



ScotchPartners
Building Services Engineering | Sustainability | Acoustics

1 – 4 Warwick Street, Soho
Maslow's Group LLP

Noise Emission Assessment

Revision 00

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Revision History

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Contents

1	Introduction.....	4
2	Policy & guidance	5
2.1	Overview.....	5
2.2	National Planning Policy Framework	5
2.3	Noise Policy Statement for England	6
2.4	Planning Practice Guidance	7
2.5	Westminster City Plan	8
2.6	Unitary Development Plan.....	9
3	Site description.....	12
3.1	Development site	12
3.2	Noise climate	12
3.3	Nearest noise sensitive receptors	14
4	Plant noise emission assessment.....	15
4.1	Plant proposals	15
4.2	Plant noise limits	16
4.3	Discussion	16
5	Terrace area	18
6	Conclusions.....	19
	Appendix A – Noise level histories.....	20
	Appendix B – Terminology.....	22

1 Introduction

- 1.1 Proposals are in place to redevelop and extend the commercial office building at 1 – 4 Warwick Street to create a 6-storey plus basement mixed use development.
- 1.2 A Noise Impact Assessment was submitted as part of the original planning application for the site (ref: 20/02247/FULL) which presented assessments of noise emission from building services plant, external noise intrusion into bedroom accommodation and internal noise transfer. A discussion on noise associated with the rooftop terrace was also included.
- 1.3 It is understood that changes have since been made to the external plant layout and roof extension and this report presents an updated assessment of plant noise and discussion of noise from the roof terraces in support of a Minor Material Amendment application.
- 1.4 A summary of planning policy and design guidance which is considered relevant to the proposals is presented within Chapter 2 with a description of the site and prevailing acoustic climate in Chapter 3. Assessments of plant noise emission and a discussion of noise associated with the rooftop terraces are presented in Chapters 4 and 5 respectively.
- 1.5 Noise level data and a glossary of terminology used throughout the report are provided within the appendices.

2 Policy & guidance

2.1 Overview

2.1.1 When assessing the noise impacts associated with the proposed development, consideration has been given to both National and Local planning policy. A full list of the documents which have been consulted is provided below:

- National Planning Policy Framework (NPPF)
- Noise Policy Statement for England (NPSE)
- Planning Practice Guidance (PPG)
- Westminster City Plan
- Unitary Development Plan (UDP)

2.1.2 Summaries of the guidance considered relevant to the proposals are provided within this chapter.

2.2 National Planning Policy Framework

2.2.1 The NPPF was originally introduced in 2012 and has recently been updated in 2018. The Framework sets out the government's planning policies for England and provides guidance on how these are to be applied.

2.2.2 Paragraphs 170 and 180 address the issue of controlling noise and are presented below:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability."

"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they 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 the 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; and c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation..."

- 2.2.3 The latest revision of the Framework has introduced the principle of the “Agent of change” which must be taken into consideration when considering the impact upon existing neighbours. The details of this principle are outlined in paragraph 182.

” 182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

2.3 Noise Policy Statement for England

- 2.3.1 The NPSE seeks to clarify the underlying principles of policies relating to noise and its stated aim is to:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on 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*

- 2.3.2 The accompanying explanatory note to the NPSE offers the following definitions for “significant adverse” and “adverse” which draw upon concepts established by the World Health Organisation:

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 the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

- 2.3.3 The NPSE advises that it is not possible to have a single objective noise-based measure which defines the SOAEL in all situations, and that the SOAEL is likely to be different depending upon the noise source(s), the receptors and the time of day.

2.4 Planning Practice Guidance

2.4.1 The government have published additional planning practice guidance on their online portal to assist with the management of noise impacts associated with new development.

2.4.2 The guidance provides the following expanded definitions for the effect levels provided within the NPSE.

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No effect	No observed effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No observed effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response. E.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum

Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in acoustic character of the area	Significant observed effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation / awakening; loss of appetite, significant, medically definable harm e.g. auditory and non-auditory.	Unacceptable adverse effect	Prevent

2.4.3 The guidance does not, however, provide objective values to define these effect levels.

2.5 Westminster City Plan

2.5.1 Westminster City Council have set out their planning policies within the Westminster Development Plan, of which the *Westminster City Plan* is considered to be key policy document for determining planning applications within Westminster.

