NSL
Noise Solutions Ltd

Deliveroo

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Swiss Cottage
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Plant Noise Impact Assessment

On behalf of

chapman ventilation

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Document Information

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	Name	Qualifications	Initials	Date
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For and on behalf of Noise Solutions Ltd				

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1	1/12/2017	Update reference to Camden London Borough policies	AM	NAC

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1.0 Introduction

1.1. A Deliveroo kitchen is to be located within an existing building along Finchley Road in Swiss Cottage, London. Noise Solutions Ltd (NSL) has been commissioned to undertake a noise impact assessment in relation to the plant noise emissions from the building services plant serving the proposed kitchen.

1.2. Noise emission levels for the proposed plant have been predicted at the nearest noise sensitive receptors to the site and assessed against the relevant local and national guidance.

1.3. Appendix A contains a guide to common acoustic terminology.

2.0 Details of development proposals

2.1. A Deliveroo kitchen will be located on the ground floor of an existing building located on the western side of Finchley Road in Swiss Cottage, London. The proposals include for the installation of three supply Air Handling Units (AHU) and three kitchen extract fans.

2.2. All plant will be located inside the building with external intake and discharge vents.

2.3. The proposed extract and supply systems will operate only between 09.00 and 23.00 hours daily. Appendix D contains the noise output data for the proposed plant.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site contains mixed residential and commercial properties. The nearest residential dwellings are above the shops adjoining the proposed kitchen (Reference R1) at a distance of approximately 2m from the closest ventilation grille. There are further residential properties (Reference R2) behind the proposed kitchen along Dobson Close at a distance of approximately 20m from the closest proposed plant item.

3.2. Appendix B contains an aerial photograph showing the site and surrounding area.

4.0 Existing noise climate

4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in Appendix C.

Table 1: Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	$L_{Aeq(15min)}$	$L_{Amax(15min)}$	$L_{A10(15min)}$	$L_{A90(15min)}$
Daytime (07.00 - 23.00 hours)	55-69	65-92	57-75	54-59
Night-time (23.00 - 07.00 hours)	53-60	57-91	54-59	52-58

4.3. The noise climate at the nearest residential flat overlooking the site was dominated by noise from existing plant serving other premises in the area. In order to be robust, the lowest $L_{A90,15min}$ background levels are therefore deemed to be representative.

4.4. It should be noted that BS 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* states the following with regard to the measurement of background noise levels;

> *Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.*

5.0 Plant noise design criteria

National Planning Policy Framework

5.1. The National Planning Policy Framework (NPPF) was introduced in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied.

5.2. *Paragraph 123* of the *NPPF* states that planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put*

on them because of changes in nearby land uses since they were established [subject to the provisions of the Environmental Protection Act 1990 and other relevant law]; and

- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

5.3. Furthermore the NPPF gives weight to the requirements of the local authority as it states the following:

11. Planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise.

12. This National Planning Policy Framework does not change the statutory status of the development plan as the starting point for decision making. Proposed development that accords with an up-to-date Local Plan should be approved, and proposed development that conflicts should be refused unless other material considerations indicate otherwise. It is highly desirable that local planning authorities should have an up-to-date plan in place.

13. The National Planning Policy Framework constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications.

Camden London Borough Council

5.4. The Camden Local Policy document dated 2017 states in Policy A1 *'Managing the impact of development'* that for noise and vibration:

"Noise and vibration can have a major effect on amenity. The World Health Organisation (WHO) for example states that excessive noise can seriously harm human health, disturb sleep and have cardiovascular and behavioural effects. Camden's high density and mixed-use nature means that disturbance from noise and vibration is a particularly important issue in the borough.

Where uses sensitive to noise are proposed close to an existing source of noise or when development that is likely to generate noise is proposed, the Council will require an acoustic report to accompany the application. Further detail can be found in Policy A4 - Noise and Vibration and our supplementary planning document Camden Planning Guidance 6: Amenity."

