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Project:

Marsh & Parsons, 27 Parkway, Camden

Title:

Plant noise assessment

quietly moving forward

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Client	ami consulting
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CONTENTS:

1 INTRODUCTION

1.01 Environmental Equipment Corporation Limited has been commissioned by ami consulting to undertake a noise assessment of two condenser units to serve the proposed Marsh & Parsons premises at 27 Parkway, Camden.

1.02 This noise assessment has been conducted in accordance with the policies and requirements of the London Borough of Camden (LBC) and is based on noise surveys carried out at the site over typical weekday, daytime periods.

1.03 This assessment includes:

- the setting of plant noise limits in accordance with the requirements of LBC and national planning policy, standards and guidance; and
- the prediction of noise impacts at the worst affected noise sensitive receptors based on the proposed plant selection and location.

1.04 This report is prepared solely for ami consulting. Environmental Equipment Corporation Limited accepts no responsibility for its use by any third party.

1.05 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in Appendix A.

2 SITE

2.01 No 27 Parkway is located on the south west corner of the junction of Parkway and Arlington Road. The property rises to three storeys on Parkway and two on Arlington Road, this elevation including a rooftop terrace upon which it is proposed to locate two new Fujitsu air conditioning condensers.

2.02 The property is bound by the following

- North – Parkway with commercial properties beyond;
- East – Arlington Road, with mixed commercial and residential terraced properties beyond.
- South – commercial properties on Arlington Road
- West – a Japanese restaurant at ground level served by mechanical extract plant with accommodation above (2nd floor).

2.03 This application is for two condensers to be located on the 2nd floor roof terrace. The condensers will operate during the trading times of Marsh & Parsons (0845 – 1900hrs) and their general location is shown on the aerial site view in Appendix B.

2.04 The closest noise sensitive windows to the proposed condensers are those above the adjacent restaurant on Parkway, 3m from the proposed plant location.

3 GUIDANCE

3.01 Local and National Planning Policy for Camden Borough Council is presented in Appendix C of this document.

3.02 The pertinent criteria relating to this application are included in Development Policy 28 the relevant section of which is reproduced below;

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
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Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL_{Aeq}

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Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL_{Aeq}

4 MEASUREMENTS

4.01 Environmental noise measurements were carried out between 0840 and 1700hrs Friday 28th March 2014. The survey methodology and results are set out below.

4.02 Noise measurements were carried out at the following location, as shown in Appendix B and described as:

- Position 1: At 2nd floor roof level 1.5m from the roof terrace and at least 3.5m from any other reflective surface.

4.03 Position 1 was used to measure noise levels representative of the closest existing noise-sensitive receptors to the proposed condenser units, which are the 2nd floor residential dwellings located above the restaurant located to the west of the site.

5 EQUIPMENT

5.01 Equipment for the survey was as follows:-

- Brüel & Kjær type 2238 Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994.
- Brüel & Kjær Condenser Microphone and Connecting Leads.
- Brüel & Kjær Outdoor Microphone Kit, type UA1404.
- Tripod.

5.02 The equipment holds current UKAS or equivalent accreditation and serial numbers as follows:

Sound Level Meter B&K2238	Serial No.	2622872
	Calibration Date	31st October 2012
	Cal Certificate No.	01079/2
½" Condenser Mic. B&K4188	Serial No.	2735447
	Calibration Date	31st October 2012
	Cal Certificate No.	01079/2
Calibrator B&K4231	Serial No.	1761563
	Calibration Date	4th November 2013
	Cal. Certificate No.	01549/1

N.B. Copies of calibration certificates are available upon request.

6 RESULTS

6.01 The weather during the survey was suitable for noise measurement, it being dry with little wind.

6.02 A significant noise source at the site during the mornings is traffic using Parkway and Arlington Road, which were heavily trafficked for the duration of both attended survey periods. Noise at the survey location was also significantly influenced by the operation of an extract fan associated with the adjacent restaurant which was operating continuously at the time the survey was concluded.

6.03 A list of the levels measured is included in Appendix D.

6.04 A summary of the time averaged ambient level and lowest measured background for the survey period is shown in Table 6.1. In accordance with the requirements of LBC the minimum L_{A90} is the lowest measurement in the specified period.