2.5.2 Policy S32 addresses the issue of noise pollution within the city and states:

Policy S32

The council will work to reduce noise pollution and its impacts and protect Noise Sensitive Receptors from noise by:

- *Requiring development to minimise and contain noise and vibration;*
- *Ensuring development provides an acceptable noise and vibration climate for occupants and is designed to minimise exposure to vibration and external noise sources; and*
- *Securing improvements to Westminster's sound environment, including protecting open spaces of particular value for their relative tranquillity.*

2.6 Unitary Development Plan

- 2.6.1 Originally adopted in 2007, the UDP forms part of the current *Westminster Development Plan* and, despite being partially superseded by the *Westminster City Plan*, many policies were “saved” by the Secretary of State in 2010.
- 2.6.2 Policies ENV 6 and ENV 7 relate to the control of noise and vibration from new development and remain active. For reference they are presented below.

POLICY ENV 6: NOISE POLLUTION

The City Council will:

1 require design features and operational measures to minimise and contain noise from developments, to protect noise sensitive properties

2 where developments adjoin other buildings or structures, require applicants to demonstrate that as far as is reasonably practicable developments will be designed and operated to prevent transmission of audible noise or perceptible vibration through the fabric of the building or structure to adjoining properties

3 require a noise and vibration assessment report where development or change of use could affect noise sensitive properties

4 require residential developments to provide adequate protection from existing background noise

5 not permit development that would cause noise disturbance in tranquil area

6 apply conditions when granting planning permission to restrict noise emissions, transmission of noise or perceptible vibration and hours of operation, to require incorporation of acoustic measures to meet these conditions and to require, where appropriate, such conditions to be complied with before new plant or the development is used

7 require all mechanical, ventilation and ducting equipment to be contained within the building envelope of new developments

8 encourage developers to ensure servicing of plant and machinery so that that noise conditions are met at all times

9 require developers, when carrying out construction work, to keep to a minimum disturbance to surrounding areas, and to adhere to hours of working agreed with the City Council prior to start on site

10 seek measures to minimise and reduce noise from traffic.

POLICY ENV 7: CONTROLLING NOISE FROM PLANT, MACHINERY AND INTERNAL ACTIVITY

(A) Where development is proposed, the City Council will require the applicant to demonstrate that this will be designed and operated so that any noise emitted by plant and machinery and from internal activities, including noise from amplified or unamplified music and human voices, will achieve the following standards in relation to the existing external noise level at the nearest noise sensitive properties, at the quietest time during which the plant operates or when there is internal activity at the development.

1) where the existing external noise level exceeds WHO Guideline levels of LAeq,12hrs 55dB daytime (07.00- 19.00); LAeq,4hrs 50dB evening (19.00-23.00); LAeq,8hrs 45dB night-time (23.00-07.00):

either

(a) and where noise from the proposed development will not contain tones or be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 10 dB below the minimum external background noise at the nearest noise sensitive properties. The background noise level should be expressed in terms of LA90,15min . or

(b) and where noise emitted from the proposed development will contain tones, or will be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 15 dB below the minimum external background noise at the nearest noise sensitive properties. The background noise level should be expressed in terms of LA90,15min .

2) where the external background noise level does not exceed the above WHO Guideline levels, policy ENV 7(A)(1)(a) and (b) will apply except where the applicant is able to demonstrate to the City Council that the application of slightly reduced criteria of no more than 5 dB will provide sufficient protection to noise sensitive properties:

either

(a) where noise emitted from the proposed development will not contain tones or be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 5dB below the minimum external background noise level at the nearest noise sensitive properties. The background noise levels should be expressed in terms of LA 90, 15min. or

(b) where noise emitted from the proposed development will contain tones or will be intermittent sufficient to attract attention, the maximum emission level (LAeq15min) should not exceed 10 dB below the minimum external background noise level at the nearest noise sensitive properties. The background noise levels should be expressed in terms of LA 90, 15min.

(B) Noise from emergency generators

Where emergency generation plant is installed and requires testing, the City Council will permit noise emitted from this plant to increase the minimum assessed background noise levels by no more than 10dB for the purpose of testing. This testing period is for up to one hour per month between 09.00 and 17.00 Monday to Friday only and not on public holidays.

