Malcolm Hollis

77 Kingsway, Holborn

Plant Noise Assessment

MLM. Group

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Contents

1 Introduction

MLM Consulting Engineers Ltd has been commissioned by Malcolm Hollis to undertake an environmental sound survey at 77 Kingsway, Holborn, London and assess the impact of plant noise on the nearest noise-sensitive receptor to the proposed emergency pressurisation fan.

The assessment considers the noise levels of the proposed unit, with respect to the existing noise levels in the area, this has been assessed in accordance with the methodology contained in British Standard 4142:2014 - Methods for Rating and Assessing Industrial and Commercial Sound.

An environmental noise survey was conducted by MLM Consulting Engineers Ltd between 5 January 2017 and 8 January 2018. This sample is considered sufficient to provide details of representative and typical prevailing noise levels during the quietest hours of the day and night periods.

Based on the results of the noise survey, BS4142:2014 and guidance attained from the London Borough of Camden, the assessment set out limits for the noise emissions from the proposed plant to be associated with the existing office building.

This report contains references of a technical nature, a glossary of acoustic terminology has therefore been provided in Appendix A to assist in any interpretation. Full tabulated and charted measurement results are presented in Appendix B.

2 Assessment Criteria

2.1 British Standard 4142: 2014 – Methods for Rating and Assessing Industrial and Commercial Sound

BS4142 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS 4142 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the LA90,T background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

BS 4142 states: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:*

"Typically, the greater this difference, the greater the magnitude of the impact."

"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."

"A difference of around +5dB 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."

For the daytime, the assessment is carried out over a reference time period of one hour, but at night-time it is carried out over a 15 minute period. The periods associated with day or night, for the purposes of the Standard, are considered to be 07.00 to 23.00 and 23.00 to 07.00, respectively.

As the operation for the industrial or commercial units within the development is not known or decided at this stage, both night time and daytime periods have been considered.

2.2 Local Authority Requirements

The London Borough of Camden's Environmental Protection Team was consulted with regards to the proposed assessment methodology and criteria. Mr Peter Rodham, Chartered Environmental Health Officer, via e-mail exchange on the 20 November 2017, provided guidance with regards to a template emergency generator condition. As the proposed pressurisation fan is for emergency use only it was agreed that the requirements would likely be similar to that of the emergency generator,

The template emergency generator condition reads as follows:

"Prior to commencement/use of the development, details shall be submitted to and approved in writing by the Council to confirm that noise emitted by standby or emergency generators during power outages or testing does not exceed the lowest daytime $L_{Aeq(15min)}$ as measured or calculated according to BS4142".

3 Site Description and Development Proposals

The site is an existing office building at 77 Kingsway, London and the proposals include the installation of a new emergency pressurisation fan to be located on the rooftop of the existing building.

The existing nearest and most affected noise-sensitive receptors are understood to be approximately 20 metres to the north, on the top floor of the building opposite, on Great Queen Street.

The site is surrounded by a mixture of building usages, the majority of which are commercial. There is a significant amount on existing plant on the rooftops next to the proposed installation, and on the surrounding buildings.

The location of the proposed development, in relation to the closest residential receptors, is identified in red in Figures 1 and 2 below.

Figure 1: Site Location – Plot 3

The elevation views for the existing building is presented below.

Figure 2: Elevation View

4 Noise Survey Details

4.1 Survey Details

The prevailing noise conditions at the location of the proposed development have been determined by an environmental noise survey. The survey was undertaken over a typical period, between 5 January 2017 and 8 January 2018. One unattended measurement position was used to gather representative noise levels affecting the nearest residential receptor.

4.2 Noise Monitoring Methodology

All noise measurements were undertaken by a consultant certified as competent in environmental sound monitoring, and in accordance with the principles of BS 7445.

All acoustic measurement equipment used during the sound survey conformed to Type 1 specification of BS 61672. A full inventory of this equipment is shown in Table 1 below.

Table 1: Inventory of Sound Measurement Equipment

Item	Make & Model	Serial Number	Calibration Certificate Number	Date of Expiration of Calibration
Sound Level Meter	Rion NA-28	00370297	1611623	29 Nov. 2018
Preamplifier	Rion NH-23	60306		
Microphone	Rion UC-59	00386		
Sound Level Meter	Rion NA-28	00370297		

The noise measurement equipment used during the survey was calibrated at the start and end of the measurement period. The calibrator used had itself been calibrated by an accredited calibration laboratory within the twelve months preceding the measurements. No significant drift in calibration was found to have occurred on the sound level meter. Calibration certificates of the above equipment are available upon request.

