NSL
Noise Solutions Ltd

Barclays
93 Euston Road
Kings Cross
London
NW1 2RA

Plant Noise
Impact Assessment

On behalf of

AMD ENVIRONMENTAL LTD

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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved
01	14th August 2018	Equipment noise details added	DAM	JS
02	29th September 2020	Updated plant selection	AM	NAC
03	30th September 2020	Minor updates	AM	NAC

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Appendices

Executive Summary

Noise Solutions Limited has carried out a Noise Impact Assessment for new ventilation plant to be installed at the existing Barclay premises at 93 Euston Road, Kings Cross, London NW1 2RA.

The Assessment has shown that the proposed plant noise will comply with Camden Borough Council's usual requirements and should therefore be acceptable.

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by AMD Environmental Ltd. to provide guidance on maximum noise emissions for new plant serving the Barclays branch at 93 Euston Road, Kings Cross.

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. This report contains an assessment based on project information available at the time of writing and the results of a baseline noise survey.

1.4. A glossary of acoustic terminology is given in **Appendix A**.

2.0 Details of development proposals

2.1. The Barclays branch is located at 93 Euston Road on the ground floor of the building which has commercial and retail units on the ground floor and hotel rooms (Premier Inn) on the eight storeys above and adjacent.

2.2. The installation of three condenser units is proposed at the rear of the premises within a laydown area in the service yard.

2.3. External louvre connections are also being provided for a heat recovery unit (MHVR) intake and exhaust and one Toilet Extract fan.

2.4. Manufacturers' noise data for the proposed equipment is given in **Appendix D**.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is commercial and retail to the adjacent ground floor; a Premier Inn Hotel is situated directly above and is deemed to be the nearest noise sensitive receptor (Receptor R1).

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 façade of the nearest noise

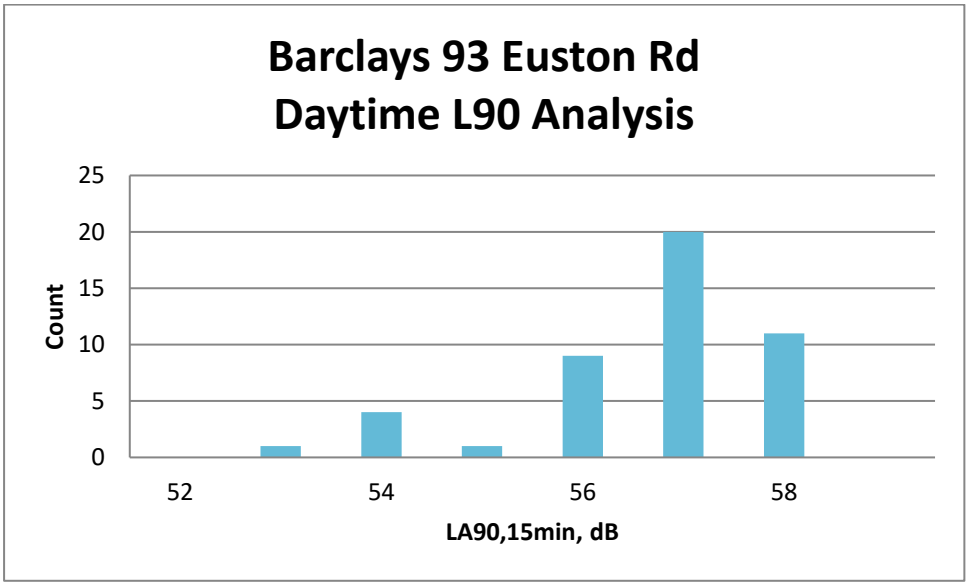
sensitive receptor to the proposed plant area during the quietest times at which the plant will operate.