- 2.6.3 Policy ENV 7 sets clear objective design targets for new plant installations to be achieved at the nearest noise sensitive property and these shall be adopted for the purpose of this assessment.
- 2.6.4 Accompanying guidance with Policy ENV 6 defines noise sensitive properties as *“all residential properties; educational establishments; hospitals; hotels; hostels; concert halls; theatres; broadcasting and recording studios.”*

3 Site description

3.1 Development site

3.1.1 The proposed development site is Regency House at 1-4 Warwick Street. The building currently provides retail space at ground floor level and commercial office space on the first to fifth floors.

3.1.2 The building is located on the northern corner of the crossroads between Brewer Street, Glasshouse Street and Warwick Street itself. It is bounded by the commercial office development at 5-6 Warwick Street to the north and the retail unit at 82-84 Brewer Street to the east. The site location is shown in Figure 3-1.

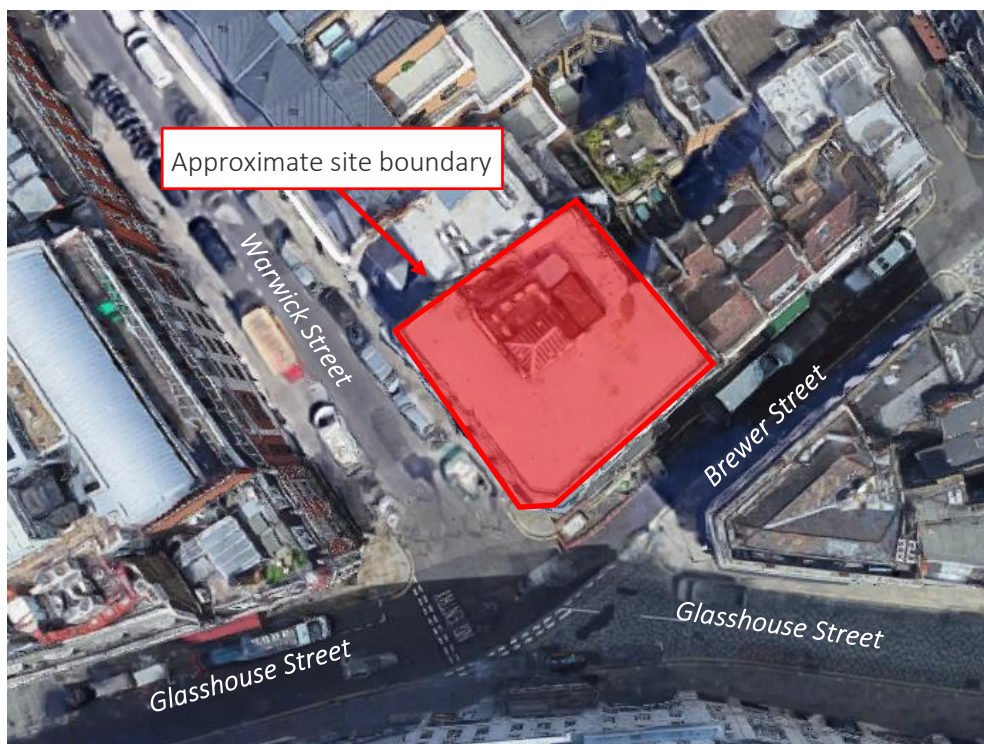


Figure 3-1 Site location

3.2 Noise climate

3.2.1 The prevailing noise climate at the development site is heavily dominated by local road and pedestrian traffic with building services plant also contributing to underlying noise levels.

3.2.2 Road traffic in the area can be expected to travel at speeds of up to 20mph and comprises cars, busses, heavy and light goods vehicles and the occasional emergency services vehicle.

3.2.3 It should also be appreciated that the site is located in the Soho district of Central London which is well known for its nightlife and dining offerings. Entertainment and patron noise from local pubs, cafes and restaurants in the area is also expected to feature prominently within the local acoustic environment.