4.3 Weather Conditions

Weather conditions were dry with negligible wind during the entire duration of the noise monitoring period.

4.4 Procedure and Measurement Positions

The survey was undertaken on the basis of one unattended measurement position on the site boundary. The measurement location was chosen to best represent the background noise levels at the nearest residential receptor. A suitable location overlooking Great Queen Street could not be used due to the close proximity of existing plant.

The measurement positions are detailed below and can be seen in Figure 3.

Measurement Position 1 (MP1):

Attended survey location on the eastern site boundary, on the seventh floor terrace of 77 Kingsway. The microphone was positioned on a 4m pole which extended out over Kingsway. The position is considered representative of the noise levels surrounding the site and at the nearest sensitive receivers. The sound level meter was located in free-field conditions.

Figure 3: Approximate Noise Monitoring Position MP1

The noise climate was dominated by road traffic noise from Kingsway.

4.5 Noise Survey Results

The results of environmental noise survey which are relevant to this assessment are present in table 2 below.

Table 2: Lowest Daytime LAeq Noise Levels at MP1

Date	Period	Lowest $L_{Aeq(15min)}$
05/01/2018	Daytime (07:00-23:00)	64
06/01/2018	Daytime (07:00-23:00)	64
07/01/2018	Daytime (07:00-23:00)	64

For information purposes, the average noise data measured during the survey are presented in table 3.

Table 3: Summary of Average Measured Noise Levels at MP1

Date	Period	$L_{Aeq,T}$	Lowest $L_{A90,T}$	L_{Amax}
05/01/2018	Daytime (07:00-23:00)	67	59	83
	Night-time (23:00-07:00)	64	55	76
06/01/2018	Daytime (07:00-23:00)	66	59	79
	Night-time (23:00-07:00)	64	55	76
07/01/2018	Daytime (07:00-23:00)	65	58	77
	Night-time (23:00-07:00)	64	55	76

Note: the lowest L_{A90} is stated for periods of one hour during the day and fifteen minutes at night.

Charted results are presented in Appendix B of this report.

5 Plant Noise Impact Assessment

5.1 Nearest Noise Sensitive Receivers (NNSR)

The nearest existing noise-sensitive receptors are understood to be the residential properties located on the top floor of the building opposite, on Great Queen Street.

5.2 External Noise Level Criteria

In order to comply with the Local Authority's requirements, the noise criterion set out in Table 4 are proposed. The noise limit is based on achieving the Local Authority's emergency plant criteria at the nearest noise sensitive receptor.

Table 4: Proposed Plant sound Emission Limits

Period	Lowest Measured $L_{Aeq,15min,day\ time}$	Proposed Plant "Rating Level" At The Nearest Noise Sensitive Receptor $L_{Ar,T}$
Daytime (07:00-23:00)	64dB	64dB

The above limits apply to the proposed emergency pressurisation fan.

Compliance with the above limiting noise levels is expected to result in a low impact at existing receptors.

5.3 Proposed External Plant Noise Sources and Mitigation Measures

A 900mm diameter, 1440 rpm emergency pressurisation fan is proposed. The noise levels of the proposed external plant are shown in Table 5 below.

Table 5: Manufacturer Plant Noise Levels

Unit Type	Octave Band Centre Frequency, Hz							
	63	125	250	500	1000	2000	4000	
	Inlet Sound Power Level (dB)							dBW
Pressurisation Fan	91	93	89	89	88	85	82	98

No data on fan noise breakout has been provided. This assessment therefore assumes but cannot guarantee that the unit noise breakout is negligible in comparison to the inlet sound power level.

As a worst case, it is assumed that the fan inlet has direct line of sight to the nearest noise sensitive receptor.

An inlet attenuator is proposed with the following insertion losses.

Table 6: Attenuator Insertion Losses

Attenuator Reference	Octave Band Centre Frequency, Hz							
	63	125	250	500	1000	2000	4000	8000
	Dynamic Insertion Loss (dB)							
ATT1	3	5	10	16	15	10	9	8

5.4 Plant Layouts

The proposed supply fan is to be located at the rooftop level in the North West corner of the site. The figure below shows the layout as currently proposed.

