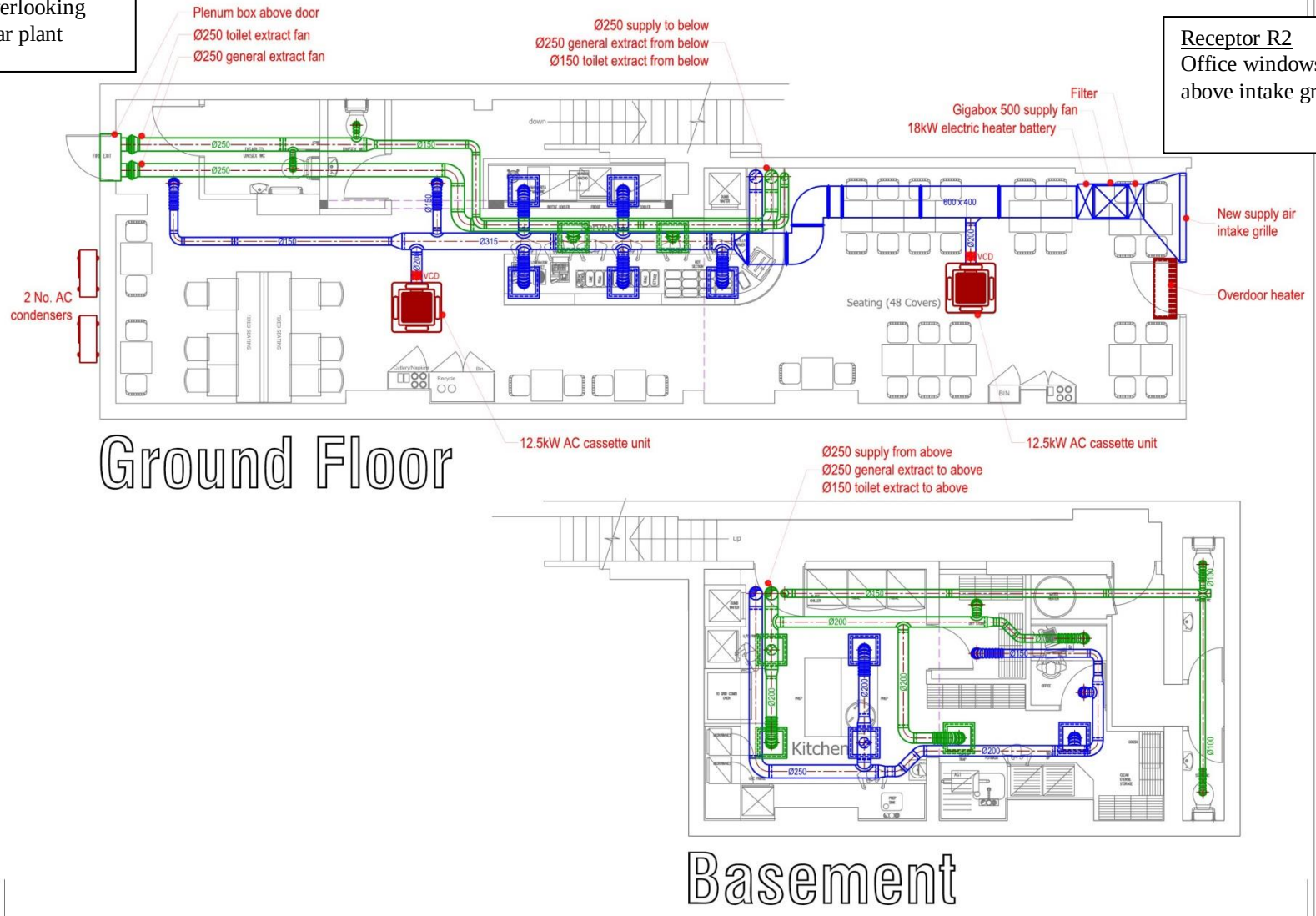
APPENDIX B

Plans showing plant layout and nearest receptors



Receptor R1
Office windows overlooking rear plant

Receptor R2
Office windows above intake grille



No.	Date	Rev. By	Revision Description
-	-	-	-

Client:

TORTILLA

Project :

Tortilla
144 Camden High Street
Camden
NW1 0NE

Drawing Title :

Ventilation Layout
Ground Floor & Basement

Drawing No.:	Rev:
001-087-01	-

Scale: 1:50 @ A2 1:100 @ A4

Drawn By: PR | Date: 10/07/13

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APPENDIX C
Details of environmental noise survey

C.1. Measurement period

Measurements of the existing background noise level were taken between 11.00 hours on Thursday 25th July and 14.30 hours on Friday 26th July 2013. The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

There were sufficient periods of clement weather such that accurate minimum background noise levels could be assessed.

C.2. Measurement position

The measurement position was located in the courtyard/lightwell at the rear of the building. This location was considered representative of prevailing noise levels affecting the nearest receptors to the site.

In accordance with BS 7445-2:2003 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were taken under free-field conditions with the microphone positioned at a height of approximately 1.5m above roof level.