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)			
	$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime (07.00 – 23.00 hours)	55-66	63-92	56-67	53-58
Night-time (23.00 – 07.00 hours)	53-60	56-82	54-59	51-57

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



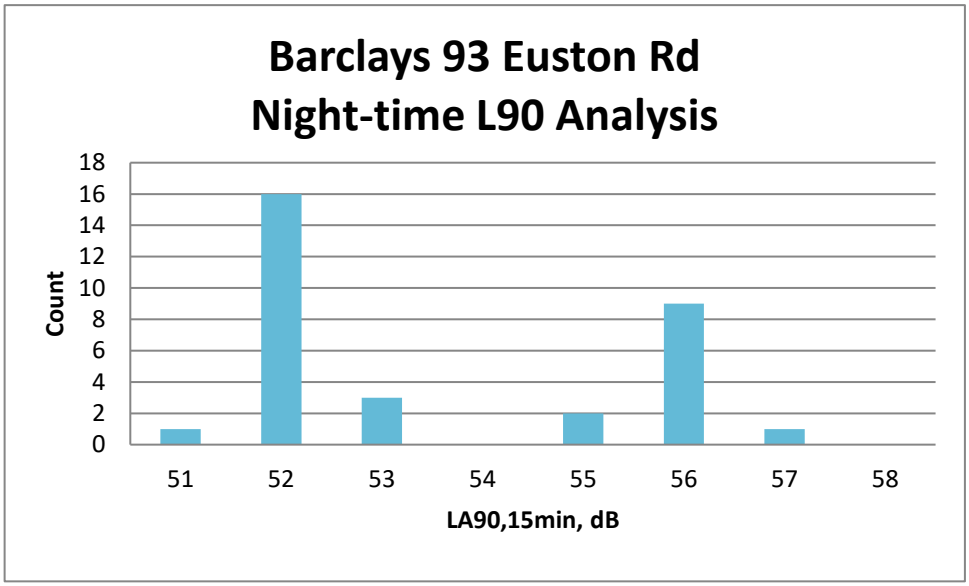
4.3. Additional statistical analysis has been undertaken. As shown in Table 2, the mean, median, and modal values have been calculated:

Table 2 Statistical analysis of $L_{A90,15min}$ levels during the daytime period

dB, L_{A90} daytime period	
Mean	57
Median	57
Mode	57

4.4. From the above analysis, 57dB L_{A90} has been selected to be representative of the background sound level during the daytime period.

Figure 2 Histogram of night-time L_{A90} background sound pressure levels



4.5. Additional statistical analysis has been undertaken. As shown in Table 3, the mean, median, and modal values have been calculated:

Table 3 Statistical analysis of $L_{A90,15min}$ levels during the night-time period

dB, L_{A90} daytime period	
Mean	54
Median	52
Mode	52

4.6. From the above analysis, 52 dB L_{A90} has been selected to be representative of the background sound level during the night-time period.

4.7. Therefore, the following values are considered as representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 57dB L_{90} during the daytime period; and
- 52dB L_{90} during the night-time period

5.0 Plant noise design criteria

National Planning Policy Framework

5.1. A new edition of NPPF was published in February 2019 and came into effect immediately. The original National Planning Policy Framework (NPPF[1]) was published in March 2012, with a revision in July 2018 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2019 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the February 2019 edition.

5.2. Paragraph 170 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."*

5.3. The NPPF goes on to state in Paragraph 180:

" planning policies and decisions should ...

a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...

5.4. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE[2]).

5.5. Paragraph 2 of the NPPF states that *"planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."*

5.6. Paragraph 12 of the NPPF states that *"The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed".*

[1] National Planning Policy Framework, DCLG, March 2012
[2] Noise Policy Statement for England, DEFRA, March 2010

5.7. Paragraph 117 states that *"Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land"*.

London Borough of Camden Council

5.8. Section 6 of the Camden Planning Guidance Amenity, published March 2018, gives guidance on noise and vibration.

5.9. Clause 6.8 refers noise thresholds within Appendix 3 of the Local Plan and to refers to the principles of No observed effect level (NOEL), Lowest observable adverse effect level (LOAEL) and Significant observed adverse effect level (SOAEL) and defines their meanings. Specifically, in the context of this report, LOAEL is defined as:

> *The level above which changes in behaviour (e.g. closing windows for periods of the day) and adverse effects on health (e.g. sleep disturbance) and quality of life can be detected.*

5.10. SOEAL is defined as:

> *The level above which adverse effects on health and quality of life occur. This could include psychological stress, regular sleep deprivation and loss of appetite.*

5.11. Clause 6.27 states that:

> *Developments proposing plant, ventilation, air extraction or conditioning equipment and flues will need to provide the system's technical specifications to the council accompanying any acoustic report. "BS4142 Method for rating Industrial and Commercial Sound' contains guidance and standards which should also be considered within the acoustic report.*

5.12. Appendix 3 within the Camden Local Plan published 2017 states:

> *"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)."*

5.13. 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.*

5.14. As the plant will not contain tones or otherwise attract attention, the plant noise level, 1m from the nearest window of the noise sensitive receptor, must be 10dB lower than the representative background sound level. Therefore, the cumulative noise level for the proposed plant at the nearest hotel windows should not exceed the limits shown in the table below.

