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Report reference 130503/1

8 July 2013

Assessment of noise and vibration

from air conditioning units

installed at

7 Coptic Street, London WC1A 1NH

Appeal reference APP/X5210/C/13/2198147

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SUMMARY

i. This report investigates the validity of reason (c) given by the London Borough of Camden for issuing an enforcement notice reference EN12/0780 concerning works carried out at 7 Coptic Street, London WC1. The reason states *"The air conditioning units due to their location in close proximity to residential windows have the potential to have a detrimental impact on the residential amenity of occupiers due to noise and vibration. The works therefore fail to comply with the policy CS5 of the London Borough of Camden Core Strategy 2010 and policies DP26 (Managing the impact of development on occupiers and neighbours) and DP28 (Noise and Vibration) of the London Borough of Camden Local Development Framework 2010."*

ii. I have carried out measurements at the site to establish existing background noise, due mainly to noise from the street, and to verify that the noise levels from the units as installed are consistent with the manufacturer's published data. I have then used standard calculation methods to establish the noise levels reaching nearby residential properties. I have also established, by measurement, the amount of vibration being transmitted into the building structure to which the units are attached.

iii. Camden Development Policy DP28 predates the NPPF / NPSE guidance and is more restrictive. It should only be given weight according to its degree of consistency with the NPPF. Nevertheless, as a result of my measurements and calculations I have concluded that noise and vibration levels from the air conditioning units installed at 7 Coptic Street are within the criteria set by DP28.

iv. The residential properties on the opposite side of Coptic Street are the worst case for noise. In terms of British Standard BS 4142, the noise reaching them is 10 dB short of marginal significance for complaints, in the worst-case scenario of both units running in heating mode at the quietest time of a Sunday night. The noise levels are below the 40 dB(A) lowest observable adverse effect level (LOAEL) at night and are below the 45 dB(A) level outside an open bedroom window that is needed to achieve good conditions for sleep.

v. Vibration levels are low to the point of being imperceptible, and are below levels at which there is a low probability of adverse comment according to British Standard BS 6472.

vi. I conclude that the air conditioning units do not have the potential to have a detrimental impact on the residential amenity of occupiers due to noise and vibration, and consequently reason (c) of the London Borough of Council's Enforcement Notice reference EN12/0780 is not justified.

1. INTRODUCTION

1.1 An Enforcement Notice dated 19th April 2013, reference EN12/0780, has been issued by the London Borough of Camden alleging a breach of planning control due to, inter alia, the installation of two items of air conditioning plant on the roof at 7 Coptic Street, London WC1. An appeal reference APP/X5210/C/13/2198147 has been lodged.

1.2 The reasons for issuing the notice state at item (c) that *"The air conditioning units due to their location in close proximity to residential windows have the potential to have a detrimental impact on the residential amenity of occupiers due to noise and vibration. The works therefore fail to comply with the policy CS5 of the London Borough of Camden Core Strategy 2010 and policies DP26 (Managing the impact of development on occupiers and neighbours) and DP28 (Noise and Vibration) of the London Borough of Camden Local Development Framework 2010."*

1.3 This report evaluates the noise and vibration levels of the air conditioning units that have been installed. It assesses the noise and vibration with regard to the NPPF, other relevant standards, and the planning policies cited by the Enforcement Notice. Conclusions are drawn as to whether there is a potential for detrimental impact due to noise and vibration as alleged by the Notice.

2. QUALIFICATIONS AND EXPERIENCE

2.1 My name is Peter Moore. I am a Chartered Engineer, a Member of the Institution of Mechanical Engineers and a Member of the Institute of Acoustics. I hold the degree of Master of Arts from Cambridge University, having studied engineering. I have been a consultant in noise and vibration for 25 years.

2.2 I regularly give advice on the assessment and control of noise and vibration for clients including County Councils, Local Authorities, planning consultants, property developers and industrial and commercial companies.

3. NATIONAL PLANNING POLICY

3.1 The National Planning Policy Framework was published in March 2012. It includes requirements for how noise should be taken into account when determining planning applications. After an initial 12 month period, which has now passed, *"due weight should be given to relevant policies in existing plans according to their degree of consistency with this framework (the closer the policies in the plan to the policies in the Framework, the greater the weight that may be given)."* (NPPF paragraph 215)

3.2 At paragraph 109 it states *"The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from … being adversely affected by unacceptable levels of … noise pollution."*

3.3 At paragraph 123 it states: *''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."*

3.4 For a definition of adverse impacts, the NPPF refers to the 2010 Noise Policy Statement for England. The NPSE utilises two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

- NOEL – No Observed Effect Level. 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.

3.5 The NPSE extends these to the concept of a

- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.

3.6 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. The NPSE states that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. The NPSE acknowledges that further research is required to increase understanding of what may constitute a significant adverse impact on health and quality of life from noise.

