11 Cannon Lane

Hampstead
NW3 1EL

Plant Noise
Impact Assessment Report

On behalf of

FLATT

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Document Information

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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved
1	12/7/2024	Revised plant	ACM	NAC

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Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Flatt Consulting to provide a noise impact assessment for new plant serving an existing residential dwelling located at No 11 Cannon Lane in Hampstead.

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. Plant noise levels have been predicted at the nearest residential property and assessed against the London Borough of Camden Council's typical 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. No 11 Cannon Lane is a residential dwelling along Cannon Lane in Hampstead.

2.2. A new air conditioning (AC) unit will be installed externally along the eastern façade of the building. The plant will potentially operate 24 hours.

2.3. A site plan showing the site and surrounding area and the noise monitoring location used in this assessment is presented in **Appendix B**.

3.0 Nearest noise-sensitive receptors

3.1. The area surrounding the site is residential in nature.

3.2. The nearest noise sensitive receptors will be the neighbouring property at No 22 Cannon Lane to the east (Reference R1) at a distance of approximately 9 metres from the proposed plant. There is a substantial brick wall between this property and the proposed plant.

4.0 Existing noise climate

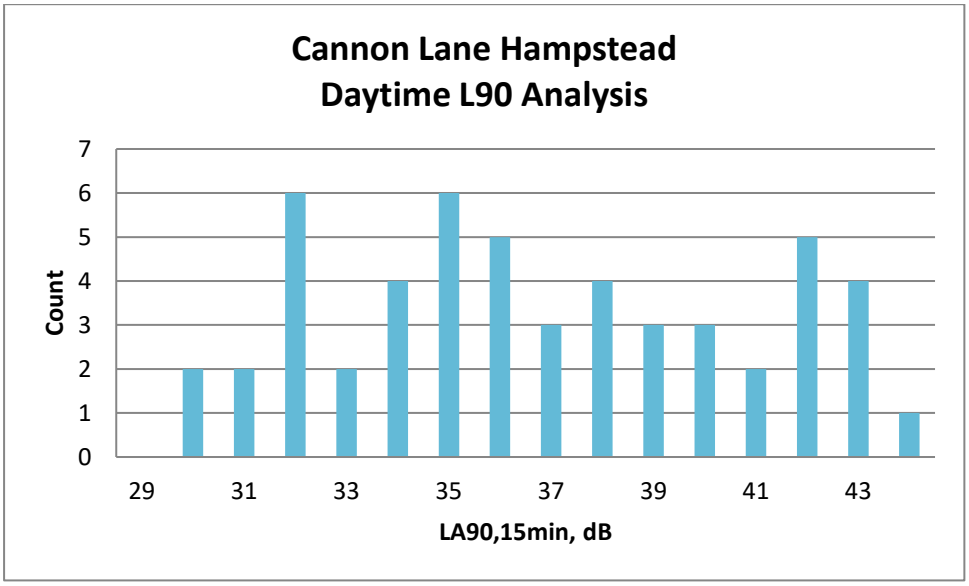
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

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)			
	$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime (07.00 – 23.00 hours)	35-72	52-94	37-71	30-44
Night-time (23.00 – 07.00 hours)	31-58	38-79	33-59	29-36