Table 4 Proposed plant noise emissions level limits at noise sensitive residential receptors

Period	Cumulative plant noise level, dB(A)
Daytime (07.00 – 23.00 hours)	47
Night-time (23.00 – 07.00 hours)	42

6.0 Plant noise assessment

6.1. The cumulative plant noise level at the most affected noise sensitive receptors has been predicted. The assessment has taken into consideration distance attenuation and directivity corrections.

6.2. The following 'straight-through' attenuators have been considered for the ventilation system:

System	Connection		L	m³/s	Pa.	Insertion Loss (dB) at octave band centre frequencies (Hz)							
						63	125	250	500	1k	2k	4k	8k
MVHR FAI	250dia	spigot	500	0.138	< 5	4	5	10	19	25	29	18	9
MVHR EXH	250dia	spigot	500	0.138	< 5	4	5	10	19	25	29	18	9
Toilet Extract Atmos	150dia	spigot	300	0.029	< 5	3	3	6	13	19	23	22	11

6.3. It should be noted that the plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems.

6.4. The proposed plant will operate during daytime only (07:00-23:00), with the exception of the comms room AC CU03 which will run constantly.

6.5. Table 5, below, summarises the results of the assessment at the nearest NSR. All other nearby receptors benefit from increased distance/screening to the plant. The full set of calculations can be found in **Appendix F**.

Table 5 Assessment of predicted noise levels at nearest receptor

Receptor	Period	Predicted plant noise level at receptor, L_{Aeq} (dB)	Proposed design criterion (dB)	Difference (dB)
R1	Daytime (07.00 – 23.00 hours)	46	47	-1
	Night-time (23.00 – 07.00 hours)	37	42	-5

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by AMD Environmental to provide a noise assessment of new plant serving the Barclays branch at 93 Euston Road, Kings Cross.

7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at a location representative of the noise climate outside the nearest noise sensitive receptors to the proposed plant area.