Location	Period	Average $L_{Aeq,T}$ – dB	Lowest L_{A90} – dB
Position 1	Day time (0840 – 1700Hrs)	63.0	53

Table 6.1: Measured Ambient and Lowest Background Noise Levels, free field

6.05 The sound level meter was calibrated before the measurements. No significant calibration drift was found to have occurred.

6.06 The majority of the measurement period was dominated by noise associated with the existing extract fan serving the adjacent restaurant. This started operating just after 10am and serves to increase the existing background noise levels to 62dB L_{A90}. The minimum background noise level listed in Table 6.1 was recorded when the extract fan was not operating.

7 PLANT NOISE ASSESSMENT

7.01 This application is for the following condensers to be located on the roof terrace of No. 27:

- 2 No. AOY12 50dB(A) at 1m

7.02 Based on the requirements of LBC and the lowest measured background noise level measured during the survey, Table 7.1 sets out the required plant noise limits.

Position	Period	Measured Existing Lowest $L_{A90,T}$	Proposed Noise Limit L_{Ar}
Closest residential windows	0845 - 1900	53dB	48dB

Table 7.1: Plant Noise Emission Limits Based on Lowest Measured L_{A90}, Free-field dB to comply with LBC Guidance

7.03 The limit suggested above is a rating level and as such any design should take into account the acoustic characteristics of the plant. In this instance the proposed units display none of the characteristics whereby the acoustic correction should be applied.

7.04 The condensers are proposed to operate during the opening times of Marsh & Parsons, 0845 – 1900hrs.

7.05 Predicted noise levels have been calculated at the closest 2st floor windows of the dwellings directly above the restaurant adjoining the west extent of the building, 3m from the proposed condenser location.

7.06 Other noise sensitive locations located further or screened more from the site will be subject to lower noise levels than those predicted at the above location

7.07 Table 7.2 present the results of worst-case plant noise predictions at the site.

Item	Noise Level, dB(A)	Notes
Cumulative Plant Noise Level	53	2 no AC units running
Conformal distance losses over 3 metres	-9	1 m from closest windows
Additional reflections	+0	No localised reflective surfaces
Screening	0	Direct line of sight
Total Noise Level	**44**	**1 m from closest windows**

Table 7.2: Condenser noise calculation – noise reaching closets residential dwellings

7.08 It can be seen from Table 7.2 that the adopted noise criterion presented in Table 7.1 will be met when the plant operates.

7.09 With respect to the NPPF, predicted noise levels at the closest and most affected noise sensitive location are 9dB below the lowest background noise level and would be classified as approaching the NOEL.

8 CONCLUSION

8.01 Environmental Equipment Corporation Limited has been commissioned by ami consulting to undertake a noise assessment of two condenser units proposed to serve the Marsh & Parsons premises at 27 Parkway, Camden.

8.02 This noise assessment has been conducted in accordance with the policies and requirements of the Camden Borough Council and is based on noise surveys carried out at the site over typical weekday, daytime periods.

8.03 A noise assessment has been undertaken to evaluate the potential noise impact of the proposed condensers at the closest and worst-affected existing residential receptors.

8.04 Plant noise limits have been set, based on the results of a background noise survey and the requirements of LBC, to control the noise from the proposed plant.

8.05 The noise impact assessment has shown that noise from the proposed items satisfy the council's noise criteria for the site.

8.06 Assessing the site in accordance with the principles of the National Planning Policy Framework has shown that predicted noise levels would be approaching the level at which no effects are observed to occur, the NOEL.

8.07 On the basis of this assessment it is considered that noise does not pose a material constraint to the operation of the proposed units.

APPENDIX A

GLOSSARY OF TECHNICAL TERMS

TECHNICAL TERMS AND UNITS

Decibel (dB) - This is the unit used to measure sound. The human ear has an approximately logarithmic response to sound over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). We therefore use a logarithmic scale to describe sound pressure levels, intensities and power levels. The logarithms used are to base 10; hence, an increase of 10 dB in sound pressure level corresponds to a doubling in perceived loudness of the sound.

Sound Power Level (SWL) - This is a function of the noise source alone and is independent of its surroundings. It is a measure of the amount of sound power output measured in decibels.