3.7 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. This does not mean that such adverse effects cannot occur.

4. NOISE CRITERIA - WORLD HEALTH ORGANISATION (WHO) GUIDELINES

4.1 The 1999 WHO "Guidelines for Community Noise" recommend noise levels indoors of 35 dB $L_{Aeq,\ 16\ hour}$ during the day to prevent moderate annoyance, and 30 dB $L_{Aeq,\ 8\ hours}$ in bedrooms at night to avoid sleep disturbance. The guidelines also note that, for noise which is not continuous at night, it is important to limit the number of noise events exceeding 45 dB $L_{Amax,\ fast}$ since sleep disturbance from intermittent noise events increases with the maximum level. Even if the total

equivalent level (L_{Aeq}) is fairly low, the number of noise events with a high maximum sound pressure level will affect sleep.

4.2 The guidelines assume the noise reduction through a bedroom window that is open for ventilation will be 15 dB, and consequently set guidelines for noise levels outside an open bedroom window of 45 dB $L_{Aeq, 8\ hour}$, with intermittent noise events not exceeding 60 dB $L_{Amax,fast}$.

4.3 The 2009 WHO "Night Noise Guidelines for Europe" considers L_{night}, which is the average over a whole year of the external night-time $L_{Aeq, 8\ hour}$ noise levels. It states that 40 dB L_{night} is the Lowest Observable Adverse Effect Level LOAEL, and 30 dB L_{night} is the No Observable Effect Level (NOEL). The report is primarily addressed at the existing European housing stock rather than new buildings, so assumes that residents will want to have their windows open for ventilation.

5. NOISE CRITERIA - BRITISH STANDARD BS 8233: 1999

5.1 British Standard BS 8233 gives recommendations for the control of noise in and around buildings, and suggests appropriate limits and criteria for different situations. The criteria and limits are intended to guide the design of new buildings, or refurbished buildings undergoing a change of use.

5.2 The standard specifies "good" and "reasonable" standards for resting or sleeping conditions inside dwellings. In living rooms and bedrooms the good standard is 30 dB L_{Aeq}. The reasonable standard is 40 dB L_{Aeq} in living rooms and 35 dB L_{Aeq} in bedrooms.

5.3 These L_{Aeq} values apply to steady noise sources such as road traffic, mechanical services or continuously running plant. They are the noise levels in the living space during normal hours of occupation but excluding noise produced by the occupants and their activities. The averaging time for the L_{Aeq} evaluation should be appropriate to the activity involved, e.g. 2300 to 0700 hours for bedrooms or 0700 to 2300 hours for living rooms.

5.4 In common with the WHO guidelines, BS 8233 recommends that intermittent noise sources should not regularly exceed 45 dB $L_{Amax, fast}$ in bedrooms.

6. NOISE CRITERIA - BRITISH STANDARD BS 4142: 1997

6.1 British Standard BS 4142 provides a method for rating the likelihood of complaint about noise caused by industrial and commercial premises affecting residential property.

6.2 The industrial or commercial noise reaching the residential property is measured in terms of its equivalent continuous noise level (L_{Aeq}) over any one hour period during the day, or 5 minute period at night. If the noise has characteristics that make it more noticeable (such as being irregular or distinctive in character) then a 5 dB correction is added to account for this. The resulting “rating level” is then compared with the background noise (L_{A90}) when the industrial noise is not present, and the difference between the two values determines the risk of complaint.

6.3 If the rating level exceeds the background level by 10 dB or more then complaints are likely. If it exceeds the background level by about 5 dB then it is of marginal significance. The rating level needs to be below the background level by a margin of 10 dB or more for complaints to be positively unlikely, at which point the noise would generally be considered inaudible.

7. VIBRATION CRITERIA - BRITISH STANDARD BS 6472: 2008

7.1 British Standard BS 6472:2008 defines levels of vibration dose value VDV, reaching the occupants of a building, at which there is a low probability of adverse comment as follows:

Day 7 am to 11 pm	0.2 to 0.4 $ms^{-1.75}$ VDV
Night 11 pm to 7 am	0.1 to 0.2 $ms^{-1.75}$ VDV

7.2 The standard observes that thresholds of perception vary widely among individuals. Approximately half the people in a typical population, when standing or seated, can perceive a vertical peak acceleration level (W_b weighting) of 0.015 ms^{-2} and approximately a quarter would perceive a level of 0.01 ms^{-2}.

8. LONDON BOROUGH OF CAMDEN POLICIES

8.1 Policy CS5 (Managing the impact of growth and development) of the Camden Core Strategy 2010 states:

"The Council will manage the impact of growth and development in Camden. We will ensure that development meets the full range of objectives of the Core Strategy and other Local Development Framework documents, with particular consideration given to:

a) providing uses that meet the needs of Camden's population and contribute to the borough's London-wide role;

b) providing the infrastructure and facilities needed to support Camden's population and those who work in and visit the borough;

c) providing sustainable buildings and spaces of the highest quality; and

d) protecting and enhancing our environment and heritage and the amenity and quality of life of local communities.