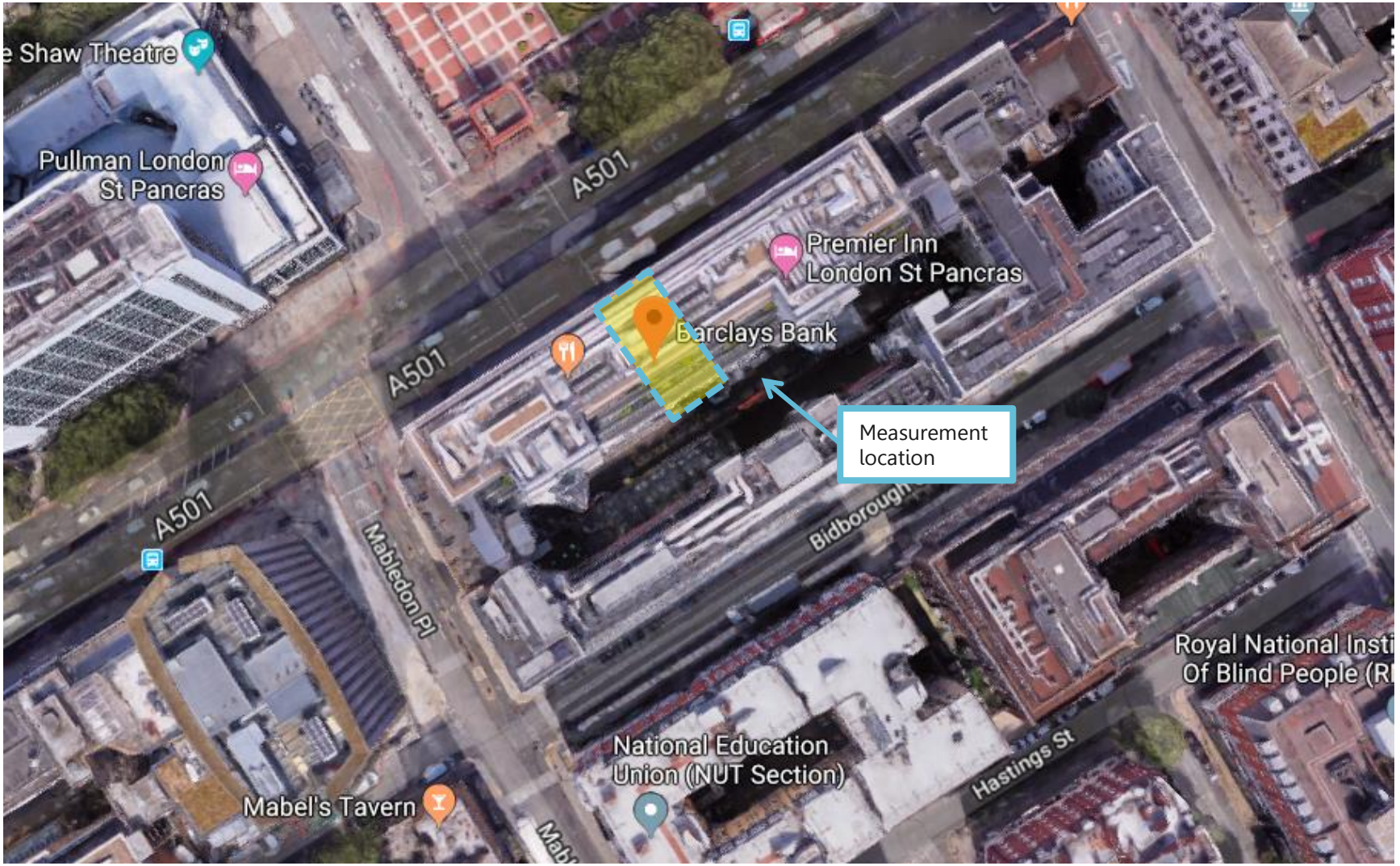
7.3. The assessment indicates that noise from proposed plant is predicted to be below the design criterion and will comply with Camden Borough Council's usual requirements.

7.4. The results of this assessment demonstrate that noise emissions from proposed plant should be considered acceptable to Camden Borough Council: Noise from the proposed fixed plant should not be grounds for refusal of planning permission.