- 3.2.4 Due to ongoing lockdown restrictions associated with the UK’s response to the Covid-19 pandemic, noise level data to inform the acoustic design has been taken from the previous planning application for the building (Ref: 19/01719/FULL). Noise level measurements were undertaken at the site prior to the national lockdown, between December 2018 and January 2019, and the data are still considered relevant. Full details of the survey can be found within Hoare Lea’s *Regency House - Noise Assessment Report – Rev 01*.
- 3.2.5 Long term, unattended noise level measurements were captured at roof level across 3 days in December 2018 and a week in January 2019. The microphone was extended from the south-western corner of the roof and with a clear line of sight to Warwick Street, Brewer Street and Glasshouse Street below. The location of the measurement position is shown in Figure 3-2.
- 3.2.6 The ambient noise spectra which can typically be expected at the upper floors of the development have been derived from this measurement data and are presented below in Table 3-1. The full time level history graphs from the survey can be found in Appendix A

Time	Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Day $L_{eq,16hr}$ (07:00-23:00)	67	64	61	60	59	55	49	40	63
Night $L_{eq,8hr}$ (23:00-07:00)	64	60	58	57	56	52	46	36	60

All values are sound pressure levels in dB (ref: $2 \times 10^{-5} Pa$)
Table 3-1 Typical ambient noise levels expected at high level

- 3.2.7 Follow up short term measurements were also conducted at ground floor level on both Warwick St and Brewer St to ascertain noise levels at street level.
- 3.2.8 The microphone was extended approximately 1 metre from the building façade on Warwick and Brewer streets and is considered to have been under façade reflected conditions. The location of the measurement positions are shown in Figure 3-2.
- 3.2.9 The hourly ambient noise level spectra typically expected during the daytime at street level are shown below.

	Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Warwick St $L_{eq,1hr}$	70	68	64	62	59	57	53	48	65
Brewer St $L_{eq,1hr}$	71	66	65	64	61	58	52	45	66

All values are sound pressure levels in dB (ref: $2 \times 10^{-5} Pa$)
Table 3-2 Typical ambient noise levels expected at low level

- 3.2.10 The ambient noise levels reported in Table 3-1 and Table 3-2 readily exceed the WHO Guideline Levels discussed in Policy ENV 7 and therefore, the objective criteria set down in Clause a) are considered applicable to the development.

3.2.11 The lowest measured background noise levels typically expected to occur during the day, evening and overnight at the nearest noise sensitive properties are set down in Table 3-3. These levels have been determined from the long-term measurement data obtained at roof level.

Time	Lowest background noise level
Day (07:00 – 19:00)	54dB $L_{A90,15min}$
Evening (19:00 – 23:00)	57dB $L_{A90,15min}$
Night (23:00 -07:00)	49dB $L_{A90,15min}$

Table 3-3 Lowest background noise levels

3.3 Nearest noise sensitive receptors

3.3.1 The nearest noise sensitive receptors, as defined by Westminster City Council, have been identified as the residential accommodation above the Leicester Arms and The Glassblower public houses to the south-west and south-east respectively.