The Council will protect the amenity of Camden's residents and those working in and visiting the borough by:

e) making sure that the impact of developments on their occupiers and neighbours is fully considered;

f) seeking to ensure development contributes towards strong and successful communities by balancing the needs of development with the needs and characteristics of local areas and communities; and

f) requiring mitigation measures where necessary."

8.2 More information on Camden's approach to protecting amenity is given at paragraphs 5.7 and 5.8 of the Core Strategy document as follows:

"Camden's high level of amenity – the features of a place that contribute to its attractiveness and comfort – is a major factor in the quality of life of the borough's residents, workers and visitors and fundamental to Camden's attractiveness and success. However, Camden's inner London location, the close proximity of various uses and the presence of major roads and railways can mean that privacy, noise and light can be particular issues in the borough.

Protecting amenity is, therefore, a key part of successfully managing growth in Camden. We will expect development to avoid harmful effects on the amenity of existing and future occupiers and nearby properties or, where this is not possible, to take appropriate measures to minimise potential negative impacts. More detail and guidance on our approach to amenity is contained in Camden Development Policies policy DP26 – and our Camden Planning Guidance supplementary document. Other policies in Camden Development Policies also contribute to protecting amenity in the borough by setting out our detailed approach to specific issues, such as ... noise and vibration (policy DP28)."

8.3 Camden Development Policy DP26 (Managing the impact of development on occupiers and neighbours) states *"The Council will protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity"* and lists factors that will be considered including, at item (d), noise and vibration. It goes on to state at paragraph 26.5: *"Noise/vibration pollution has a major effect on amenity and health and can be a particularly significant issue in Camden given the borough's dense urban nature. More detail on how to prevent disturbance from noise and vibration, including the requirement for mitigation measures can be found in policy DP28."*

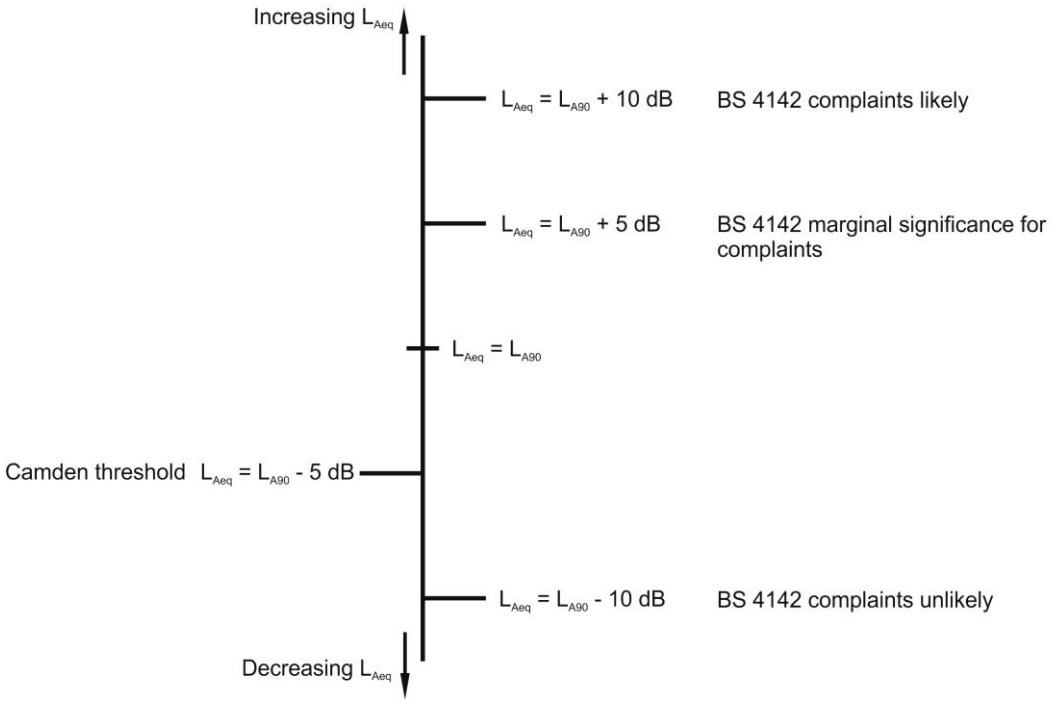
8.4 Camden Development Policy DP28 (Noise and Vibration) and its accompanying text is reproduced in full at Appendix 1.

8.5 Camden's Development Policy DP28 and the associated noise and vibration thresholds restate advice given in the former Planning Policy Guidance Note PPG24, which was replaced by the NPPF. It should only be given weight, therefore, in so far as it is consistent with the NPPF.