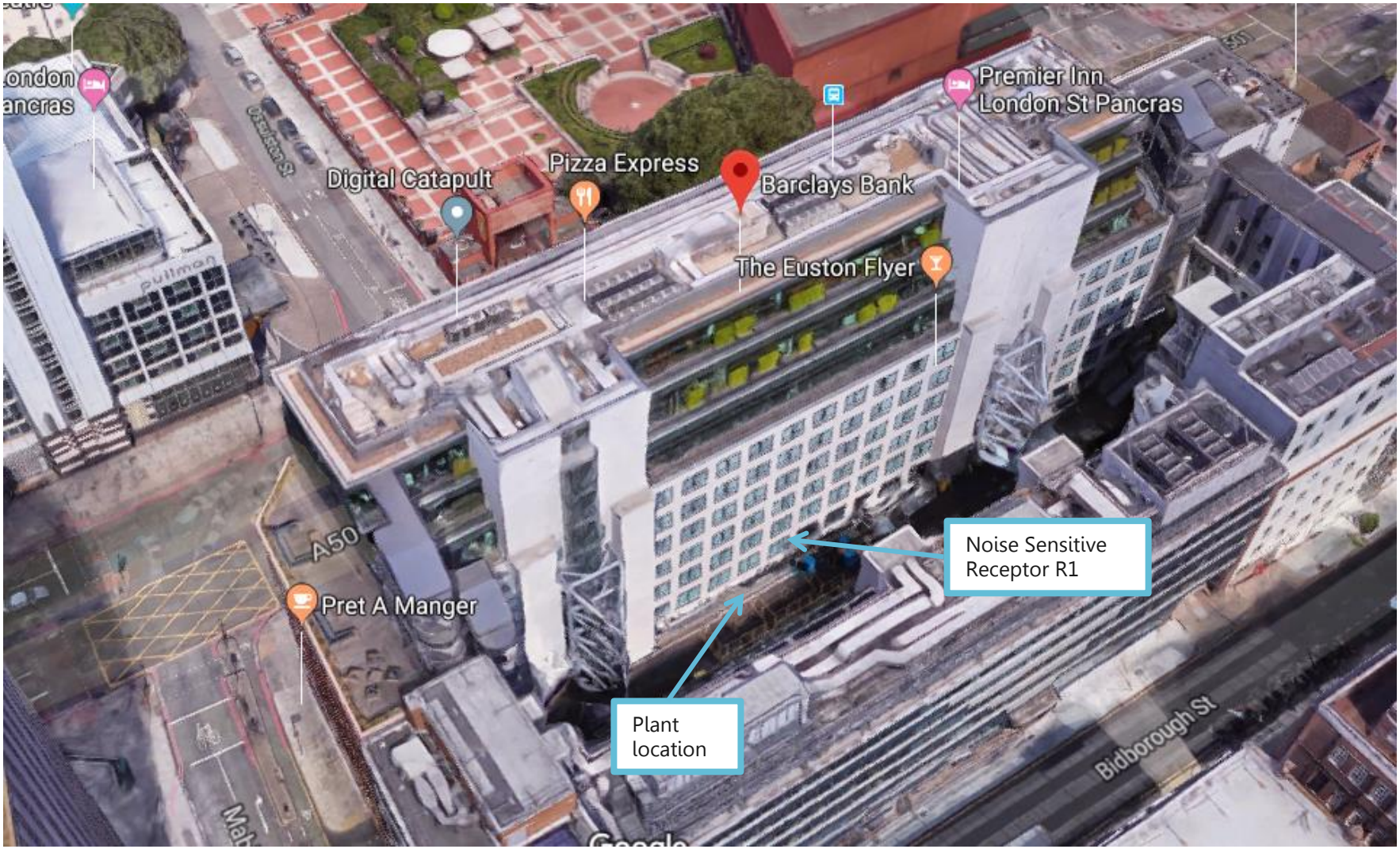
Appendix A Acoustic terminology

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 $\log_{10}$ (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. 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 Photographs of site showing areas of interest



Photographs Courtesy of Google Earth



Photographs Courtesy of Google Earth

Appendix C Environmental sound survey

Details of environmental sound surveys

C.1 Measurements of the existing background sound levels were undertaken from 14.20 hours on Monday 6th August to 09.30 hours on Tuesday 7th August 2018.

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 fifteen-minute sample periods for the duration of the survey.

Measurement position

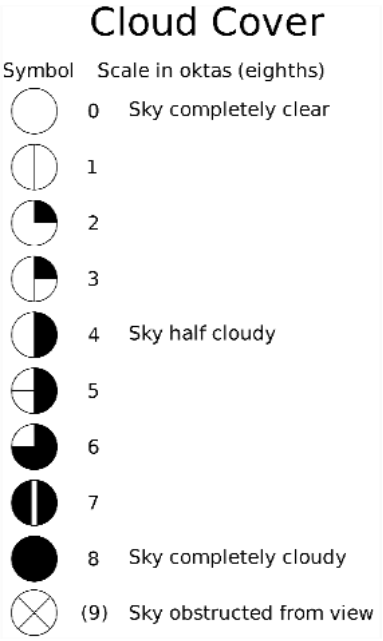
C.3 The sound level meter was positioned on an elevated balustrade at the rear of the Premier Inn. The approximate location of the microphone is indicated on the aerial photograph in **Appendix B**.

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.