C.3. Noise measurement equipment

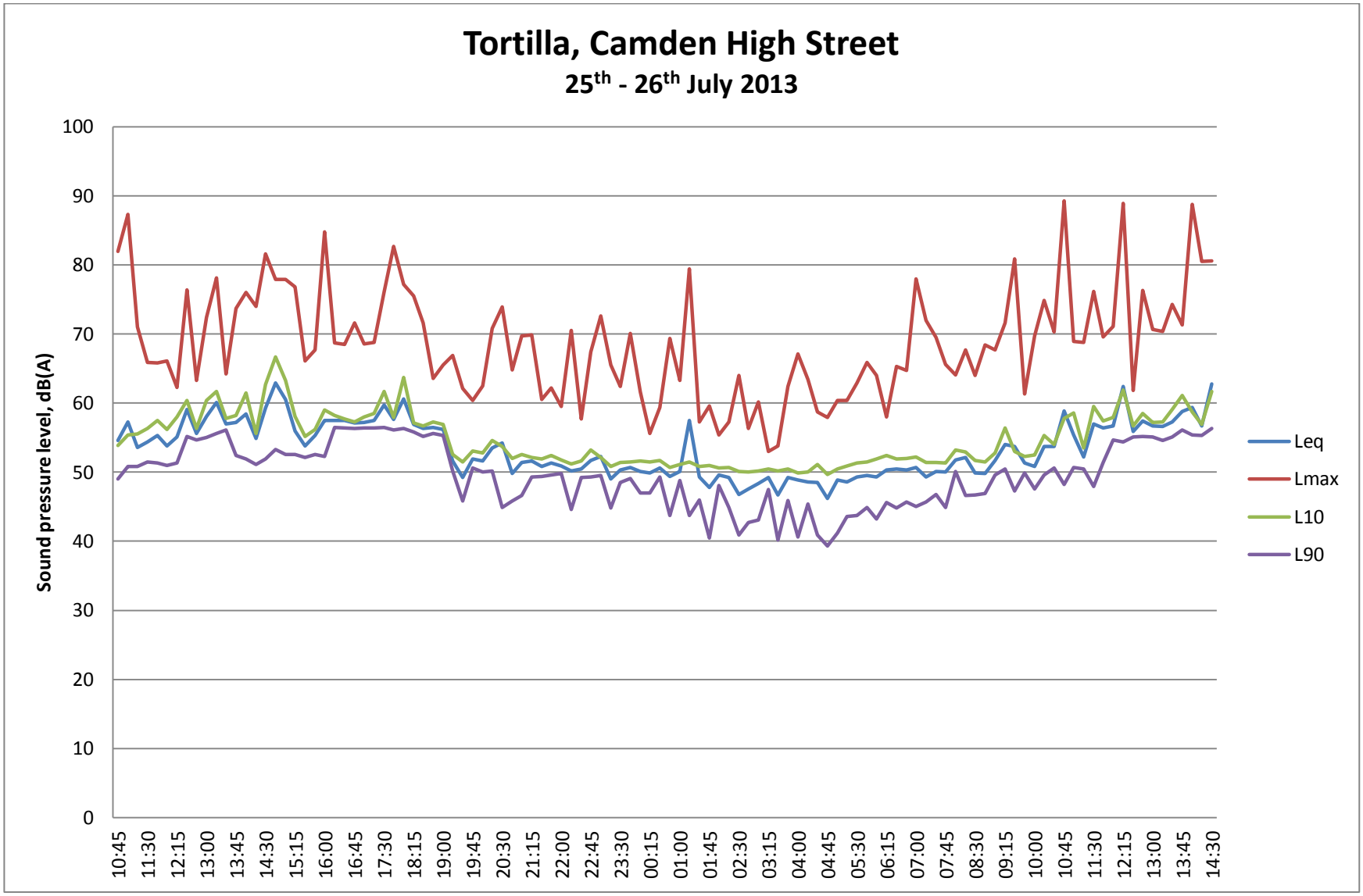
Details of the equipment used during the course of the noise survey have been provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.1 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-52 / 00231646	15/04/2013	CONF041310
Condenser microphone	Rion UC-59 /04684		
Preamplifier	Rion NH-25 / 21590		
Calibrator	Rion NC-74 /34535932	15/04/2013	CONF041309

C.4. Results

The results of the noise survey are considered to be representative of typical prevailing noise levels at the windows of the nearest properties to the proposed plant at the quietest times at which the plant will operate.

The noise climate at the measurement position was dominated by existing building services plant serving other premises. The results of the noise survey have been provided overleaf.


Tortilla, Camden High Street
25th - 26th July 2013
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
20
10
0
10:45
11:30
12:15
13:00
13:45
14:30
15:15
16:00
16:45
17:30
18:15
19:00
19:45
20:30
21:15
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06:15
07:00
07:45
08:30
09:15
10:00
10:45
11:30
12:15
13:00
13:45
14:30
Leq
Lmax
L10
L90

APPENDIX D
Noise level predictions

Receptor R1 (rear courtyard)

Plant	Source noise level		Distance correction		Screening correction (dB)	Façade reflection	Noise level at receptor, L_{Aeq} (dB)
	Source noise level (dBA)	Reference distance (m)	Distance to receptor (m)	Correction (dB)			
AC 1	54	1	2	-6	0	+3	51
AC 2	54	1	2	-6	0	+3	51
						Cumulative	54

Receptor R2 (Camden High Street)

Plant	Source noise level		Distance correction		Screening correction (dB)	Façade reflection	Noise level at receptor, L_{Aeq} (dB)
	Source noise level (dBA)	Reference distance (m)	Distance to receptor (m)	Correction (dB)			
AC 1							N/A
AC 2							N/A
Kitchen supply inlet	See separate calculation sheet						35
						Cumulative	35

Receptor R2 (commercial)

Description	Notes	L_{eq} (dB)								L_{Aeq} (dB)
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Supply inlet										
Source noise level	In-duct L_w	-	73	75	72	74	69	63	56	77
System losses		-11	-10	-5	-2	-1	0	0	0	
Atmospheric-side attenuator	I.L.	-5	-8	-15	-25	-32	-31	-28	-22	
Directivity correction	0^o,90^o	-1	-1	-2	-7	-10	-10	-10	-10	
Distance correction	2	-11	-11	-11	-11	-11	-11	-11	-11	
Resultant at receptor	L_p @ R2	-	43	42	28	20	17	14	13	35