8.6 The DP28 noise thresholds applicable to the air conditioning units at 7 Coptic Street are in Table E "Noise levels from plant and machinery at which planning permission will not be granted" where a threshold of 5 dB less than the background L_{A90} is specified at 1 metre external to a sensitive facade. Where the noise has a distinguishable discrete continuous tone or distinct impulses this is reduced to 10 dB below the background L_{A90}.

8.7 These thresholds appear to have been based on the British Standard BS 4142 guidance, in which case they should be defined in terms of L_{Aeq}. This is not explicitly stated in the Camden policy, except in the case when the background noise is high (greater than 60 dB L_{A90}) for which the stated threshold is 55 dB L_{Aeq}. Furthermore the time over which the noise should be assessed (1 hour during the day, and 5 minutes at night according to BS 4142) is not stated in the Camden policy. For the purposes of this assessment the BS 4142 conventions are applied.

8.8 The threshold above which Camden will not grant permission is shown in relation to the BS 4142 assessment of the likelihood of complaints as follows:



8.9 The Camden threshold is set low in relation to the likelihood of complaints, at 5 dB above the point at which complaints are positively unlikely and 10 dB short of the point at which the noise is of marginal significance for complaints. The relationship between the BS 4142 rating of the likelihood of complaint and the SOAEL / LOAEL / NOEL levels in the NPSE is not firmly established but it is unlikely that the SOAEL would occur at anything lower than a marginal significance for complaints. The Camden threshold is therefore more restrictive than the NPPF / NPSE guidance, since the NPPF / NPSE does not rule out adverse effects from noise provided they are not above the SOAEL.

8.10 The DP28 vibration thresholds are at Table C *"Vibration levels on residential sites adjoining railways and roads at which planning permission will not be granted"*. The title of this table suggests a limited applicability which does not include vibration from air conditioning units, but British Standard BS 6472 from which the thresholds are evidently taken applies to any vibration source. The DP28 thresholds correspond to the level at which a low probability of adverse comment is expected according to the 1992 edition of the standard. The levels are revised in the current 2008 edition of the standard, which is quoted at paragraph 7.1 of this report.

9. NOISE ASSESSMENT

9.1 The two air conditioning units that have been installed at 7 Coptic Street are both Fujitsu type AOYG30LAT4, which the manufacturer's published data states has a noise level at 1 metre from the unit of 50 dB(A) when cooling and 51 dB(A) when heating. A frequency analysis of the noise, from the manufacturer's data, is at Appendix 2.

9.2 I have carried out my own measurements of the noise from these units. It was not possible to reliably measure the noise at 1 metre from the units because at that distance it was mainly the traffic noise from the nearby roads that could be heard, rather than the noise from the unit itself.

Going closer to the unit, at a distance of 0.5 metres, its noise became more dominant. The measurement at this distance when cooling, and its comparison with the manufacturer's data are as follows:

Measured at 0.5 m, cooling mode	60.5 dB(A)
Noise when not running (traffic)	54.2 dB(A)
Difference attributed to aircon unit	59.3 dB(A)
Adjusted to 1 metre (-6 dB)	53.3 dB(A)
Adjusted for reflective surfaces (-3 dB)	50.3 dB(A)
Manufacturer's figure	50.0 dB(A)
Difference	0.3 dB(A)

The noise measured on site and the manufacturer's data are therefore in close agreement. Subjectively the noise does not contain any discrete tones or impulsive characteristics that would warrant a penalty in the DP28 or BS 4142 analyses.

9.3 The manufacturer's data has been used as the basis for a calculation of the noise reaching the nearby residential properties. The calculation is done with a proprietary computer program, "Soundplan", which is an implementation of the International Standard ISO 9613-2 calculation method "Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation". It takes account of the distances over which the sound travels, and the effects of intervening barriers (including buildings) and reflective surfaces. In the case of the calculations for 7 Coptic Street, the barriers include the brick walls that form the chimneys either side of the roof terrace, and the transparent panels at either end of the roof terrace.

9.4 The results of the calculation are shown in Figure 1, in the form of coloured contour bands of noise levels superimposed on the Ordnance Survey plan. The noise levels are calculated at the height of the air conditioning units, assuming both are running together in the cooling mode. If they were both running together in heating mode the noise levels would be 1 dB(A) more.

9.5 The nearest residential building with windows facing the air conditioning units is on the opposite side of Coptic Street, to the east. To the north west, further away, are the Stedham Chambers apartments. These buildings are shown in photographs, taken from the roof at 7 Coptic Street, at Figures 2 and 3. Buildings to the west are believed to be in non-residential use and are further away. The adjoining neighbours on the same side of Coptic Street (numbers 6 and 7) do not have windows facing the air conditioning units so are less exposed to the noise than those on the opposite side of the road.