3.3.2 The location of these receptors in relation to the site are shown in Figure 3-2.

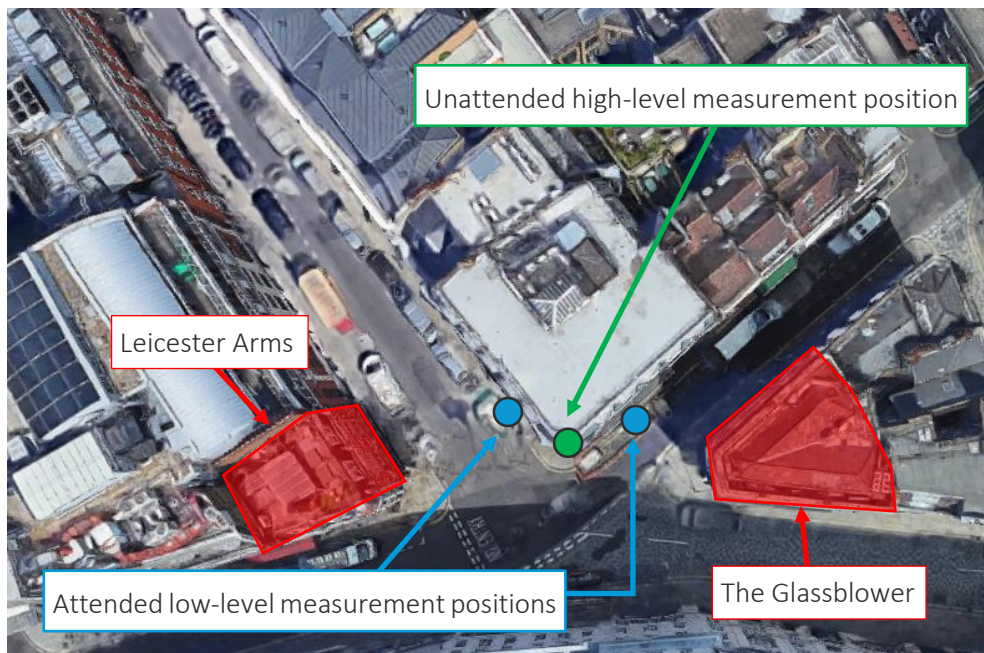


Figure 3-2 Noise survey positions and nearest noise sensitive receptors

4 Plant noise emission assessment

4.1 Plant proposals

4.1.1 External plant items associated with the development are expected to comprise a single air handling unit and ventilation fans located at sixth floor level. Additional fans serving the newly formed sixth floor kitchen and a number of air source heat pumps are to be located within a plant area on top of the new extension. It is understood that the plant has the potential to operate at any time during the day and night.

4.1.2 The plant areas will be open topped but visually screened on all sides. The location and layout of the plant area is shown in Figure 4-1.

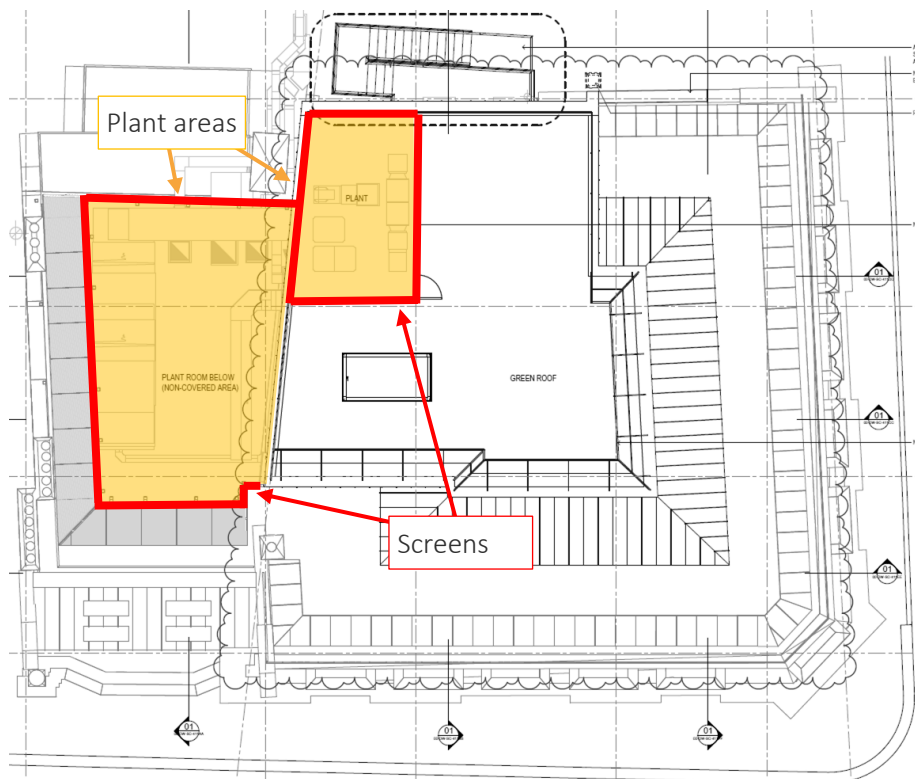


Figure 4-1 Rooftop plant areas

4.1.3 The number of units and model selections are subject to change as the design progresses and so noise limits have been established to assist with the design. A discussion on potential mitigation measures to satisfy Westminster's planning requirements is also presented in Section 4.3.

4.2 Plant noise limits

4.2.1 The following cumulative noise limits for all plant items have been established at the nearest noise sensitive receptors based on Westminster City Council’s planning requirements and the lowest measured background noise levels presented Table 3-3.