5.5. Policy A4 *'Noise and Vibration'* states under the section titled *'Plant and other noise generating equipment'* that:

"Planning conditions will be imposed to require that plant and equipment which may be a source of noise is kept working efficiently and within the required noise limits and time restrictions. Air conditioning will only be permitted where it is demonstrated that there is a clear need for it after other measures have been considered (Policy CC2 Adapting to climate change). Conditions may also be imposed to ensure that attenuation measures are kept in place and are effective throughout the life of the development."

5.6. The policy document goes on to describe noise thresholds in Appendix 2 and states in the *'Industrial and Commercial Noise Sources'* section:

"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."

5.7. Table C of the appendix states the criteria at which development related noise levels will be acceptable:

Table C: Noise levels applicable to proposed industrial and commercial development (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dBL_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of*

Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

5.8. Based on the guidance above and given that noise from existing plant serving adjacent units is presently influencing the prevailing background, it is recommended that the cumulative noise level for the proposed plant should not exceed a level 10dB lower than the representative L_{A90} background level at the nearest noise sensitive receptors. The following noise limits apply:

Table 3: Plant noise emissions limits at nearest receptors

Period	Cumulative plant noise rating level, dB(A)
Daytime (07.00 – 23.00 hours)	44
Night-time (23.00 – 07.00 hours)	42

6.0 Noise assessment

6.1. Cumulative noise emissions from the proposed plant have been predicted at the nearest properties to the site based on the manufacturer noise data presented in Appendix D.

6.2. Noise levels for the proposed extract and supply systems have been predicted taking into account ductwork system losses, aperture size, directivity of sound propagation and distance attenuation. Predictions are inclusive of the following atmospheric-side attenuation fitted to the ventilation systems.

Table 4: Proposed atmospheric-side attenuator selections

Attenuator	Insertion loss (dB) at Octave Band Centre Frequencies (Hz)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Kitchen extract 1	4	6	9	17	22	20	16	10
Kitchen extract 2	4	6	9	17	22	20	16	10
Kitchen extract 3	4	6	9	17	22	20	16	10
AHU 1	5	7	11	19	25	22	18	12
AHU 2	6	13	26	36	40	36	30	21
AHU 3	5	7	11	19	25	22	18	12

6.3. It should be noted that the proposed plant is high-quality, inverter driven equipment which will minimise the presence of any specific acoustic characteristics (i.e. bangs, clicks, tonal components, impulsive nature, etc.). In order to be robust, however, Camden Council's most stringent plant noise emissions criteria have been applied.

6.4. Predicted noise levels during the daytime period (specifically between 09.00 and 23.00 hours) are based upon all plant operating simultaneously at maximum capacity. All the plant will be switched off during the night-time period (between 23.00 and 07.00), when the kitchen is closed.

6.5. Table 5, below, summarises the assessment of predicted noise levels. The full set of calculations are presented in Appendix E.

Table 5 Assessment of predicted noise levels at the nearest noise sensitive receptors

Receptor	Period	Predicted noise level at receptor, L_{Aeq} (dB)	Design criterion (dB)	Difference (dB)
Receptor R1	All plant operating (11.00 - 23.00 hours)	44	44	0
Receptor R2	All plant operating (11.00 - 23.00 hours	41	44	-3

6.6. The plant noise impact assessment has demonstrated that cumulative noise emissions from the proposed plant will comply with appropriate design criteria (as established in Table 3) at the

nearest residential premises, inclusive of suitable atmospheric-side attenuation fitted to the kitchen extract and supply systems.

6.7. In addition, all plant and associated ductwork/pipework will be fitted with suitable anti-vibration isolation in order to ensure structure-borne transmission to the adjoined residential properties is appropriately mitigated.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation Ltd to undertake a noise assessment for new plant at a proposed Deliveroo kitchen along Finchley Road in Swiss Cottage.

