Tesco Express
10 Bloomsbury Way
London
WC1A 2SH

Plant Noise Impact Assessment

On behalf of

stace
construction and property consultants

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Document Information

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

Revision	Date	Description	Prepared	Reviewed/ Approved
1	8/11/2017	New plantroom layout	AM	NAC
2	14/11/2017	Commercial windows above the louvres	AM	NAC
3	30/11/2017	Various updates	AM	NAC
4	3/4/2018	Updated ventilation layout	AM	NAC

Contents

Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Stace Construction and Property Consultants to provide a plant noise impact assessment for plant serving a proposed Tesco Express store located at 10 Bloomsbury Way in London.

1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.

1.3. Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed using the local authority criteria.

1.4. To assist with the understanding of this report a glossary of acoustic terms can be found in Appendix A.

2.0 Details of development proposals

2.1. The proposed Tesco Express store is to occupy the ground floor of a new building on the corner of Bloomsbury Way and New Oxford Street. The upper floors of the building are to be occupied by commercial offices.

2.2. Plant serving the proposed store is to be located internally in a plant room with intake and discharge louvres on the southern elevation of the building overlooking New Oxford Street. The plant layout is shown in Appendix F.

2.3. The plantroom will house both refrigeration and AC plant. Manufacturer's sound level data for the proposed plant is provided in Appendix D.

2.4. Appendix B contains an aerial photograph of the site location and a drawing which shows the plant location.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is mainly commercial in nature. The nearest noise sensitive receptors are offices within the development above the ventilation louvres. There are office windows at first floor level above the intake and discharge louvres (References R1, R2, R3, R4 and R5) and below the rooftop discharge at 10th floor level (Reference R6). It is anticipated that there will be direct line of sight between the first floor office windows and the proposed ground floor louvres.

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 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)			
	$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A15(10mins)}$	$L_{A90(15mins)}$
Daytime (07.00 - 23.00 hours)	62-73	76-97	65-77	55-69
Night-time (23.00 - 07.00 hours)	59-70	76-89	61-76	47-56

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 2016 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. Condition 6 of 2014/2783/P approved 3/12/2014 states that:

> *"Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (L_{A90}), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the L_{A90}, expressed in dB(A)."*

5.7. Based on Camden Council's requirements it would be considered appropriate for noise from the plant to be at level that is lower than 5dB below the L_{A90} background level

5.8. The cumulative noise rating level for the proposed plant at the nearest noise sensitive windows should not therefore exceed the limits shown in the table below.

Table 2 Plant noise emissions limits at residences

Period	Cumulative plant noise level, L_{Aeq} dB
Daytime (07.00 – 23.00 hours)	50
Night-time (23.00 – 07.00 hours)	42

6.0 Plant noise impact assessment

6.1. 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 3: Proposed atmospheric-side attenuator selections

Attenuator	Insertion loss (dB) at Octave Band Centre Frequencies (Hz)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Plantroom Intake	4	5	8	16	23	22	21	17
Intake fan 1	2	3	5	10	13	11	9	8
Intake fan 2	4	7	13	21	21	14	13	12
Intake fan 3	3	5	9	18	25	22	18	13
Discharge fan 1	5	9	18	28	30	29	24	19
Discharge fan 2	4	5	8	16	23	22	21	17
Discharge fan 3	4	5	8	16	23	22	21	17

6.2. The predictions during both the daytime and night-time periods have been based on the proposed fans running at full duty.

6.3. Table 3, below, summarises the results of the assessment at the most affected noise sensitive window overlooking the plant. All other nearby noise sensitive receptors benefit from increased distance or screening from the plant. The full set of calculations can be found in Appendix E.

