

Pret a Manger
163 Piccadilly
London W1J 9ED

**Plant Noise
Impact Assessment**

On behalf of

Epta UK

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1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by Epta UK to provide a noise impact assessment for replacement air conditioning plant serving an existing Pret a Manger premises at 163 Piccadilly, 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 following Westminster City Council's usual requirements.
- 1.4. To assist with the understanding of this report a glossary of acoustic terms can be found in [Appendix A](#). An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

- 2.1. The Pret a Manger premises occupies a ground floor unit on the south side of Piccadilly, close to the junction with St. James's Street. Existing external air conditioning (AC) condensers are located at upper roof (eighth floor) level.
- 2.2. Current proposals are for this equipment to be replaced by four AC condensers on a lower, first floor, roof. This roof area is surrounded on three sides (east, west and north) by seven floors of overlooking office windows, while there is a wall around three storeys higher to the south.
- 2.3. It is understood that the AC units will operate only while the premises are open.
- 2.4. [Appendix B](#) contains a table with the manufacturer's published sound pressure levels for the proposed plant. The proposed plant location is shown in [Appendix F](#).

3.0 Nearest noise sensitive receptors

- 3.1. It is understood that there are no residential properties overlooking the plant area. A search on the Council Tax Valuation website supports this assessment. All overlooking windows are considered to serve commercial or office premises.
- 3.2. The nearest windows (receptor reference R1) will be around 3.0 to 3.5m from the units.

- 3.3. An aerial view showing the site and surrounding area, the nearest neighbouring properties and the noise monitoring location used in this assessment is presented in [Appendix C](#).

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 D](#).

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 hrs)	56-58	59-73	57-59	55-57
Night-time (23.00 – 07.00 hrs)	56-58	58-70	57-59	55-56

- 4.3. The lowest background sound level measured during the proposed plant operating hours was 55dB L_{A90} 15min.

5.0 Plant noise design criteria

City of Westminster

- 5.1. Westminster City Council’s Draft Noise Technical Guidance Note was published in November 2019 to accompany the City Plan 2019 – 2040.
- 5.2. Section 2.4 of the Guidance Note gives noise thresholds for “Development including plant or machinery, or contains activities that cause noise from amplified and unamplified music or human voices both internally and externally” as set out in Table 2 below (Table 3 in the Guidance Note).

Table 2. Noise criteria for plant machinery and internal/external activities

Existing External Ambient Noise Level	Tonal or Intermittent Noise / Noise Source	Sound Emission Level that should not be exceeded at the nearest Noise Sensitive Receptor ¹
Exceed WHO Guideline Levels L _{Aeq} 55dB over periods of daytime (07.00-23.00 hours) and	Does not contain tones or intermittent noise sufficient to attract attention	10dB below the minimum external background noise level

Existing External Ambient Noise Level	Tonal or Intermittent Noise / Noise Source	Sound Emission Level that should not be exceeded at the nearest Noise Sensitive Receptor ¹
L _{Aeq} 45 dB at night-time (23.00-07.00 hours)	Contains tones or be intermittent noise sufficient to attract attention	15dB below the minimum external background noise level
	Noise emitted from emergency plant or an emergency life supporting generator(s) ²	10dB above the lowest background noise level within a 24-hour period
Does not exceed WHO Guideline Levels L _{Aeq} 55dB over periods of daytime (07.00-23.00 hours) and L _{Aeq} 45 dB at night-time (23.00-07.00 hours)	Does not contain tones or intermittent noise sufficient to attract attention	5dB below the minimum external background noise level
	Contains tones or be intermittent noise sufficient to attract attention	10dB below the minimum external background noise level
	Noise emitted from emergency plant or an emergency life supporting generator(s) ²	10dB above the lowest background noise level within a 24-hour period
Below 30 dB L _{A90,15min} at the nearest noise sensitive receptors Both daytime (07.00-23.00hrs) and night-time (23.00-07.00hrs).	Noise contains and/or does not contain tones or intermittent noise	Site specific standards that avoid noise disturbance to nearest noise sensitive receptors may be considered

Notes:

Measured at the nearest noise sensitive receptors 1m from the most affected façade, relative to the existing external background noise level in this location and including assessment at the quietest time during which the plant operates or when there is internal activity at the development site. The background noise level should be expressed in terms of the lowest L_{A90,15min} during daytime or night time (depending on the hours of use being applied for).