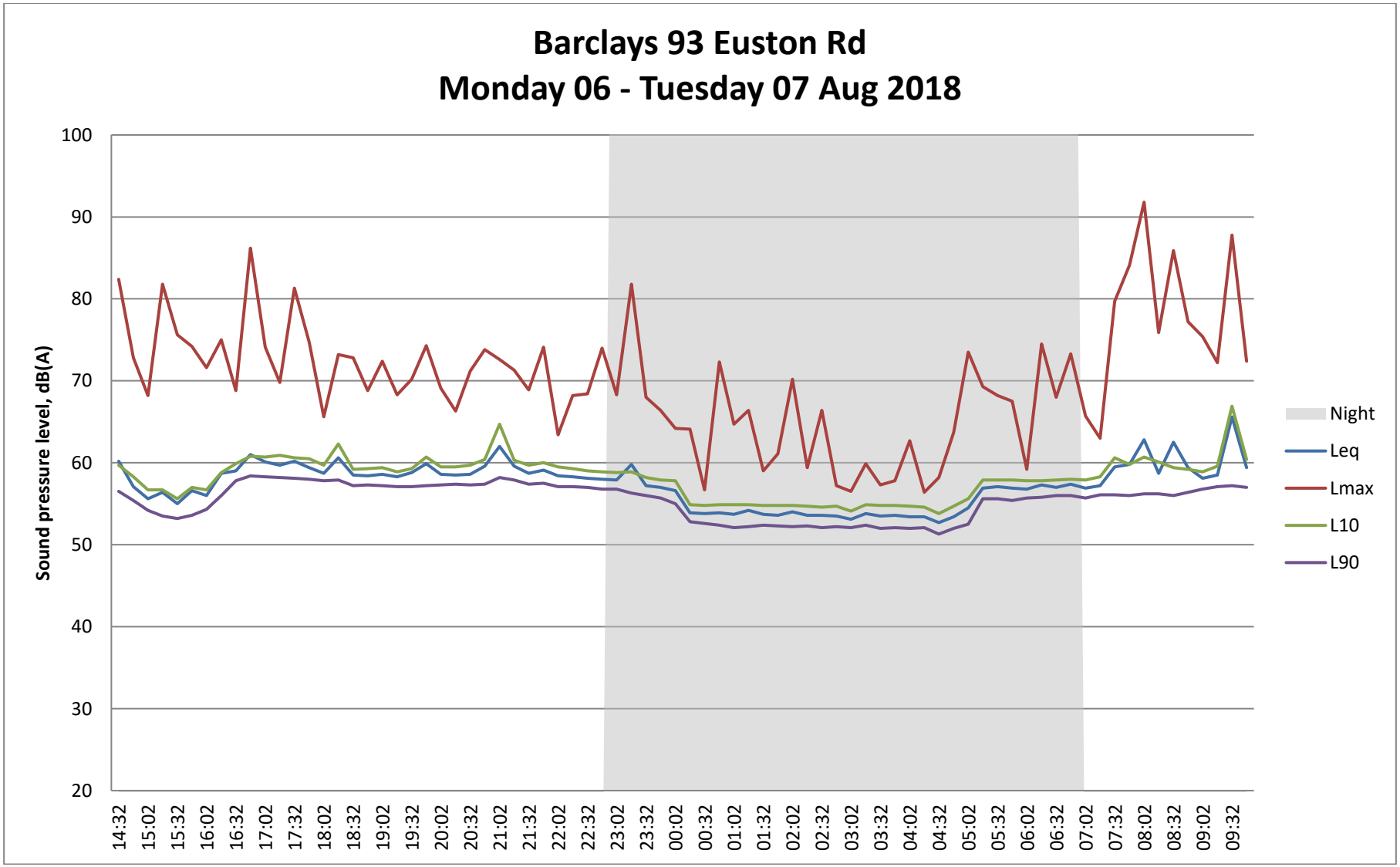
Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977 / 36190	06/07/2018	15444
Condenser microphone	ACO Pacific 7052E / 57366		
Preamplifier	Svantek SV12L / 41504		
Calibrator	CEL 284/2 /4/03326334	06/07/2018	15443

C.5 Weather conditions were determined both at the start and on completion of the survey. 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	**Time/Date**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	14.20 06/08/2018 – 09.30 07/08/2018	Temperature (°C)	30.0	25.0
		Precipitation:	No	No
		Cloud cover (oktas – see guide)	0	7
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	<0.5	<0.5
		Wind Direction	-	-
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

7.5. The results of the survey are considered to be representative of the background sound pressure levels at the façade of the most affected noise sensitive receptor to the plant area during the quietest times at which the plant will operate. The noise climate at the measurement position was dominated by existing HVAC plant noise from other premises. The results of the survey are presented in a time history graph overleaf.