7.2. The noise impact from the proposed plant has been predicted at the nearest noise sensitive receptors to the site and assessed against the typical requirements of the local authority (and in accordance with national policy on noise).

7.3. The predictions demonstrate that cumulative noise from the proposed plant should be acceptable to Camden Council at all nearby receptors and all times, inclusive of suitable atmospheric-side attenuators fitted to the fresh air supply and kitchen extract systems.

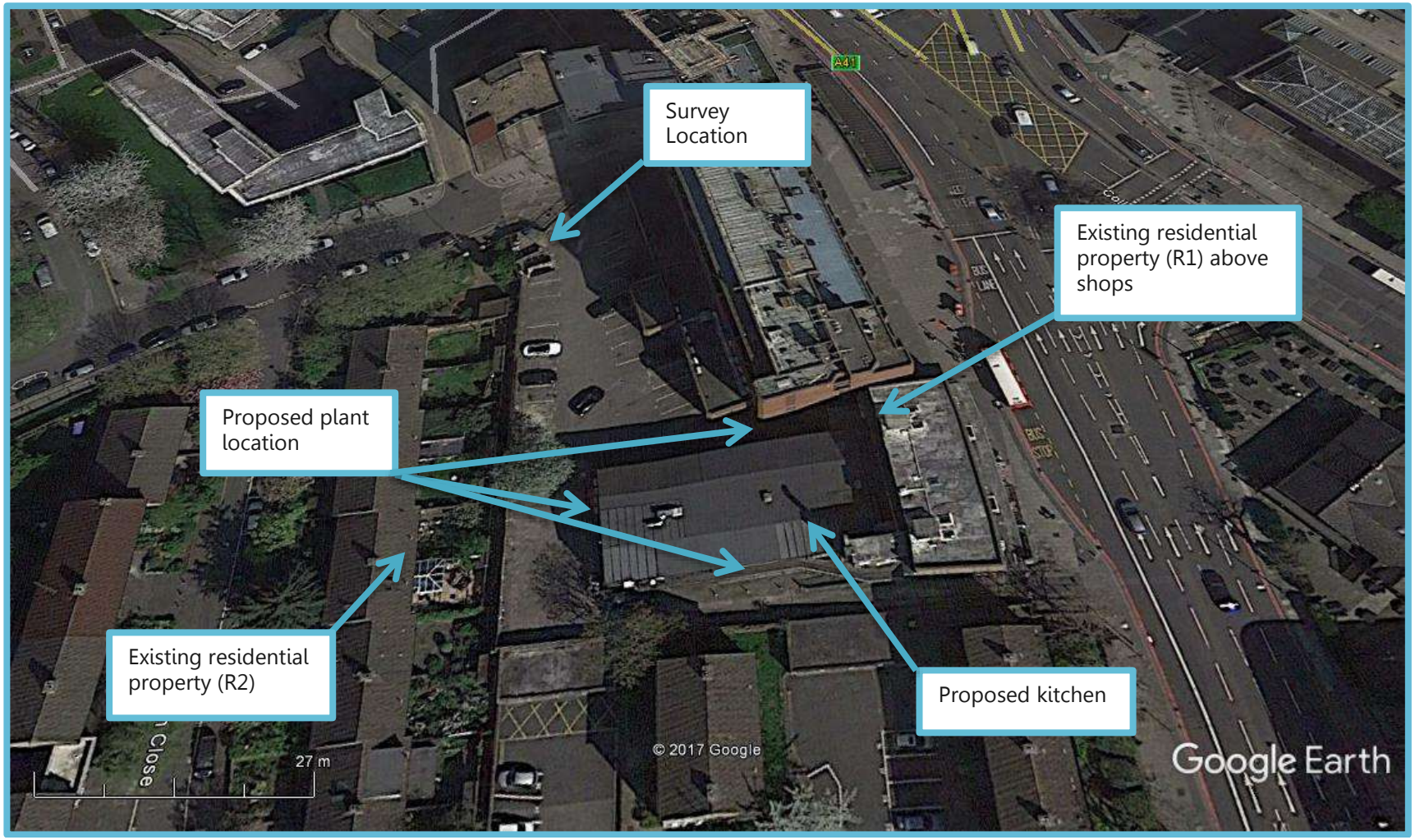
7.4. In addition, all plant and associated ductwork/pipework will be fitted with suitable anti-vibration isolation in order to ensure structure-borne transmission to the adjoined residential properties is appropriately mitigated.