9.6 It was not possible to establish background noise levels at these nearby residential locations by direct measurement, due to lack of access. Instead, background noise was measured on the roof of 7 Coptic Street commencing on Friday 21st June and continuing over the weekend until the following Monday evening when the recording stopped due to the sound level meter's memory becoming full. Noise levels were sampled over consecutive five-minute periods, this being the period specified by BS 4142 at night. Measurements were taken over the weekend since it was anticipated that the Sunday night would be the quietest period, and therefore the worst case against which to assess the air conditioning noise. The results of the measurements (Figure 4) confirm this to be the case. The air conditioning units were switched off during this survey, and the main source of the measured noise was from the local streets.

9.7 The microphone was set back by approximately 2 metres from the edge of the roof, due to the constraints of the site, which meant that the roof edge created a barrier to noise coming up from Coptic Street. It was at a height of 1.5 metres, i.e. not obstructed by the transparent screens at the end of the roof terrace. The residential windows on the opposite side of Coptic Street have a direct view of the street, so the background noise at those windows is likely to be higher than the measured values. The Stedham Chambers apartments appear to be more shielded from street noise than the measurement position, so there the background noise is likely to be lower than the measured values.

9.8 Facade noise levels from the air conditioning units compare with the measured background noise at the quietest time of the Sunday night as follows:

Opposite side of Coptic Street	37 dB(A) cooling, both running
	38 dB(A) heating, both running
Stedham Chambers	28 dB(A) cooling, both running
	29 dB(A) heating, both running
Measured background noise (quietest time on a Sunday night)	43 dB L_{A90}

9.9 It is apparent that the criterion set by Camden's policy DP28 of the air conditioning noise level being quieter than 5 dB below the background noise is met at the opposite side of Coptic Street, even before any account is taken of the background noise there most likely being higher than the measured value.

9.10 In terms of BS 4142, the noise reaching the opposite side of Coptic Street is 10 dB short of being of marginal significance for complaints, in this worst-case scenario of both units running in heating mode at the quietest time of a Sunday night. During the day, when background noise is in excess of 50 dB L_{A90}, the air conditioning noise is positively unlikely to cause complaints according to BS 4142, and is likely to be inaudible.

9.11 In terms of BS 8233 and the World Health Organisation guidance, the air conditioning noise reaching the opposite side of Coptic Street is below the 40 dB(A) lowest observable adverse effect level (LOAEL) at night and is below the 45 dB(A) level outside an open bedroom window that is needed to achieve good conditions for sleep. Existing noise from the street is above these criterion levels.

9.12 At Stedham Chambers the air conditioning noise level is 14 dB below the measured background noise at the quietest time of a Sunday night. Account needs to be taken of the likelihood that the background noise at Stedham Chambers is lower than the value measured on the roof of 7 Coptic Street, but it is unlikely to be as low as the 34 dB L_{A90} value that would cause it to be a worse case than the situation at the opposite side of Coptic Street with regard to DP28 or BS 4142.

9.13 In terms of BS 8233 and the World Health Organisation guidance, the air conditioning noise reaching Stedham Chambers is below the 30 dB(A) no observable effect level (NOEL) at night and is below the 45 dB(A) level outside an open bedroom window that is needed to achieve good conditions for sleep.

9.14 A list of instrumentation used in the surveys is given at Appendix 1. The equipment has its calibration checked annually, traceable to national reference standards.

10. VIBRATION ASSESSMENT

10.1 Vibration levels were measured on the steel mounting brackets of each of the air conditioning units, where they are fixed to the brickwork, while they were running in the cooling mode. The units are secured to these brackets through rubber bushes which help to isolate any vibration generated in the unit from being transmitted to the bracket.

10.2 Weighted acceleration levels (b and d weightings as defined in BS 6472) were measured in three mutually perpendicular planes, using a high sensitivity triaxial accelerometer affixed by a magnet. The instrumentation is listed at Appendix 1. The vibration dose value (VDV) was measured for one minute and the total VDV for the whole day and night periods was then calculated by assuming the vibration would be continuous for the whole period.

10.3 The vibration at the worst case measurement position / direction was equivalent to a vibration dose value over the whole day of 0.09 $m/s^{1.75}$ VDV and over the whole night of 0.08 $m/s^{1.75}$ VDV. These are below the range at which BS 6472 indicates a low probability of adverse comment, and they meet the criteria set by Camden's policy DP28.

10.4 The W_b weighted peak acceleration was 0.006 ms^{-2} which is below the thresholds of perception (0.015 ms^{-2} for half the population, 0.01 ms^{-2} for a quarter of the population) stated in BS 6472.