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



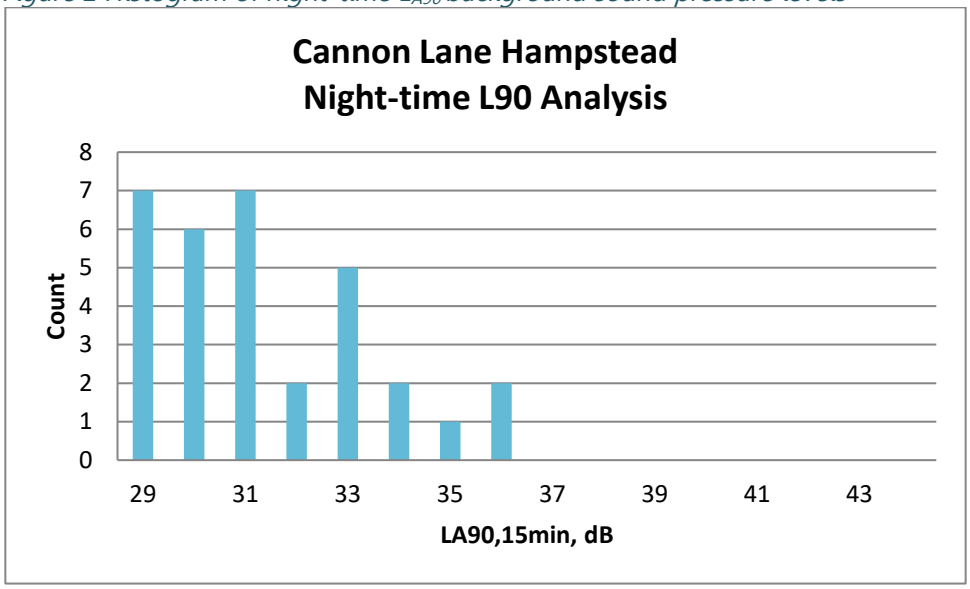
4.3. Additional statistical analysis has been undertaken. As shown in Table 1, the mean, median, and modal values have been calculated:

Table 1 Statistical analysis of $L_{A90,15min}$ levels during the daytime period

dB, L_{A90} daytime period	
Mean	37
Median	35
Mode	36

4.4. 32dB L_{A90} is considered as representative of the typical 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 2, the mean, median, and modal values have been calculated:

Table 2 Statistical analysis of LA90,15min levels during the night-time period

dB, L_{A90} daytime period	
Mean	31
Median	31
Mode	31

4.6. 31dB L_{A90} is considered as representative of the typical 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:

- 32dB L_{90} during the daytime period; and
- 31dB L_{90} during the night-time period

5.0 Plant noise design criteria

National Planning Policy Framework

5.1. A new edition of the NPPF was published in December 2023 and came into effect immediately. The original National Planning Policy Framework (NPPF[1]) was published in March 2012, with subsequent revisions made periodically - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The December 2023 revised edition contains no new directions or guidance with respect to noise. The paragraph references quoted below relate to the December 2023 edition.

5.2. Paragraph 180 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *"preventing 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 instability."*

5.3. The NPPF goes on to state in Paragraph 191:

" 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 123 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

5.8. Section 6 of the Camden Planning Guidance Amenity, published January 2021, gives guidance on noise and vibration .

5.9. Clause 6.8 refers to noise thresholds within Appendix 3 of the Local Plan and 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.*

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

5.14. BS 4142:2014 +A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014[3] includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.

[3] For brevity, references to BS 4142 and BS 4142:2014 should be read as BS 4142:2014 + A1:2019

5.15. The procedure contained in BS 4142:2014 is to quantify the *"specific sound level"*, which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

5.16. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

5.17. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*

5.18. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*

5.19. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

5.20. The standard does state that "*adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

5.21. The standard goes on to note that: *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

5.22. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

5.23. BS 4142:2014 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Summary of criteria

5.24. In order to comply with London Borough of Camden council's usual requirements, the rating level of the new plant must be at least 10dB below the background sound level at the affected nearby residential windows.

Table 4 Proposed plant sound level limits at nearest residential receptors

Receptor	Period	Plant sound level (dB)
Residential	Daytime (07.00 – 23.00 hours)	22
	Night-time (23.00 – 07.00 hours)	21

6.0 Plant noise impact assessment

6.1. Plant sound levels at the most affected noise sensitive receptors have been predicted based on the manufacturer's noise data for the proposed equipment.

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

6.3. Plant sound pressure levels have been predicted at the nearest noise sensitive receptors. The assessment has taken account of the distance between the plant and the nearest receptors, orientations, screening, reflections and other propagation effects.

6.4. The predictions are inclusive of a minimum 6dB sound reduction for appropriate acoustic enclosures around the AC unit.