Time	Noise limit
Day (07:00 – 19:00)	44dB $L_{Aeq,T}$
Evening (19:00 – 23:00)	47dB $L_{Aeq,T}$
Night (23:00 – 07:00)	39dB $L_{Aeq,T}$

Table 4-1 Cumulative noise limits for building services plant at the nearest noise-sensitive receptors

4.2.2 Should the noise output from any plant items contain any tonal qualities then these limits should be reduced by 5dB in accordance with Policy ENV 7.

4.3 Discussion

4.3.1 The nearest noise sensitive receptors identified in Section 3.3 can be expected to benefit from at least 26dB of attenuation owing to geometric divergence over 20 metres, between them and the development site.

4.3.2 Selecting equipment so as to satisfy the following design limits at the perimeter of each plant area could be expected to achieve compliance with Westminster’s planning limits in Table 4-1.

Time	Design limit
Day (07:00 – 19:00)	67dB L_{pA}
Evening (19:00 -23:00)	70dB L_{pA}
Night (23:00 -07:00)	62dB L_{pA}

Table 4-2 Recommended design limits within plant areas

4.3.3 Air source heat pumps typically operate with an individual noise output of 60-65dB L_{pA} at 1 metre so careful consideration will need to be given to the number and size of units to avoid exceeding the limits above. Introducing additional control methods, such as a setback low-noise mode, could help with satisfying the most onerous limit overnight.

4.3.4 The exhaust and fresh air intakes of the air handling unit and ventilation fans could be expected to readily satisfy the limits above at all times of the day and night subject to the inclusion of appropriate silencers on the intake and exhaust. The exact sizing of these silencers will ultimately depend upon the final plant selections, but it is suggested that allowance should be made for silencers some 1200 - 1500mm long.

4.3.5 Careful consideration will need to be given to controlling casing breakout as this can be particularly challenging for ventilation fans with the motor located outside of the airstream.

- 4.3.6 If the design limits set out in Table 4-2 cannot be achieved with standard equipment selections then the design of the plant screens should be such that they offer additional acoustic attenuation.
- 4.3.7 Solid and imperforate screens achieving 10kg/m^2 or acoustically rated louvres some 150mm deep can be expected to offer at least 10dB of attenuation, allowing for an equivalent relaxation of the design targets within each plant area. It is important to note that this attenuation is subject to the screens obstructing any direct line of sight between the equipment and nearest noise sensitive receptors.
- 4.3.8 It is expected that the plant proposals could readily satisfy Westminster's planning requirements through careful equipment selection and off the shelf attenuation solutions.

5 Terrace area

- 5.1 It should be appreciated that patron noise from the sixth and seventh floor roof terraces has the potential to disturb noise-sensitive receptors however, accurately predicting the impact of this noise source is likely to be very difficult. There is currently no industry guidance on the assessment of this type of noise.
- 5.2 Noise from the terraces can be expected to primarily consist of conversations between patrons and how loud this will be is likely to fluctuate depending upon the number of the patrons present, prevailing background noise levels and other social and cultural factors.
- 5.3 The current design proposals show the rooftop terraces set back from the roof edge and with fairly small usable floor areas of just 56m² at sixth floor and 70m² at seventh floor. These factors can be expected to help control noise emission from the terrace with the roof edge acoustically screening residences at low level, and the floor space limiting the total capacity of the terrace.
- 5.4 Implementing additional control measures through a Noise Management Plan can be expected to further minimise and mitigate the potential impact upon local residents and would be considered a neighbourly thing to do.
- 5.5 Mitigation measures such as controlling the occupancy of the terrace, avoiding loud music events and providing clear signage reminding patrons to be considerate to their neighbours would all serve to help control noise levels.
- 5.6 Maintaining an open channel of communication with the local residents is considered key to maintaining a successful relationship with the community and it would be advisable to provide local residents with contact details for a site representative to whom they can direct any complaints regarding noise from the terrace. Details of the complaint can then be logged and appropriate action taken. If operational changes are required, then the Noise Management Plan should be reviewed and updated accordingly.
- 5.7 Copies of any Noise Management Plan should be shared with the local residents and Westminster City Council for review.

6 Conclusions

- 6.1 Scotch Partners have undertaken a noise impact assessment of the minor material amendments to the redevelopment and extension of 1-4 Warwick Street.
- 6.2 Consideration has been given to the impacts associated with noise emission from the revised external building services plant layout and newly formed roof terraces.
- 6.3 Subject to the incorporation of appropriate mitigation measures, which have been discussed within this report, the proposed redevelopment is expected to readily satisfy Westminster City Council's planning requirements.