Table 4 Assessment of predicted noise levels at Receptors

Receptor	Period	Predicted rating level at receptor, L_{Aeq} (dB)	Representative background L_{A90} level (dB)	Difference (dB)
R1	Daytime (07.00 - 23.00 hours)	25	55	-30
	Night-time (23:00 – 07:00 hours)	12	47	-35
R2	Daytime (07.00 - 23.00 hours)	42	55	-13
	Night-time (23:00 – 07:00 hours)	42	47	-5
R3	Daytime (07.00 - 23.00 hours)	42	55	-13
	Night-time (23:00 – 07:00 hours)	42	47	-5
R4	Daytime (07.00 - 23.00 hours)	42	55	-13
	Night-time (23:00 – 07:00 hours)	42	47	-5
R5	Daytime (07.00 - 23.00 hours)	37	55	-18
	Night-time (23:00 – 07:00 hours)	37	47	-10
R6	Daytime (07.00 - 23.00 hours)	21	55	-34
	Night-time (23:00 – 07:00 hours)	21	47	-26

6.4. The above assessment indicates that noise from the proposed plant will comply with the local planning authority criteria at the most affected noise sensitive receptors.

7.0 Summary

7.1. Noise Solutions Ltd has been commissioned by Stace Construction and Property Consultants to provide a plant noise impact assessment for plant installed as part of a proposed Tesco Express store at 10 Bloomsbury Way in London.

7.2. A baseline noise survey has been undertaken to establish existing prevailing noise levels at a location representative of the nearest noise sensitive receptors to the proposed site.

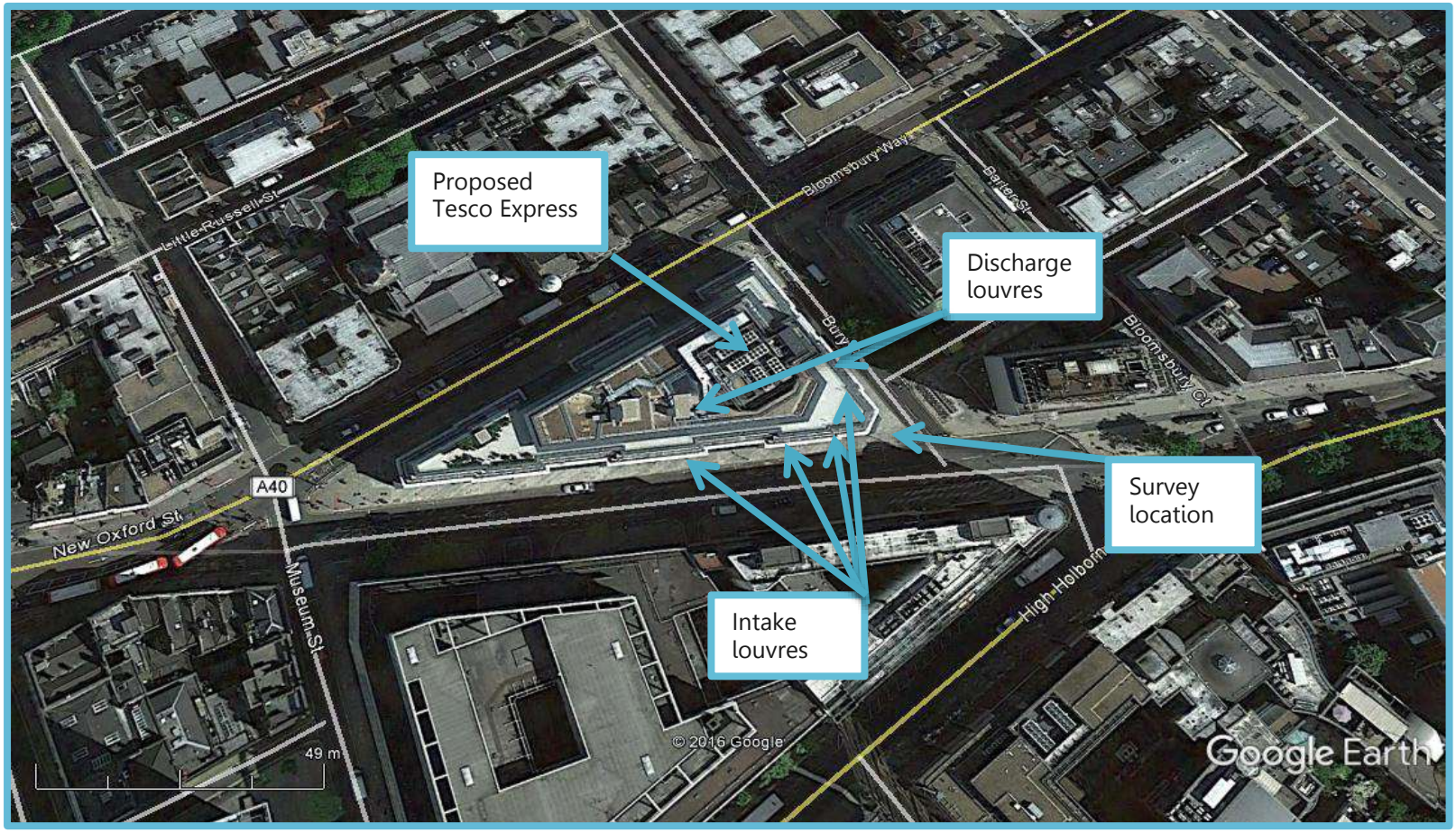
7.3. The cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptor location and assessed against the requirements of Camden London Borough Council.