Sound Pressure Level (SPL) - This is a function of the source and its surroundings and is a measure of the sound pressure at a point in space. For example, a sound pressure level measured at 1 metre from a sound source of certain sound power in reverberant room will not be the same as the sound pressure level a 1 metre from the sound source measured in open space.

Octave and One-Third Octave Bands - The human ear is sensitive to sound over a range of approximately 20 Hz to 20 KHz and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For finer analysis, each octave band may be split into one-third octave bands.

"A" Weighting - A number of frequency weightings have been developed to imitate the ear's varying sensitivity to sound of different frequencies. The most commonly used weighting is the "A" weighting. The "A" weighted SPL can be measured directly or derived from octave or one-third octave band SPLs. The result is a single figure index which gives some idea of the subjective loudness of the sound, but which contains no information as to its frequency content.

Noise Rating (NR) Curves - The "A" weighted sound pressure level cannot be used to define a spectrum or to compare sounds of different frequencies. NR curves convey frequency information in a single-figure index. This is done by defining the maximum permissible sound pressure level at each frequency for each curve. To measure the noise rating of a given environment, the SPL is measured in octave or one-third octave bands and the noise rating is then the highest NR curve touched by the measured levels.

Intermittency and Time-Weighting - The degree of annoyance caused by a noise also depends on its duration and intermittency of a noise. Intermittent, impulsive or repetitive noises tend to be more annoying than continuous noises. Various time-weightings have been derived to measure sounds of differing intermittences and these can be measured directly on modern equipment. The most common time-weightings in use are as follows:-

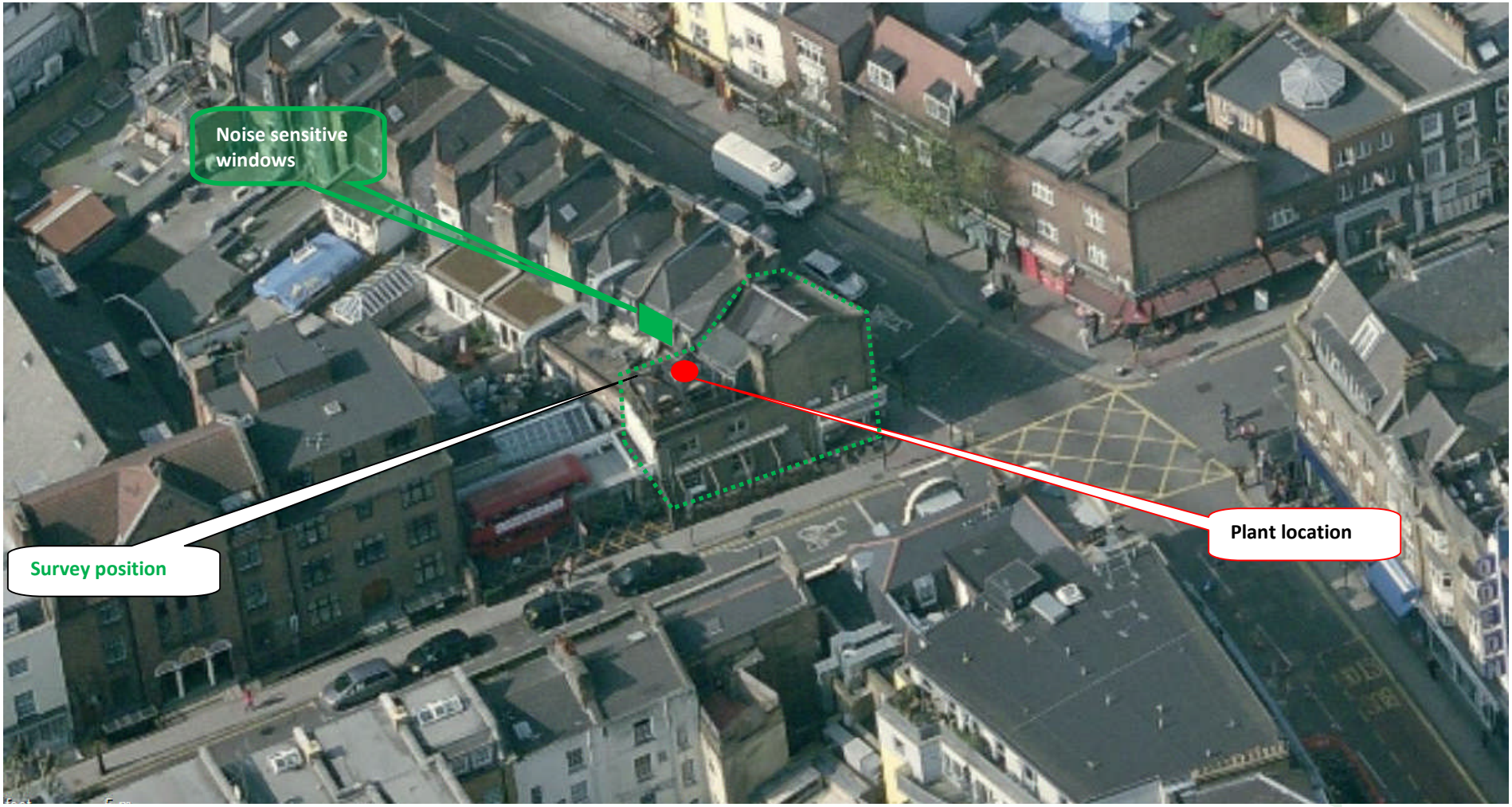
L_{90} This is the sound pressure level exceeded for 90% of the measurement period. It is widely used to measure background noise levels.