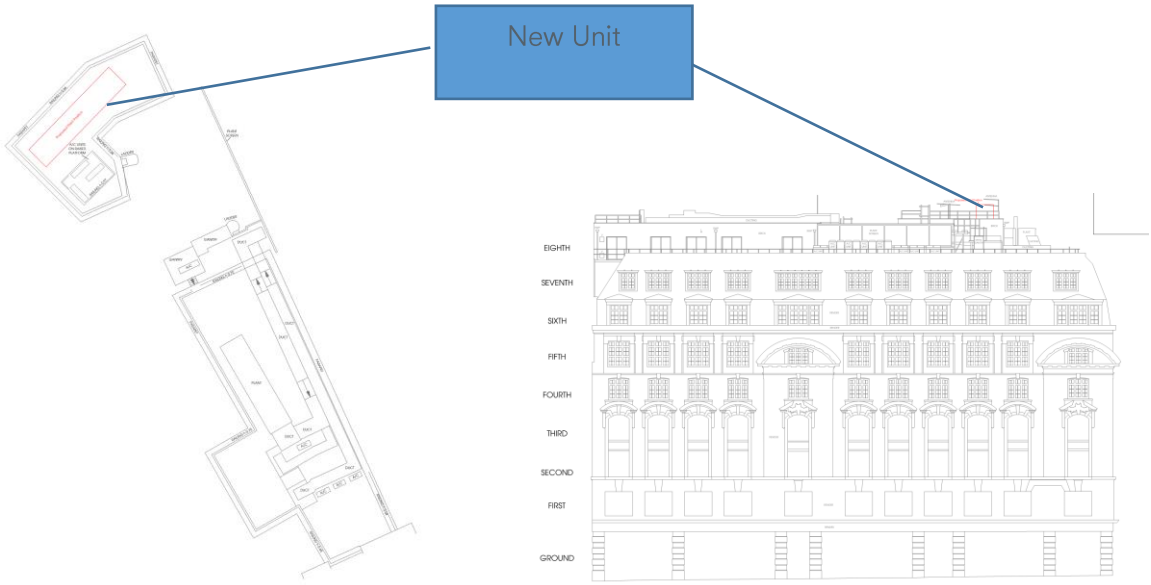


Figure 4: Proposed Plant Layout

5.5 Uncertainty

All possible efforts to reduce uncertainty in this assessment have been taken. There will always be an element of uncertainty in the noise measurements and in the manufacturer noise data.

5.6 Expected External Plant Noise Levels

The expected noise level from the proposed unit at the nearest residential receptor are shown in Table 7 below.

Table 7: Proposed Plant Noise Levels at Nearest Sensitive Receiver				
Unit Type	Distance to Receptor	Expected Plant Noise Level at 1m from Receiver L_{Aeq}	Plant Noise Rating Limit $L_{Ar,T}$	Excess Over Noise Limit
Pressurisation Fan	20m	52dB	64dB	-12dB

The expected noise level is 12dBA below the lowest $L_{Aeq,15min}$ noise measurement during the day and therefore the pressurisation fan noise emissions are expected to be compliant with the Local Authority's requirements.

Please note that the Local Authority template condition does not clarify whether the imposed plant noise limit is a "rating" level (i.e. making an allowance for its character, impulsivity, intermittency and tonality). Nevertheless, if this were to be considered, the predicted plant noise emission level of -12dB below the aforementioned criteria should provide sufficient safety margin to allow for any feature corrections.

6 Conclusion

MLM Consulting Engineers Ltd has been commissioned by Malcolm Hollis to undertake an environmental noise survey at 77 Kingsway, Holborn, London, and assess the impact of plant noise on the nearest noise-sensitive receptor from the proposed pressurisation fan, as required by the London Borough of Camden.

The report presents the results of a background noise monitoring exercise, carried out to determine the existing noise climate at the nearest noise-sensitive receptors to the proposed development. The environmental noise survey was conducted by MLM Consulting Engineers between 5th January 2018 and 8th January 2018. This sample is considered sufficient to provide details of representative and typical prevailing noise levels during the quietest hours of the day and night time periods.