Where emergency plant or a generator is installed testing times will be regulated

- 5.3. Table 3 summarises the external noise limits suggested in the WHO Guidelines and provides a comparison to the measured average noise levels in this report.

Table 3 WHO Guidelines comparison with survey results

Period	WHO Guideline	Average measured noise level, L _{Aeq,T} (dB)	Difference
Daytime (07.00 – 23.00 hours)	55	57	+2
Night-time (23.00 – 07.00 hours)	45	56	+11

- 5.4. From the above table it can be seen that external ambient noise levels at the site are above the WHO guidelines during the measurement period.

Criterion at commercial property

- 5.5. Typically, local authorities do not consider office premises to be as sensitive to noise as residential properties and, therefore, emissions criteria are generally relaxed at these locations.
- 5.6. However, it is considered appropriate to control plant noise levels within offices to meet the recommended internal noise levels provided in BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'. The standard states a range of noise levels for various spaces used for 'study and work requiring concentration' between 35 and 50dB L_{Aeq}.
- 5.7. In addition, BS 8233 provides general guidance on the expected sound insulation performance of a given building façade, with details of how various elements can affect the overall performance. Concerning windows, it states that:

If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB.

- 5.8. This implies that should windows on a noise affected façade be openable, a sound insulation value of 15dB should be applied to the whole façade to an internal room being assessed. It should be noted that a sound insulation performance of much greater than 15dB is expected for non-openable standard double-glazed windows. However, in order to assess the worst-case scenario, this report assumes that windows may be opened if desired.
- 5.9. Based on the above and assuming a worst-case internal criterion of 35dB L_{Aeq}, cumulative plant noise levels at the façade of the nearest office premises should not exceed 50dB L_{Aeq}.

Proposed criteria

- 5.10. From review of the proposed plant, no tonality is expected and therefore the plant noise levels should be at least 10 dB(A) below the lowest measured background level, at 1m outside any nearby noise sensitive window.
- 5.11.

5.12. Table 4 below presents the proposed plant noise specific noise level at the nearest receptors.

Table 4 Proposed plant noise emissions level limits at nearest receptors

Period	1m from residential window	Commercial receptors
	Plant noise level, dB	Plant noise level, dB
Daytime (07:00 – 23:00 hours)	45	50
Night time (23:00 – 07:00 hours)	45	-

6.0 Plant noise impact assessment

- 6.1. The cumulative plant noise levels at the nearest noise sensitive receptors have been predicted. The assessment has considered distance attenuation and directivity. The predictions have been based on the proposed plant all operating at full capacity at all times.
- 6.2. Table 5 summarises the results of the assessment at the closest windows, these being commercial. All other nearby receptors benefit from increased distance/screening to the plant such that resulting noise levels will be lower than at the receptors considered. The full set of calculations can be found in [Appendix E](#).

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

Receptor	Period	Predicted sound level at receptor, L_{Aeq} (dB)	Design criterion, dBA	Difference (dB)
R1	Daytime (07:00 – 23:00 hours)	50	50	0
	Night time (23:00 – 07:00 hours)	-	-	-

- 6.3. The noise level predictions demonstrate that cumulative noise emissions from the proposed plant will comply with the proposed limits at the nearest commercial windows.

Context and uncertainties

- 6.4. Where possible uncertainty in the above assessments has been minimised by taking the following steps:
- The meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.

- Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement positions were representative of the noise climate outside the nearby noise sensitive receptors and not in positions where higher noise levels were present.