6.5. Table 5 summarises the results of the assessment outside the nearest noise-sensitive dwellings. 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 calculations are presented in **Appendix E**:

Table 5 Assessment of plant sound levels

Receptor	Period	Predicted plant sound level at receptor, L_{Aeq} (dB)	Proposed design criterion (dB)	Difference (dB)
R1	Daytime (07.00 – 23.00 hours)	21	22	-1
	Night-time (23.00 – 07.00 hours)	21	21	0

Assessment of uncertainties

6.6. Where possible uncertainty in this assessment has been minimised by taking the following steps:

- The measurement of the background sound levels was undertaken over a period including the quietest times of the day and night.
- The sound level meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
- Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement position was representative of the noise climate outside the nearby residential dwellings and not at a position where higher noise levels are present.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned by Flatt Consulting to provide a noise impact assessment for new plant serving an existing residential dwelling located at No 11 Cannon Lane in Hampstead.

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

7.3. The cumulative sound pressure levels for the proposed plant have been predicted at the most affected noise sensitive receptor locations and assessed taking into consideration the typical requirements of the London Borough of Camden Council. Therefore, sound 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 $\log_{10}$ (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 exceeded for 90% of the time over the period T. Generally used to describe background noise level.

Appendix B 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 between 13.15 hours on Wednesday 12th June and 10.15 hours on Thursday 13th June 2024.

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 representative measurement position was located on a lamp post along Cannon Lane. This location is approximately representative of the levels of road traffic noise at the closest receptor. The approximate location of the microphone is indicated on the plan in **Appendix B**.

C.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

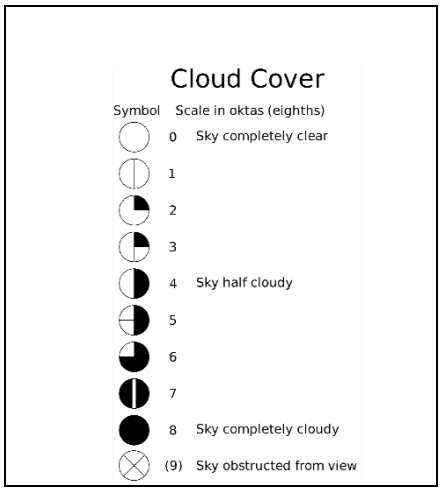
C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Rion NL-52 / 00654035	06/07/2023	TCRT23/1489
Condenser microphone	Rion UC-59 / 14826		
Preamplifier	Rion NH-25 / 87474		
Calibrator	Rion NC-74 /34235932	06/10/2023	1506701-1