7.4. The results of the assessment demonstrate that cumulative plant noise emissions from the proposed external plant will be in compliance with the requirements of Camden London Borough Council.

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 s_1 and s_2 is given by 20 $\log_{10}$ (s_1/s_2). 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. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} 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



Appendix C Environmental Sound Survey

Details of environmental sound survey

C.1 Measurements of the existing background sound levels were undertaken from 14.30 hours on Thursday 30 March 2017 and 11.15 hours on Friday 31 March 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 near to the junction of Bury Place and New Oxford Street.

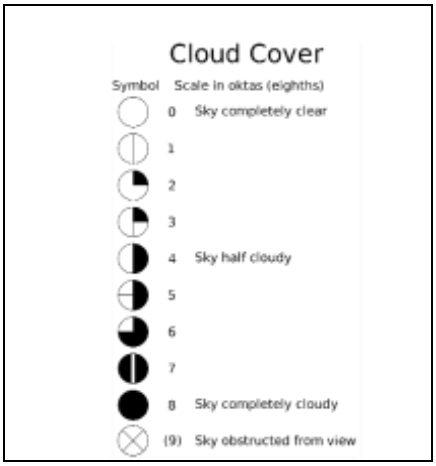
Equipment

C.4 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

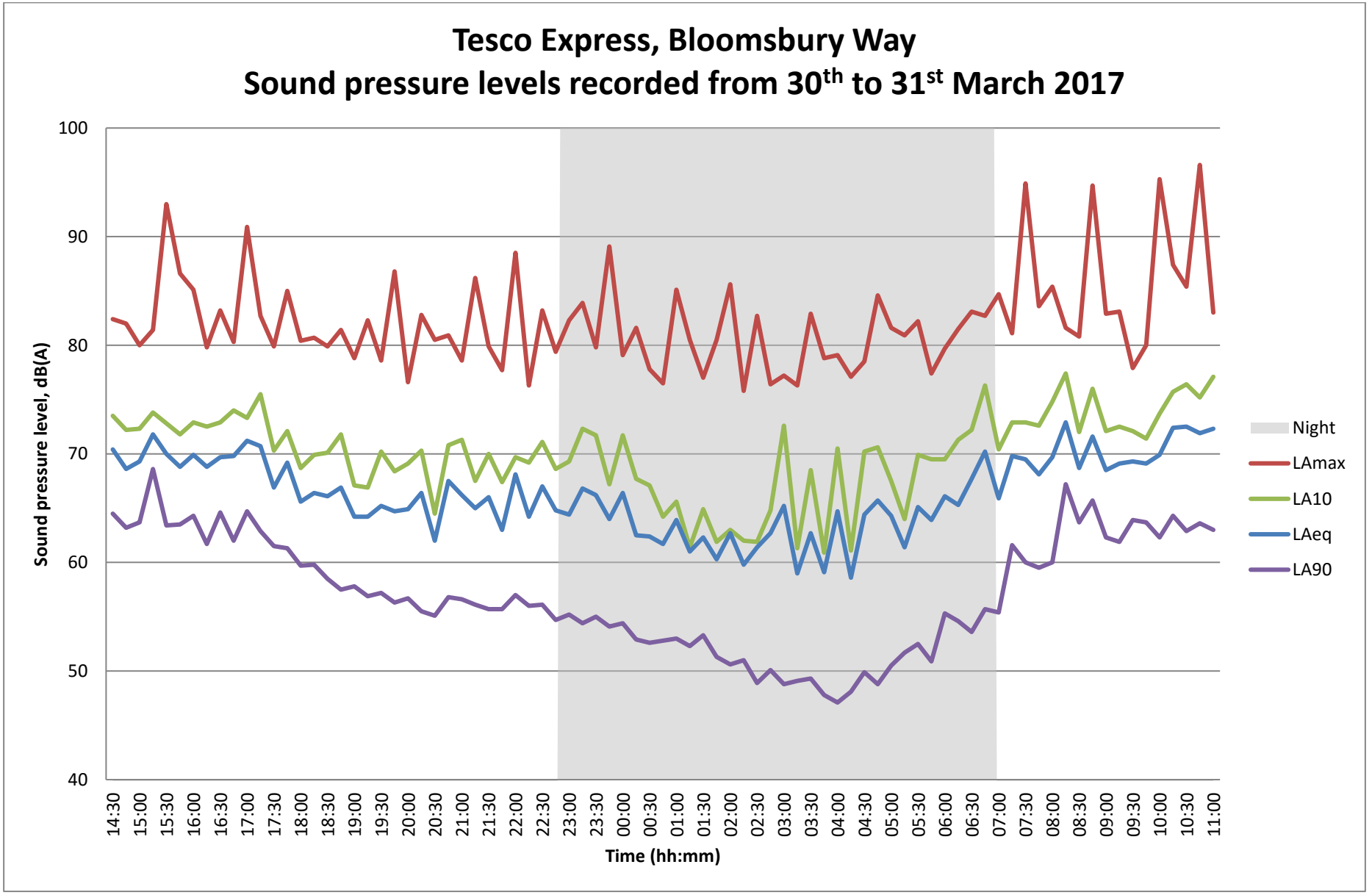
Weather Conditions

C.5 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	14.30 30/03/17 – 11.15 31/03/17	Temperature (°C)	22	15
		Precipitation:	Dry	Dry
		Cloud cover (oktas - see guide)	8	7
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	1.8	2.0
		Wind Direction	Southerly	South westerly
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.6 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. The results of the survey are presented in a time history graph overleaf.


Tesco Express, Bloomsbury Way