L_{10} This is the sound pressure level exceeded for 10% of the measurement period. It is widely used to measure traffic noise. For a given measurement period, the L_{10} level is by definition greater than or equal to the L_{90} level.

L_{eq} The equivalent continuous noise level is often used to measure intermittent noise. It is defined as the notional steady noise level that would contain the same acoustic energy as the varying noise. Because the averaging process used is logarithmic, the L_{eq} level tends to be dominated by the higher noise levels measured.

APPENDIX B

AERIAL SITE VIEW
&
MEASUREMENT LOCATION


Noise sensitive windows
Survey position
Plant location

APPENDIX C

PLANNING POLICY
AND GUIDANCE

PLANNING POLICY AND GUIDANCE

London Borough of Camden's planning policy is set out in a range of documents that constitute its Local Development Framework. This includes its Core Strategy and Local Development Policies which were adopted on 8th November 2010 and provide the '*vision, objectives and spatial policies to guide development in the borough up to 2025*'.

The Development Policies support the Core Strategy by setting detailed planning policies that the Council will use for determining planning permissions.

Criteria used to assess the noise and its impact are outlined in development policy 28 which also gives an overview of the Councils intent in regard of noise sensitive and noise generating development:

> *The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:*
>
> *a) development likely to generate noise pollution; or*
> *b) development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided. Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted.*
>
> *The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds. The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact.*

DP28 – Noise and vibration includes a number of tables relating to detailed noise criteria:

Table A: Noise levels on residential sites adjoining railways and roads at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	74 dB L_{Aeq} 12h	72 dB L_{Aeq} 12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	74 dB L_{Aeq} 4h	72 dB L_{Aeq} 4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	66 dB L_{Aeq} 8h	66 dB L_{Aeq} 8h

Table B: Noise levels on residential streets adjoining railways and roads at and above which attenuation measures will be required

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	65 dB L_{Aeq} 12h	62 dB L_{Aeq} 12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	60 dB L_{Aeq} 4h	57 dB L_{Aeq} 4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	55 dB L_{Aeq} 1h	52 dB L_{Aeq} 1h
Individual noise events several times an hour	Night	2300-0700	>82 dB L_{Amax} (S time weighting)	>82 dB L_{AMAX} (S time weighting)

Table C: Vibration levels on residential sites adjoining railways and roads at which planning permission will not be granted

Vibration description and location of measurement	Period	Time	Vibration levels
Vibration inside critical areas such as a hospital operating theatre	Day, evening and night	0000-2400	0.1 VDV ms-1.75
Vibration inside dwellings	Day and evening	0700-2300	0.2 to 0.4 VDV ms-1.75
Vibration inside dwellings	Night	2300-0700	0.13 VDV ms-1.75
Vibration inside offices	Day, evening and night	0000-2400	0.4 VDV ms-1.75
Vibration inside workshops	Day, evening and night	0000-2400	0.8 VDV ms-1.75