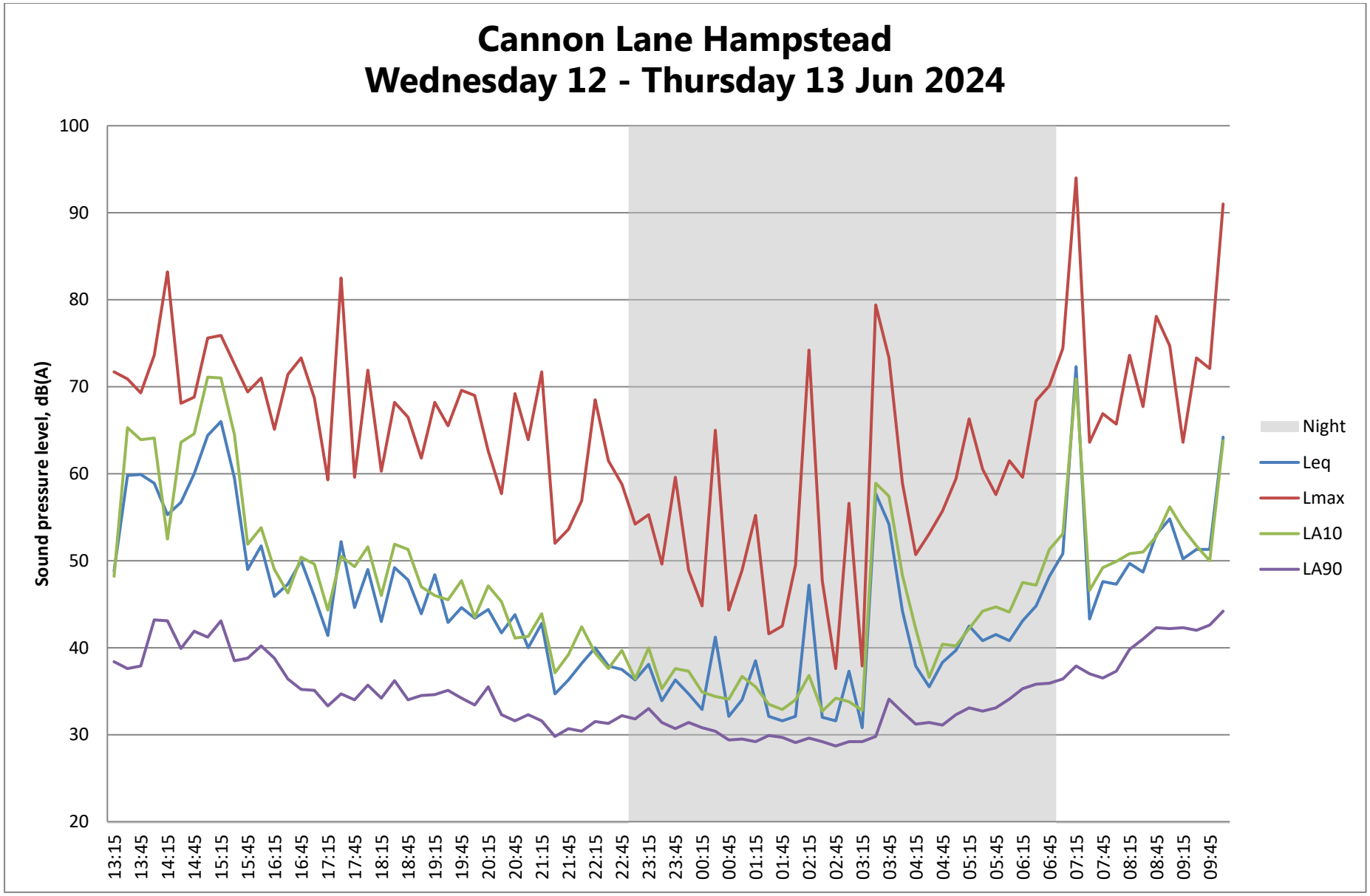
Weather conditions

C.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	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	13.15 12/6/24 - 10.15 13/6/24	Temperature (°C)	16	16
		Precipitation:	No	No
		Cloud cover (oktas - see guide)	8	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	0	1
		Wind Direction	-	swirling
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The predominant noise source affecting the area was distant traffic. The results of the survey are presented in a time history graph overleaf.


Cannon Lane Hampstead
Wednesday 12 - Thursday 13 Jun 2024
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
20
13:15
13:45
14:15
14:45
15:15
15:45
16:15
16:45
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04:15
04:45
05:15
05:45
06:15
06:45
07:15
07:45
08:15
08:45
09:15
09:45
Night
Leq
Lmax
LA10
LA90

Appendix D Manufacturer's Noise Data

Plant	Unit/Model	No. of units	Description	Level (dBA)
AC1	Mitsubishi/PUMY-P250YBM	1	Sound pressure level at 1m	55

Appendix E Plant noise calculations

Receptor R1– Day and night

Plant	PLANT NOISE LEVEL AT SOURCE		DISTANCE		Directivity	Screening	Mitigation	Rating Level at Receptor (dB)
	Noise level (dBA)	Distance (m)	Distance (m)	Correction (dB)	Correction (dB)	Correction (dB)	Correction (dB)	
AC1	55	1	9	-19	3	-12	-6	21
Rating level at receptor								**21**

Appendix F Proposed layout