Sound pressure levels recorded from 30th to 31st March 2017
Sound pressure level, dB(A)
100
90
80
70
60
50
40
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
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05:30
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
10:30
11:00
Time (hh:mm)
Night
LAmax
LA10
LAeq
LA90

Appendix D Manufacturer's sound level data

Description	Model / Model	Quantity	Notes.	Sound power level/Sound pressure level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
				63	125	250	500	1k	2k	4k	8k	
Fan	Elta SCD/630	5	Intake L_w	74	80	79	81	80	78	78	73	85
			Discharge L_w	74	80	79	81	80	78	78	73	85
Fan	Elta SCD/4000	1	Intake L_w	71	80	77	72	70	66	63	59	75
			Discharge L_w	71	80	77	72	70	66	63	59	75
Gas cooler	Kelvion/RF MB102	1	Daytime L_w	74	66	61	60	56	47	43	43	61
			Night-time L_w	60	57	52	50	44	36	31	31	51
Shop floor AC	Mitsubishi/FDC100VN	2	L_w	63	59	57	54	53	44	42	39	57
Office AC	Mitsubishi/SRK28	1	L_w	54	56	53	55	49	46	41	35	55

Appendix E Calculations

Plantroom Intake louvre at R1 daytime

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
Reverberant level in plant room	Rev L_p	71	64	60	58	52	43	39	37	59
Opening area (m^2)	3	5	5	5	5	5	5	5	5	
SRI of opening	I.L.	-4	-5	-8	-16	-23	-22	-21	-17	
Inside-outside correction		-6	-6	-6	-6	-6	-6	-6	-6	
L_w of opening	L_w	66	58	51	41	28	20	17	19	47
Directivity correction	90˚,0˚	-1	-5	-8	-8	-7	-7	-7	-7	
Distance correction (m)	3	-18	-18	-18	-18	-18	-18	-18	-18	
Resultant at receptor	L_p @ R1	48	36	25	16	4	-4	-7	-5	25