11. CONCLUSIONS

11.1 Camden Development Policy DP28 predates the NPPF / NPSE guidance and is more restrictive. It should only be given weight according to its degree of consistency with the NPPF. Nevertheless, noise and vibration levels from the air conditioning units installed at 7 Coptic Street are within the criteria set by DP28.

11.2 The residential properties on the opposite side of Coptic Street are the worst case for noise. In terms of British Standard BS 4142, the noise reaching them is 10 dB short of marginal significance for complaints, in the worst-case scenario of both units running in heating mode at the quietest time of a Sunday night. The noise levels are below the 40 dB(A) lowest observable adverse effect level (LOAEL) at night and are below the 45 dB(A) level outside an open bedroom window that is needed to achieve good conditions for sleep.

11.3 Vibration levels are low to the point of being imperceptible, and are below levels at which there is a low probability of adverse comment according to British Standard BS 6472.

11.4 I conclude that the air conditioning units do not have the potential to have a detrimental impact on the residential amenity of occupiers due to noise and vibration, and consequently reason (c) of the London Borough of Council's Enforcement Notice reference EN12/0780 is not justified.

FIGURE 1: Soundplan calculation results

Based on the Ordnance Survey MasterMap

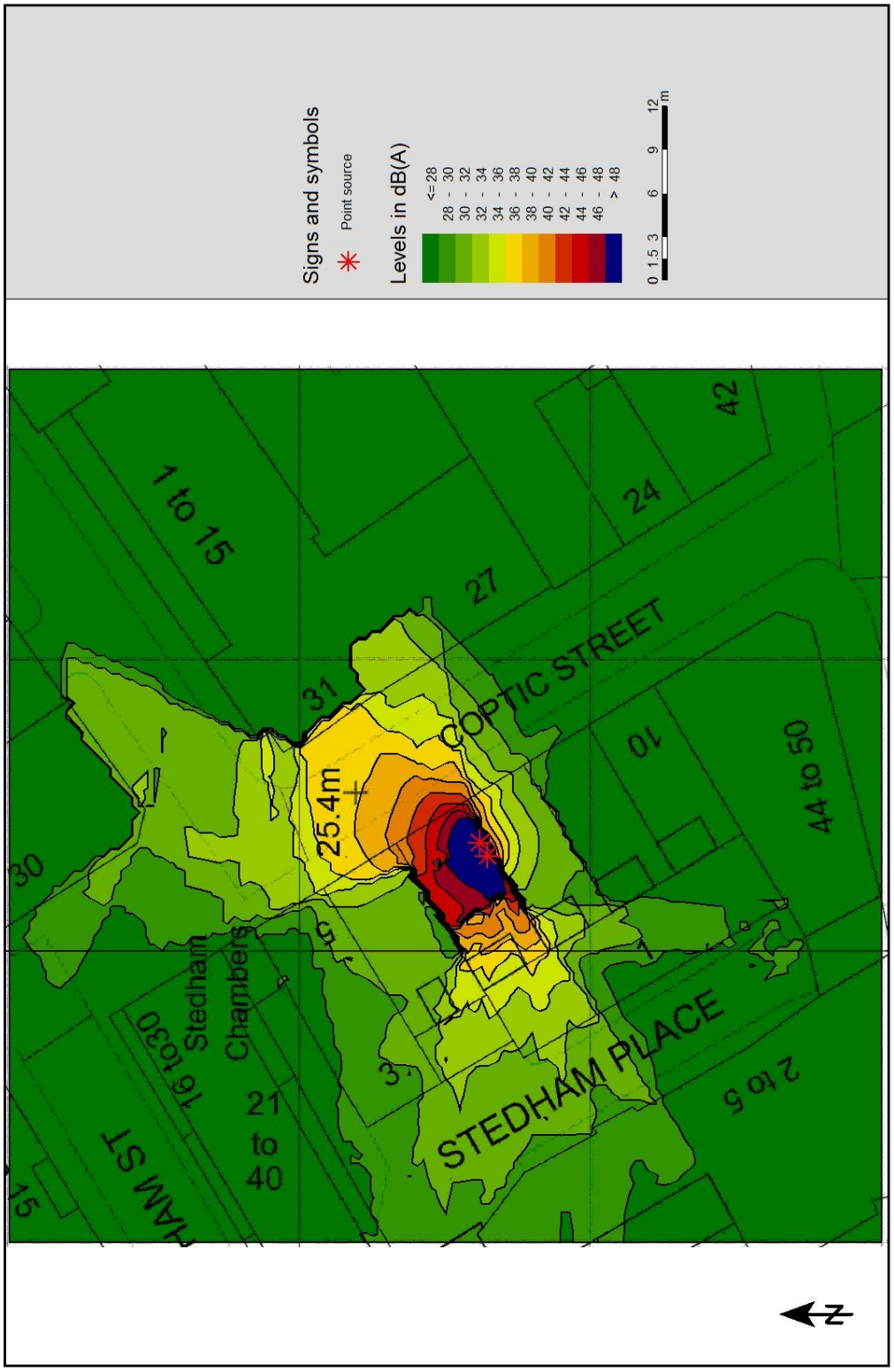
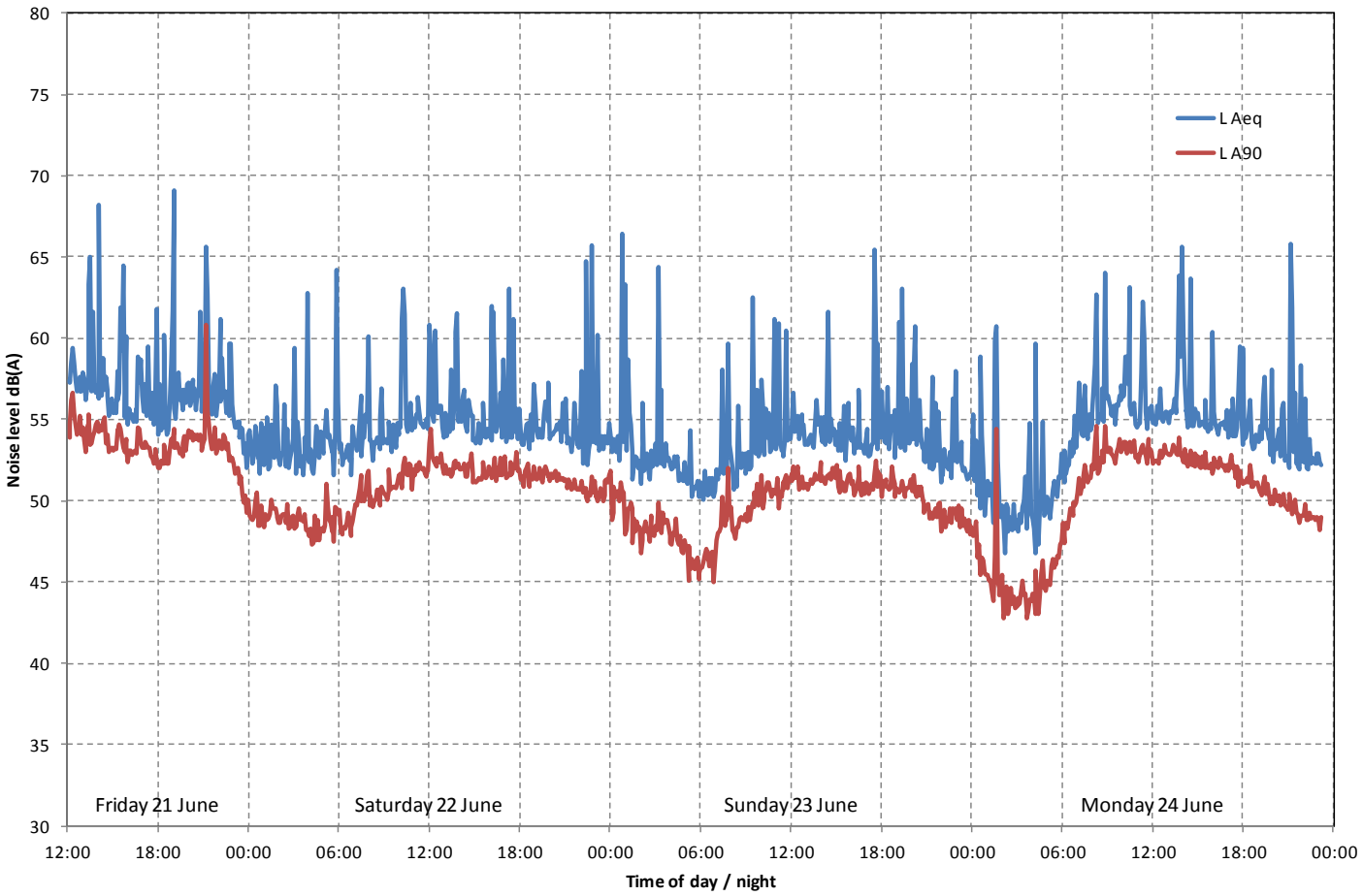


FIGURE 2 : Building on opposite side of Coptic Street

FIGURE 3: Stedham Chambers

FIGURE 4: Ambient Noise Level Survey

5 minute samples, measured on the roof at 7 Coptic Street, air conditioning units not running



Weather conditions dry with light winds, except for Saturday afternoon when winds were 15 to 20 mph south-westerly, and Sunday daytime when winds were 20 mph westerly.

Work activity reported on the roof terrace Saturday 09:30 to 14:00, Monday 12:30 to 15:30.