7.5. Therefore, noise from the plant proposals should not be a reason for refusal of planning permission.

Appendix A Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Aerial Photograph of site showing areas of interest



Appendix C Environmental Sound Survey

Details of environmental sound survey

C.1 Measurements of the existing background sound levels were undertaken from 12:00 hours on Wednesday 2 August 2017 and 10:00 hours on Thursday 3 August 2017.

C.2 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 survey.

Measurement position

C.3 The sound level meter was positioned on a lamppost at the rear of the building as shown in Appendix B. The microphone was positioned in free-field at a height of approximately 3.5m above ground level.

C.4 The adopted position is considered to be representative of the noise climate affecting the nearest noise sensitive premises to the site. The position was located at a similar distance and comparably screened from the dominant noise sources in the area, when compared to the nearest receptors assessed in this report.

Equipment

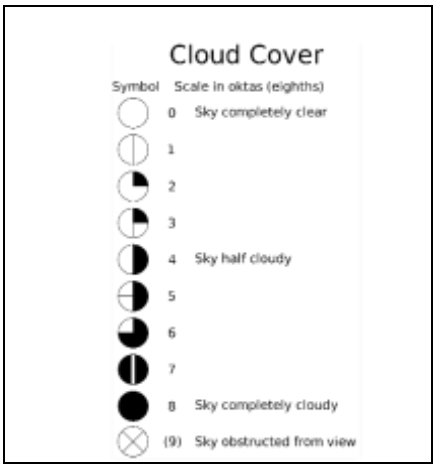
C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-52 / 00654035	21/09/2015	CONF091517
Condenser microphone	Rion UC-59 /08290		
Preamplifier	Rion NH-25 / 54080		
Calibrator	Rion NC-74 /34535932	21/09/2015	14746