Where dwellings may be affected by ground-borne regenerated noise internally from, for example, railways or underground trains within tunnels, noise levels within the rooms should not be greater than 35dB(A)max

Table D: Noise levels from places of entertainment on adjoining residential sites at which planning permission will not be granted

Noise description and measurement location	Period	Time	Sites adjoining places of entertainment
Noise at 1 metre external to a sensitive façade	Day and evening	0700-2300	L_{Aeq} 5m shall not increase by more than 5dB*
Noise at 1 metre external to a sensitive façade	Night	2300-0700	L_{Aeq} 5m shall not increase by more than 3dB*
Noise inside any living room of any noise sensitive premises, with the windows open or closed	Night	2300-0700	L_{Aeq} 5m (in the 63Hz Octave band measured using the 'fast' time constant) should show no increase in dB*

* As compared to the same measure, from the same position, and over a comparable period, with no entertainment taking place

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL_{Aeq}

National Planning Policy Framework and the Noise Policy Statement for England

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 and upon its publication, the majority of planning policy

statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

The NPPF contains four aims, which are set out at paragraph 123 in Section 11 of the document, titled *Conserving and enhancing the natural environment*:

> *"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 health and 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; 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."*

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

> *"NOEL – No Observed Effect Level*
>
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
>
> *LOAEL – Lowest Observed Adverse Effect Level*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
>
> *SOAEL – Significant Observed Adverse Effect Level*
>
> *This is the level above which significant adverse effects on health and quality of life occur."*

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:*
>
> *avoid significant adverse impacts on health and quality of life;*
>
> *mitigate and minimise adverse impacts on health and quality of life; and*
>
> *where possible, contribute to the improvement of health and quality of life."*

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

2.25 This aim (the third aim)*, seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."*

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

British Standard 4142

British Standard (BS) 4142: 1997 *Method for rating industrial noise affecting mixed residential and industrial areas* is intended to be used to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings.

The procedure contained in BS4142 for assessing the likelihood of complaints is to compare the "*specific noise level*", which is the measured or predicted noise level from the source in question immediately outside the dwelling, with the background noise level. Where the noise contains a "*distinguishable discrete continuous note (whine, hiss, screech, hum etc.) or if there are distinct impulses in the noise (bangs, clicks, clatters or thumps), or if the noise is irregular enough to attract attention*" then a correction of +5dB is added to the specific noise level to obtain the "*rating level*" or L_{Ar}.

The likelihood of noise provoking complaints is assessed by subtracting the background noise level from the rating noise level. BS4142 states:

> *"A difference of around 10dB or higher indicates that complaints are likely. A difference of around 5dB is of marginal significance. A difference of -10dB is a positive indication that complaints are unlikely."*

The standard also notes that:

> *"The greater this difference the greater the likelihood of complaints."*

In the context of the NPPF, it is considered that a situation where BS4142 suggests complaints are unlikely would equate to the No Observed Effect Level (NOEL). The situation where BS4142 suggests complaints are likely would equate to the Significant Observed Adverse Effect Level (SOAEL).

The Lowest Observed Adverse Effect Level (LOAEL) has been equated to the situation that BS4142 describes as "marginal" as this is the only intermediate threshold identified in BS4142.

This assessment is carried out over a one hour period for the daytime and a five minute period for the night-time. Day or night are not defined in the standard but it states that night should cover the times when the general adult population are preparing for sleep or are actually sleeping. For the purposes of this assessment, it is assumed that daytime and night-time are 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX D

SURVEY RESULTS
(TABULAR)