Barclays 93 Euston Rd
Monday 06 - Tuesday 07 Aug 2018
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
20
14:32
15:02
15:32
16:02
16:32
17:02
17:32
18:02
18:32
19:02
19:32
20:02
20:32
21:02
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04:02
04:32
05:02
05:32
06:02
06:32
07:02
07:32
08:02
08:32
09:02
09:32
Night
Leq
Lmax
L10
L90

Appendix D Manufacturers Noise Data

Plant	Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)							
			63	125	250	500	1k	2k	4k	8k
MVHR	Mitsubishi Lossnay LGH-50RVX-E SP4	In-duct L_w	64	68	66	64	59	61	57	44
Toilet Extract	Vent-Axia ACM 150	In-duct L_w	33	45	49	54	54	52	45	36
Condenser Units	CU01 Mitsubishi PUMY-P112VKMR1	L_p	54dBA @ 1m							
	CU02 Mitsubishi MXZ-3F68VF-E2	L_p	53dBA @1m							
	CU03 Mitsubishi MUZ-HR25VF	L_p	50dBA @1m							
	CU04 Mitsubishi PUHZ-ZRP140VKA2	L_p	52dBA @1m							

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Appendix E Noise Level Calculation

Description				Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
					63	125	250	500	1k	2k	4k	8k	
MVHR													
Mitsubishi Lossnay LGH-50RVX-E SP4				In-duct L_w	64	68	66	64	59	61	57	44	
System losses	Duct	250d	2m		0	0	0	0	1	1	1	1	
	90° Bend	250R	2		0	0	0	0	2	4	6	6	
	Attenuator	No Pod	2D	IL	4	5	10	19	25	29	18	9	
	End Reflection	400	300	0.12m²	9	5	2	0	0	0	0	0	
	System Loss				13	10	12	19	28	34	25	16	
Sound power level leaving terminal				**Lw**	**51**	**58**	**54**	**45**	**31**	**27**	**32**	**28**	
Sound Path	Directivity		135°	-	2	5	8	11	14	17	20	22	
	Distance		3.5m	-	11	11	11	11	11	11	11	11	
	Screening			-	0	0	0	0	0	0	0	0	
	FAI + EXH	Combined		+	3	3	3	3	3	3	3	3	
Resultant at Receptor R1				**L_p**	**41**	**45**	**38**	**26**	**9**	**2**	**4**	**-2**	**33**
Toilet Extract													
Vent-Axia ACM 150				In-duct L_w	33	45	49	54	54	52	45	36	
System losses	Duct	150d	0		0	0	0	0	0	0	0	0	
	90° Bend	150R	0		0	0	0	0	0	0	0	0	
	Attenuator	No Pod	2D	IL	3	3	6	13	19	23	22	11	
	End Reflection	160	dia	0.02m²	15	11	7	3	0	0	0	0	
	System Loss				18	14	13	16	19	23	22	11	
Sound power level leaving terminal				**Lw**	**15**	**31**	**36**	**38**	**35**	**29**	**23**	**25**	
Sound Path	Directivity		135°	-	2	5	8	11	14	17	20	22	
	Distance		3.5m	-	11	11	11	11	11	11	11	11	
	Screening			-	0	0	0	0	0	0	0	0	
Resultant at Receptor R1				**L_p**	**2**	**15**	**17**	**16**	**10**	**1**	**-8**	**-8**	**17**

Condensers													
CU01 Mitsubishi PUMY-P112VKMR1													**dBA**
	Catalogue L_p	@1m	54										
Sound Path	Directivity		3										
	Distance	3.5m	-11										
	Screening		-5										
Resultant at Receptor R1													**41**
CU02 Mitsubishi MXZ-3F68VF-E2													
	Catalogue L_p	@1m	53										
Sound Path	Directivity		3										
	Distance	3.5m	-11										
	Screening		-5										
Resultant at Receptor R1													**40**
CU03 Mitsubishi MUZ-HR25VF													
	Catalogue L_p	@1m	50										
Sound Path	Directivity		3										
	Distance	3.5m	-11										
	Screening		-5										
Resultant at Receptor R1													**37**
CU04 Mitsubishi PUHZ-ZRP140VKA2													
	Catalogue L_p	@1m	52										
Sound Path	Directivity		3										
	Distance	3.5m	-11										
	Screening		-5										
Resultant at Receptor R1													**39**
Cumulative level at Receptor													**46**