6.5. The impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The assessment is undertaken at the nearest windows, which are to office premises. The impact on other nearby windows will be lower due to additional distance attenuation, with many also benefitting from acoustic screening by intervening buildings.
- The site is located within a busy commercial area. Many of these premises will have existing building services plant and, therefore, noise emitted from the site will be in keeping with the existing noise climate.
- It should be noted that the above assessment is based on all plant operating at maximum duty. Given that the plant will not operate at maximum design duty all of the time the above assessment is considered to be representative of the worst case.

Vibration isolation

6.6. To control plant vibration into the building structure it is recommended that all plant is installed on suitable anti-vibration mounts.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Epta UK to undertake a noise impact assessment for proposed replacement plant serving the Pret a Manger at 163 Piccadilly, London.

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

7.3. The cumulative plant noise emission levels for the proposed have been predicted at the nearest residential premises and will comply with Westminster City Council's usual requirements. Therefore, 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 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 $20\mu\text{Pa}$. 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 Plant information and manufacturer published sound pressure levels

Plant Reference	Unit/Model	Sound pressure level at 1m dBA
AC1	Daikin RZAG100N7Y1B	50
AC2, AC3, AC4	Daikin RZAG140N7Y1B	52

Appendix C Aerial photograph showing areas of interest

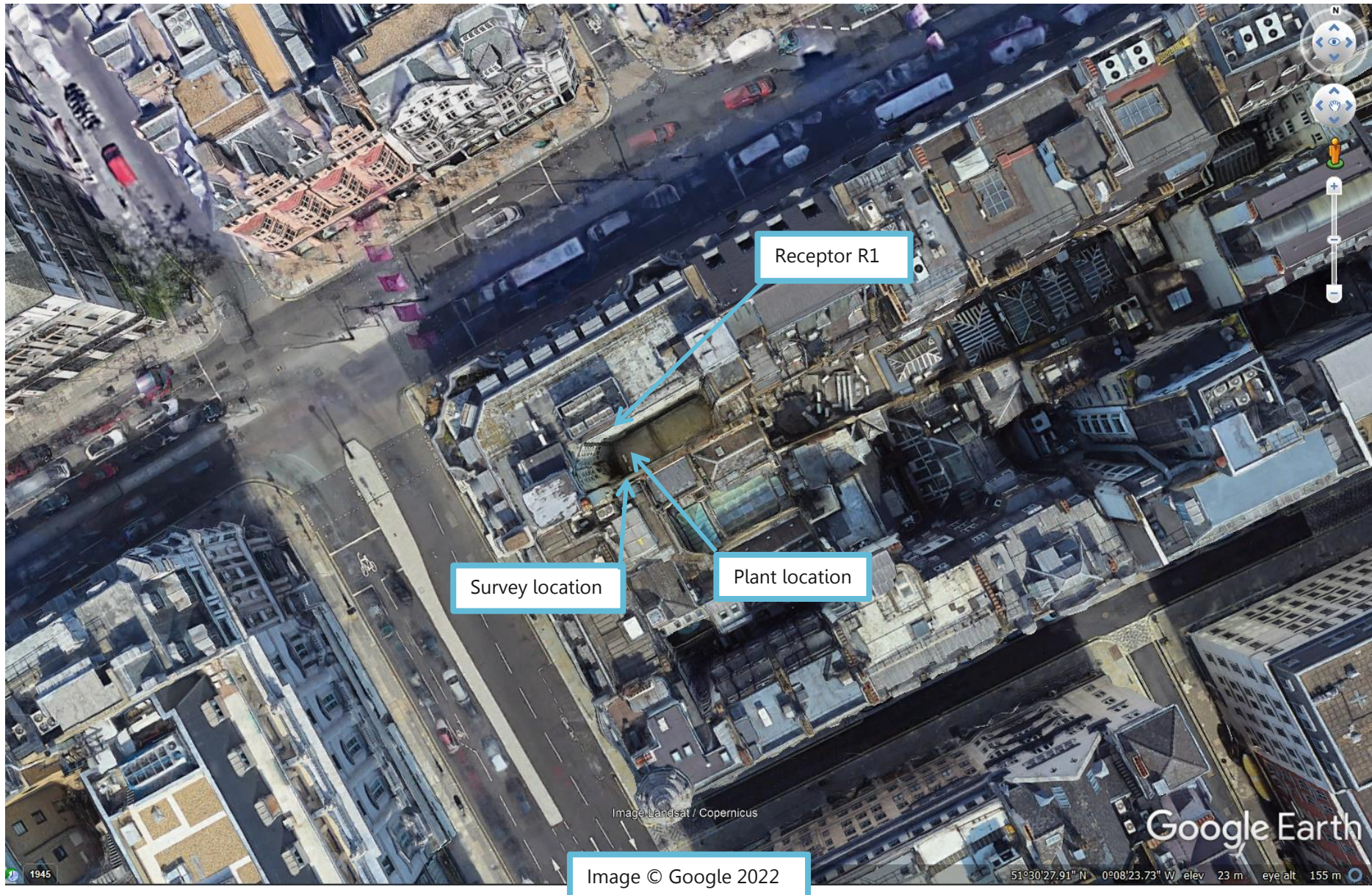


Image © Google 2022

Appendix D Environmental sound survey

Details of sound survey

- D.1 Measurements of the existing background sound levels were undertaken between 12.00 hours on Wednesday 6 April and 12.30 hours on Thursday 7 April 2022.
- D.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 noise survey.

Measurement position

- D.3 The sound level meter was positioned on the roof of the building, adjacent to the nearest noise-sensitive windows, as indicated in [Appendix C](#)).
- D.4 In accordance with BS 7445-2:1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use', the measurements were undertaken under free-field conditions.

Equipment

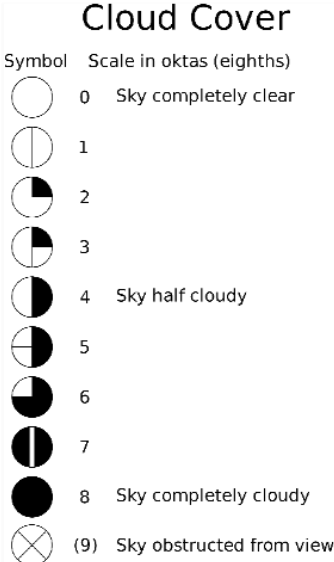
- D.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (± 0.2 dB) in the calibration level was noted.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 971 / 111625	18/06/2021	Factory conformation certificate
Condenser microphone	ACO Pacific 7052E / 80034		
Preamplifier	Svantek SV18 / 112630		
Calibrator	Rion NC-74 / 35094453	13/08/2021	1500814-1