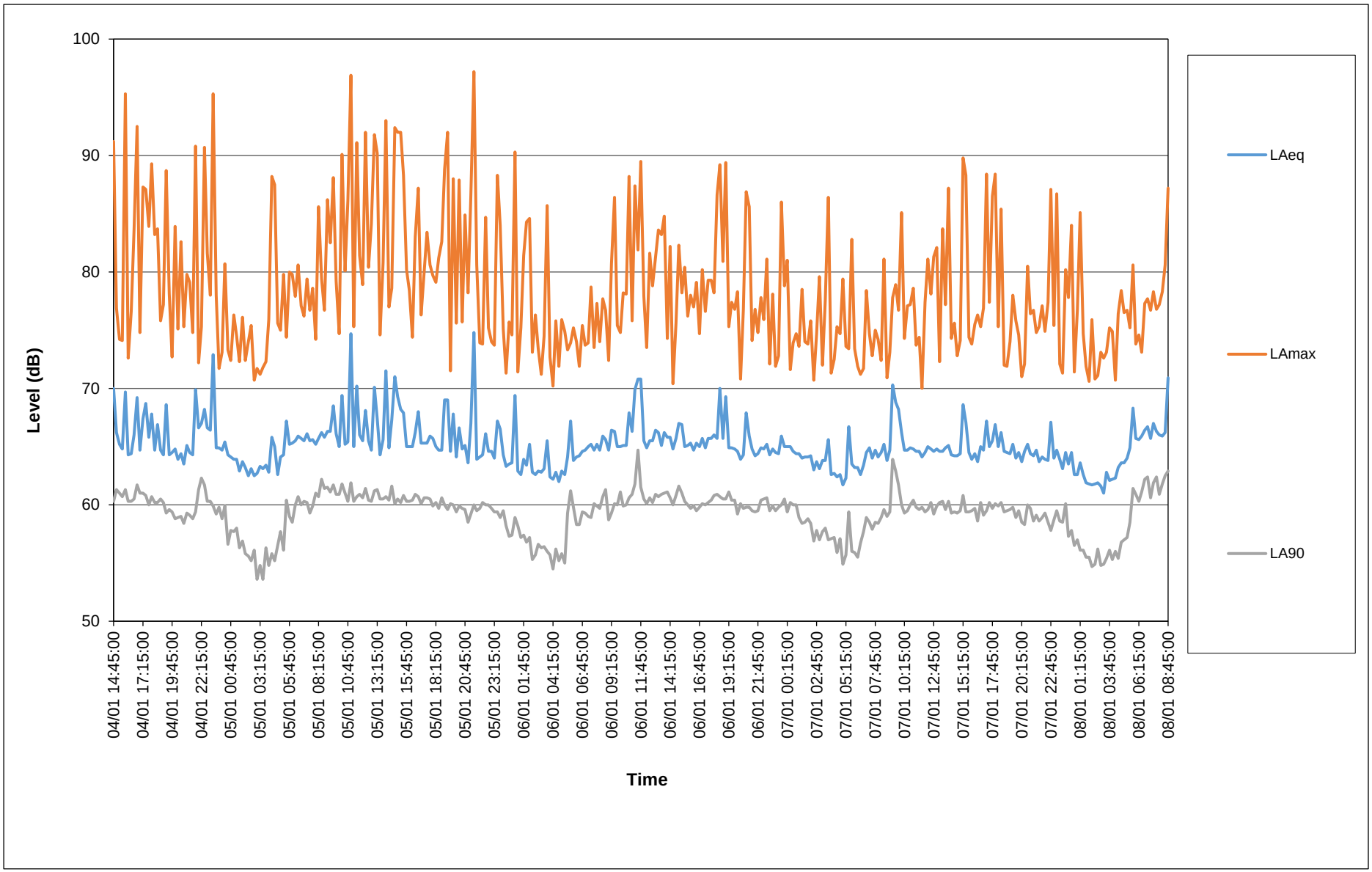
Plant noise calculations have been carried out in accordance with BS4142:2014 and Local Authority guidance. Plant noise levels are expected to be approximately 12dB below the lowest measured daytime 15 minute L_{Aeq} and is therefore considered compliant with the noise criterion likely to be implemented by the Council for emergency plant.

In the light of the findings of this report, it is considered that noise should not present a constraint to the granting of planning permission for proposed installation at this site.

Appendix A - Glossary of Acoustic Terminology

Wording	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20x10-6 Pascal's) on a decibel scale.
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 log10 (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.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Leq,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.
Lmax,T	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L90,T	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L10,T	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

Appendix B - Time History Chart



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