EC 13287 - Marsh & Parsons 27 Parkway Camden

AMI

Tabulated Results

Time	L_{Aeq}	L_{Amax}	L_{A90}
08:40	61.1	78.2	53.5
08:45	61.1	74.8	55.0
08:50	61.1	74.0	55.5
08:55	59.5	81.9	54.0
09:00	60.2	77.9	53.5
09:05	60.7	71.1	52.5
09:10	59.1	70.7	53.0
09:15	59.8	73.2	55.0
09:20	61.0	75.9	54.5
09:25	60.8	84.0	54.5
09:30	60.3	72.3	55.0
09:35	59.9	68.3	55.5
09:40	60.8	72.4	55.5
09:45	59.8	69.8	55.0
09:50	70.1	87.6	54.5
09:55	59.0	74.2	54.5
10:00	59.8	74.1	55.0
10:05	62.5	80.6	56.0
10:10	62.2	71.2	55.0
10:15	65.4	72.3	63.0
10:20	63.2	70.5	62.0
10:25	63.2	70.0	61.5
10:30	62.9	68.8	61.5
10:35	63.5	81.1	61.5
10:40	67.6	86.2	61.5
10:45	63.2	67.1	61.5
10:50	63.4	72.5	61.5
10:55	63.2	72.0	61.5
11:00	63.1	68.0	61.0
11:05	63.7	76.5	61.5
11:10	63.5	70.0	61.5
11:15	63.1	69.1	62.0
11:20	63.4	70.1	61.5
11:25	63.1	78.2	61.5
11:30	63.5	70.1	62.0
11:35	63.5	73.9	62.0
11:40	63.4	77.1	61.5
11:45	62.9	67.7	61.0
11:50	62.5	74.3	61.0
11:55	63.0	72.9	61.5
12:00	62.9	69.5	61.0
12:05	62.7	68.6	61.5
12:10	63.0	74.5	61.5
12:15	63.1	70.6	61.5
12:20	64.1	77.3	61.5
12:25	62.5	68.8	61.0
12:30	62.6	69.1	61.0
12:35	62.8	70.4	61.5

Time	L_{Aeq}	L_{Amax}	L_{A90}
12:40	62.5	67.2	61.5
12:45	62.3	69.3	61.0
12:50	62.7	68.4	61.5
12:55	63.6	76.9	61.5
13:00	63.8	77.4	61.5
13:05	64.5	80.6	62.0
13:10	63.3	73.7	62.0
13:15	63.6	80.8	62.0
13:20	62.7	68.8	61.0
13:25	62.7	71.4	61.5
13:30	62.8	70.4	61.5
13:35	62.9	69.6	61.0
13:40	63.0	69.5	61.5
13:45	63.2	74.3	61.5
13:50	62.9	69.9	61.5
13:55	64.7	75.4	61.5
14:00	62.4	70.5	61.0
14:05	64.3	79.0	61.5
14:10	62.7	68.6	61.5
14:15	63.4	71.5	62.0
14:20	63.2	70.1	61.0
14:25	63.3	72.9	61.5
14:30	63.2	70.6	61.5
14:35	62.8	72.5	61.0
14:40	64.6	75.8	61.5
14:45	62.9	69.1	61.5
14:50	64.0	80.6	61.5
14:55	62.7	71.5	61.5
15:00	63.1	69.3	61.5
15:05	63.4	73.8	61.5
15:10	63.1	72.0	61.5
15:15	63.1	73.1	61.5
15:20	62.7	71.5	61.5
15:25	63.2	78.7	61.0
15:30	62.5	69.5	61.5
15:35	63.0	70.9	61.5
15:40	62.7	75.5	61.5
15:45	63.0	70.7	61.5
15:50	63.9	80.6	62.0
15:55	63.1	69.6	61.5
16:00	63.1	75.1	61.5
16:05	64.2	75.5	61.0
16:10	62.9	74.5	61.0
16:15	63.3	77.1	61.5
16:20	63.0	73.4	61.0
16:25	62.7	75.9	61.0
16:30	62.6	68.4	61.0
16:35	63.0	73.2	61.0

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Tabulated Results

Time	L_{Aeq}	L_{Amax}	L_{A90}
16:40	*62.8*	*77.1*	*61.0*
16:45	*62.6*	*67.8*	*61.0*
16:50	*63.2*	*74.4*	*61.0*
16:55	*62.8*	*71.4*	*61.0*

Time	L_{Aeq}	L_{Amax}	L_{A90}

APPENDIX E

SURVEY RESULTS
(GRAPHICAL)

Noise Level Time History at Marsh & Parsons 27 Parkway Camden