Weather Conditions

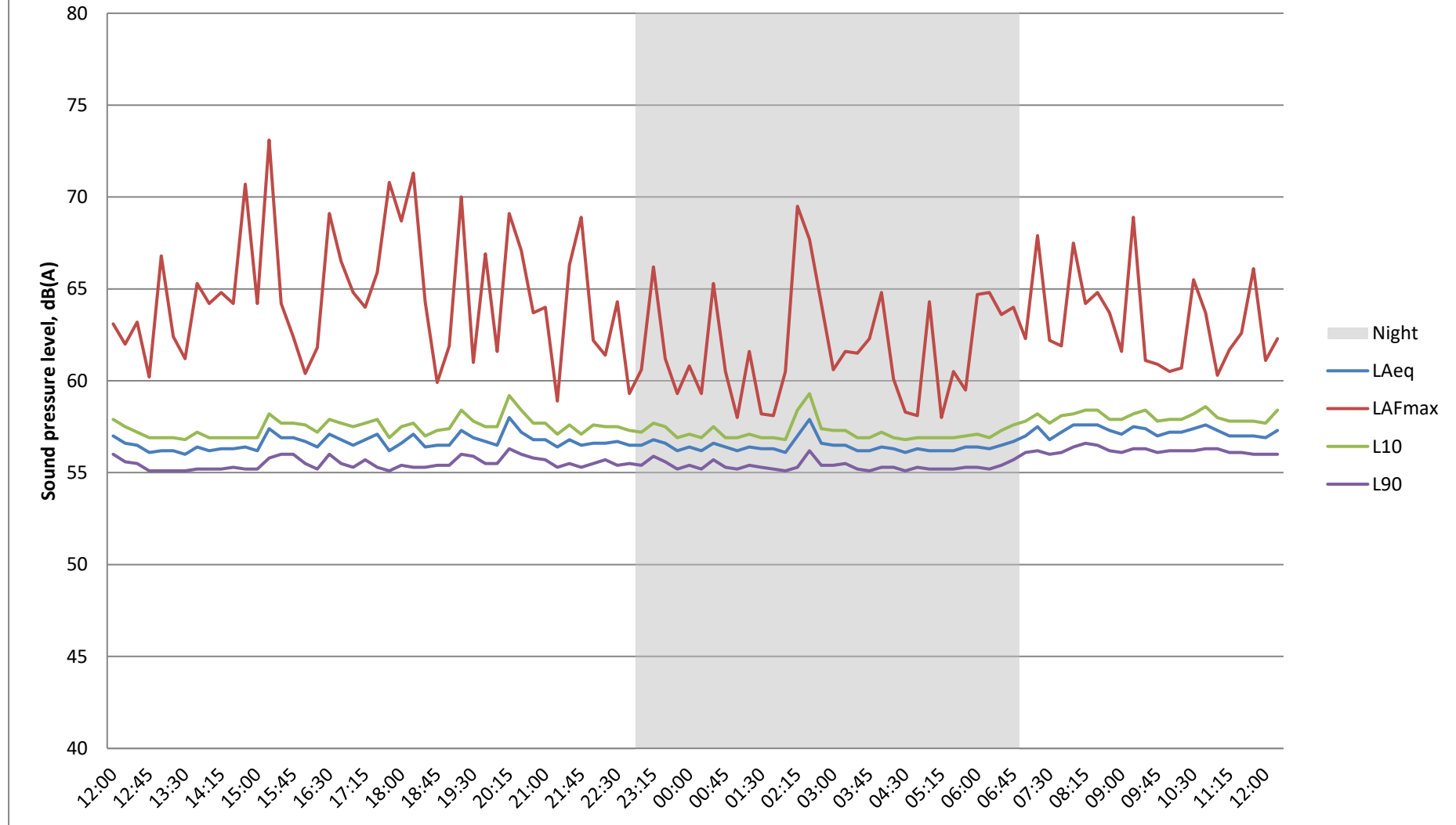
D.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Time/Date	Description	Beginning of Survey	End of Survey
As indicated on Appendix C	12.00 6 Apr - 12.30 7 Apr 2022	Temperature (°C)	12	12
 <p>Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view</p>		Precipitation:	None	None
		Cloud cover (oktas - see guide)	7	7
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Yes	Yes
		Wind Speed (m/s)	<1	<1
		Wind Direction	ENE	ENE
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

D.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest receptors during the quietest times at which the plant will operate. During setup and collection of the monitoring equipment, the noise climate was dominated by exiting plant serving other premises and distant road traffic. The results of the survey are presented in a time history graph overleaf.

Pret, Piccadilly Wednesday 06 - Thursday 07 Apr 2022



Appendix E Noise level predictions

AC units

Receptor R1 – Worst-case office windows on same level as plant area

Unit	Distance				Directivity, dB	Screening, dB	Result, dB L _{Aeq}
	L _{pA}	at / m	m	dB			
AC1	50	1	3.0	-10	3	0	43
AC2	52	1	3.0	-10	3	0	45
AC3	52	1	3.5	-11	3	0	44
AC4	52	1	3.5	-11	3	0	44
Combined sound pressure level at receptor							50