APPENDIX 1: Camden Development Policy DP28

DP28. Noise and vibration

28.1 Noise and vibration can have a major effect on amenity and health and therefore quality of life. Camden's high density and mixed-use nature means that disturbance from noise and vibration is a particularly important issue in the borough. Camden's Core Strategy recognises the importance of this issue for Camden's residents and policy DP28 contributes to implementing a number of Core Strategy policies, including CS5 – *Managing the impact of growth and development*, CS9 – *Achieving a successful Central London*, CS11 – *Promoting sustainable and efficient travel* and CS16 – *Improving Camden's health and well-being*.

DP POLICY

DP28 – Noise and vibration

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.

28.2 The effect of noise and vibration can be minimised by separating uses sensitive to noise from development that generates noise and by taking measures to reduce any impact. Noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces, while noise is generated by rail, road and air traffic, industry, entertainment (e.g. nightclubs, restaurants and bars) and other uses.

28.3 The Council will only grant planning permission for development sensitive to noise in locations that experience noise pollution, and for development likely to generate noise pollution, if appropriate attenuation measures are taken, such as double-glazing. Planning permission will not be granted for development sensitive to noise in locations that have unacceptable levels of noise. Where uses sensitive to noise are proposed close to an existing source of noise or when development that generates noise is proposed, the Council will require an acoustic report to ensure compliance with PPG24: *Planning and noise*. A condition will be imposed to require that the plant and equipment which may be a source of noise pollution is kept working efficiently and within the required noise limits and time restrictions. Conditions may also be imposed to ensure that attenuation measures are kept in place and effective throughout the life of the development.

28.4 In assessing applications, we will have regard to the Noise and Vibration Thresholds, set out below. These represent an interpretation of the standards in PPG24 and include an evening period in addition to the day and night standards contained in the PPG, which provide a greater degree of control over noise and vibration during a period when noise is often an issue in the borough.

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	55dB$L_{Aeq'}$

Key evidence and references

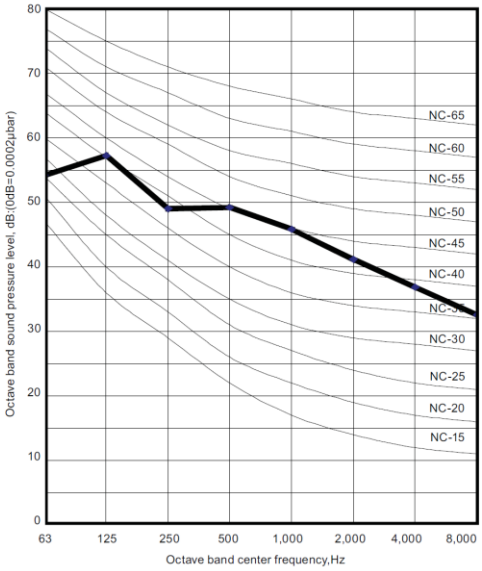
- Camden's Noise Strategy, 2002
- The London Plan (Consolidated with Alterations since 2004), 2008
- Planning Policy Guidance 24: Planning and noise

APPENDIX 2: Air conditioning unit manufacturer's noise data

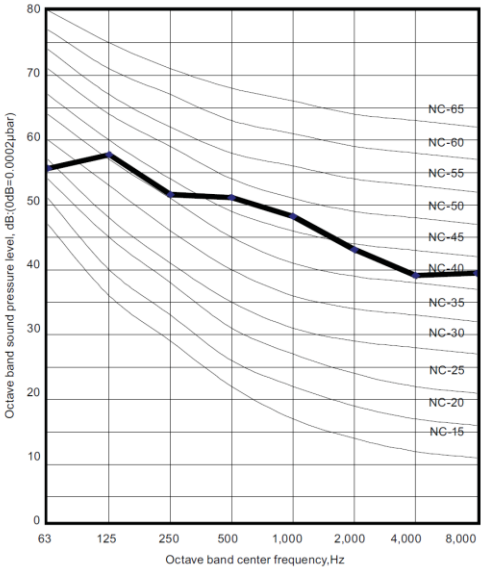
OUTDOOR UNIT
AO∗G30L4

■ MODEL: AO∗G30L4

● Cooling



● Heating



OUTDOOR UNIT
AO∗G30L4

APPENDIX 3: Instrumentation

Long term noise measurement – Cirrus type CR:811B sound level meter, serial no. C18910FD

Measurements close to air conditioning units:

Microphone – PCB type 377B02, serial no. 115598

Microphone preamplifier – PCB type Y426A11, serial no. 319

Acoustical calibrator - Bruel & Kjaer type 4231, serial no. 1914710

Accelerometer – PCB high sensitivity triaxial type 356B18, serial no. 72919

Accelerometer calibrator - Bruel & Kjaer type 4294, serial no. 2678037

Computer interface – National Instruments type 9234, serial no. 137EC95

Analysis software – National Instruments Sound & Vibration Measurement Suite version 6