Plantroom Intake louvre at R1 night-time

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
Reverberant level in plant room	Rev L_p	57	53	46	41	34	25	20	20	43
Opening area (m^2)	3	5	5	5	5	5	5	5	5	
SRI of opening	I.L.	-4	-5	-8	-16	-23	-22	-21	-17	
Inside-outside correction		-6	-6	-6	-6	-6	-6	-6	-6	
L_w of opening	L_w	52	47	37	24	10	2	-2	2	34
Directivity correction	90˚,0˚	-1	-5	-8	-8	-7	-7	-7	-7	
Distance correction (m)	3	-18	-18	-18	-18	-18	-18	-18	-18	
Resultant at receptor	L_p @ R1	34	25	12	-1	-14	-22	-26	-22	12

Intake louvre at R2

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	71	80	77	72	70	66	63	59	75
System losses		-4	-1	0	-2	-3	-4	-4	-4	
Atmospheric side attenuator	I.L.	-2	-3	-5	-10	-13	-11	-9	-8	
Directivity correction	90˚,0˚	-1	-5	-8	-7.5	-7	-7	-7	-7	
Distance correction (m)	3	-18	-18	-18	-18	-18	-18	-18	-18	
Barrier Correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor	L_p	46	53	46	35	29	26	25	22	42

Intake louvre at R3

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	74	80	79	81	80	78	78	73	85
System losses		-5	-2	-1	-2	-4	-5	-5	-5	
Atmospheric side attenuator	I.L.	-4	-7	-13	-21	-21	-14	-13	-12	
Directivity correction	90˚,0˚	-1	-5	-8	-7.5	-7	-7	-7	-7	
Distance correction (m)	3	-18	-18	-18	-18	-18	-18	-18	-18	
Barrier Correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor	L_p	47	49	40	33	31	35	36	32	42

Intake louvre at R4

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	74	80	79	81	80	78	78	73	85
System losses		-5	-2	-1	-1	-2	-2	-2	-2	
Atmospheric side attenuator	I.L.	-3	-5	-9	-18	-25	-22	-18	-13	
Directivity correction	90˚,0˚	-1	-5	-8	-7.5	-7	-7	-7	-7	
Distance correction (m)	3	-18	-18	-18	-18	-18	-18	-18	-18	
Barrier Correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor	L_p	48	51	44	37	29	30	34	34	42

Discharge louvre at R5

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	74	80	79	81	80	78	78	73	85
System losses		-5	-2	-1	-2	-4	-5	-5	-5	
Atmospheric side attenuator	I.L.	-5	-9	-18	-28	-30	-29	-24	-19	
Directivity correction	90˚,0˚	0	0	-4	-7	-7	-7	-7	-7	
Distance correction (m)	3	-18	-18	-18	-18	-18	-18	-18	-18	
Barrier Correction	0	0	0	0	0	0	0	0	0	
Resultant at receptor	L_p	46	51	38	26	22	20	25	25	37

Discharge louvre at R6 Roof level

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								$L_{Aeq,T}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	74	80	79	81	80	78	78	73	85
System losses		-24	-21	-10	-7	-8	-9	-8	-8	
Atmospheric side attenuator	I.L.	-4	-5	-8	-16	-23	-22	-21	-17	
Directivity correction	90˚,0˚	0	0	-4	-7	-7	-7	-7	-7	
Distance correction (m)	3	-25	-25	-25	-25	-25	-25	-25	-25	
Barrier Correction	0	-10	-10	-10	-10	-10	-10	-10	-10	
Resultant at receptor	L_p	11	19	22	16	7	5	7	6	18
Correction for number of vents	2	3	3	3	3	3	3	3	3	
Cumulative at receptor	L_p	14	22	25	19	10	8	10	9	21

Appendix F Plant layout