Weather Conditions

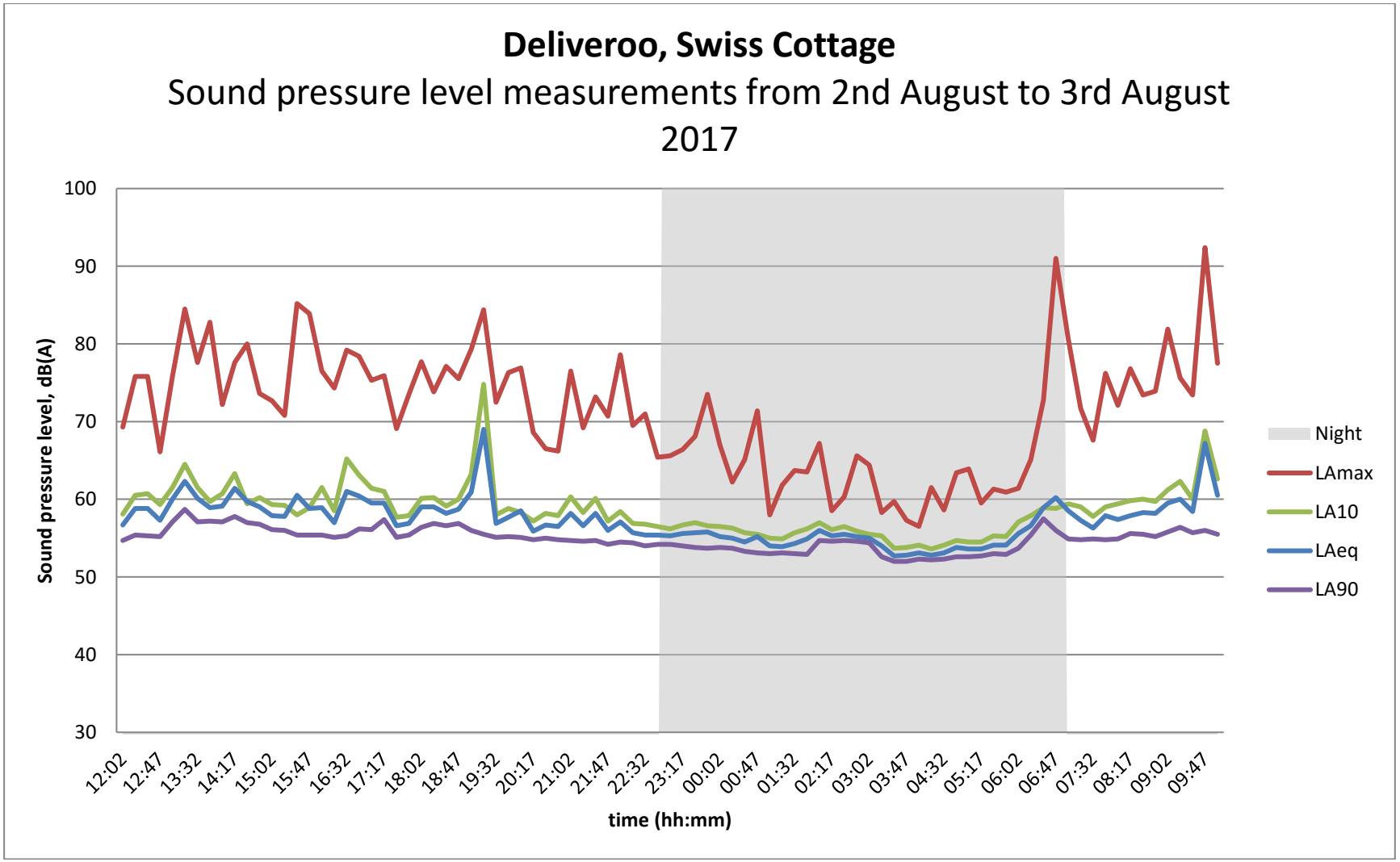
C.6 Weather conditions were determined both at the start and on completion of the surveys. It is considered that the meteorological conditions were appropriate for environmental noise

measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	12:00 2/8/2017-10:00 3/8/2017	Temperature (°C)	20	19
		Precipitation:	Yes	Yes
		Cloud cover (oktas - see guide)	6	5
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Yes	Yes
		Wind Speed (m/s)	8	5
		Wind Direction	North Easterly	South Westerly
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.7 The results of the survey are considered to be representative of background sound pressure levels at the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by road traffic movements and plant noise emissions from neighbouring premises. The results of the survey are presented in a time history graph overleaf.


Deliveroo, Swiss Cottage
Sound pressure level measurements from 2nd August to 3rd August 2017
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
12:02
12:47
13:32
14:17
15:02
15:47
16:32
17:17
18:02
18:47
19:32
20:17
21:02
21:47
22:32
23:17
00:02
00:47
01:32
02:17
03:02
03:47
04:32
05:17
06:02
06:47
07:32
08:17
09:02
09:47
time (hh:mm)
Night
LAmax
LA10
LAeq
LA90

Appendix D Manufacturer plant noise data

Description	Model / Model	Quantity	Notes.	Sound power level(dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
				63	125	250	500	1k	2k	4k	8k	
Kitchen Extract	Fläkt Woods	3	In-duct Lw Outlet	82	82	84	87	86	81	79	75	90
AHU	Fläkt Woods	3	In-duct Lw Inlet	76	77	89	81	81	75	76	73	86

Appendix E Plant noise level predictions at receptor

Receptor	Plant	Resultant at Receptor (dBA)
R1	Kitchen extract 1	31
	Kitchen extract 2	31
	Kitchen extract 3	31
	AHU 1	31
	AHU 2	42
	AHU 3	36
	Cumulative	44
R2	Kitchen extract 1	35
	Kitchen extract 2	35
	Kitchen extract 3	35
	AHU 1	30
	AHU 2	16
	AHU 3	33
	Cumulative	41

Kitchen extract fans

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	82	82	84	87	86	81	79	75	90
System losses		-6	-2	0	-1	-2	-3	-3	-3	
Atmospheric side attenuator	I.L.	-4	-6	-9	-17	-22	-20	-16	-10	
Directivity correction	90,0	0.25	0.25	0	-4	-7	-7	-7	-7	
Distance correction	30m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R1	L_p	35	36	38	27	17	13	15	17	31
Source noise level (unattenuated)	In-duct L_w	82	82	84	87	86	81	79	75	90
System losses		-6	-2	0	-1	-2	-3	-3	-3	
Atmospheric side attenuator	I.L.	-4	-6	-9	-17	-22	-20	-16	-10	
Directivity correction	90,0	0.25	0.25	0	-4	-7	-7	-7	-7	
Distance correction	20m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R2	L_p	38	40	41	30	21	17	19	21	35

AHU 1

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	76	77	89	81	81	75	76	73	86
System losses		-4	-1	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-5	-7	-11	-19	-25	-22	-18	-12	
Directivity correction	0,135	-0.5	-2	-5.5	-8	-8	-8	-8	-8	
Distance correction	20m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R1	L_p	32	33	38	20	13	11	16	19	31
Source noise level (unattenuated)	In-duct L_w	76	77	89	81	81	75	76	73	86
System losses		-4	-1	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-5	-7	-11	-19	-25	-22	-18	-12	
Directivity correction	0,90	0.75	0.75	0.5	-3.5	-7	-7	-7	-7	
Distance correction	40m	-40	-40	-40	-40	-40	-40	-40	-40	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R2	L_p	27	30	38	18	8	6	10	14	30

AHU 2

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	76	77	89	81	81	75	76	73	86
System losses		-4	-1	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-6	-13	-26	-36	-40	-36	-30	-21	
Directivity correction	0,90	0.75	0.75	0.5	-3.5	-7	-7	-7	-7	
Distance correction	2m	-14	-14	-14	-14	-14	-14	-14	-14	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R1	L_p	52	50	49	27	19	18	25	31	42
Source noise level (unattenuated)	In-duct L_w	76	77	89	81	81	75	76	73	86
System losses		-4	-1	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-6	-13	-26	-36	-40	-36	-30	-21	
Directivity correction	0,90	0.75	0.75	0.5	-3.5	-7	-7	-7	-7	
Distance correction	42m	-40	-40	-40	-40	-40	-40	-40	-40	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R2	L_p	26	23	23	1	-7	-8	-2	4	16

AHU 3

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	76	77	89	81	81	75	76	73	86
System losses		-4	-1	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-5	-7	-11	-19	-25	-22	-18	-12	
Directivity correction	0,90	0.75	0.75	0.5	-3.5	-7	-7	-7	-7	
Distance correction	20m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R1	L_p	33	36	44	24	14	12	17	20	36
Source noise level (unattenuated)	In-duct L_w	76	77	89	81	81	75	76	73	86
System losses		-4	-1	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	-5	-7	-11	-19	-25	-22	-18	-12	
Directivity correction	0,90	0.75	0.75	0.5	-3.5	-7	-7	-7	-7	
Distance correction	30m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor R2	L_p	29	32	41	21	11	9	13	16	33

Appendix F Proposed plant layout