Appendix A – Noise level histories

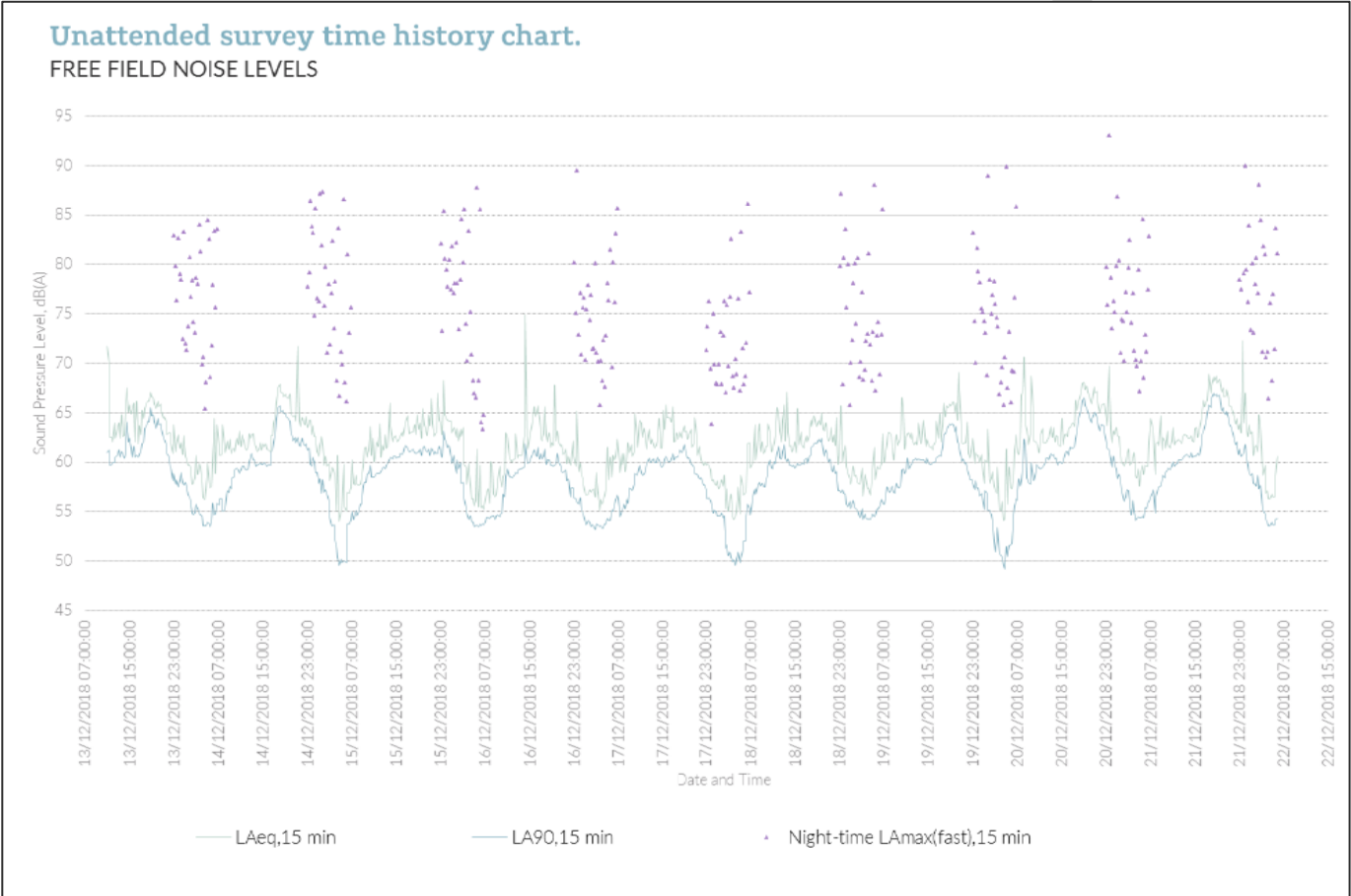


Figure A1 Long term noise level data, 13 – 22 December 2018. Taken from Hoare Lea’s Regency House -Noise Assessment Report Feb 2019

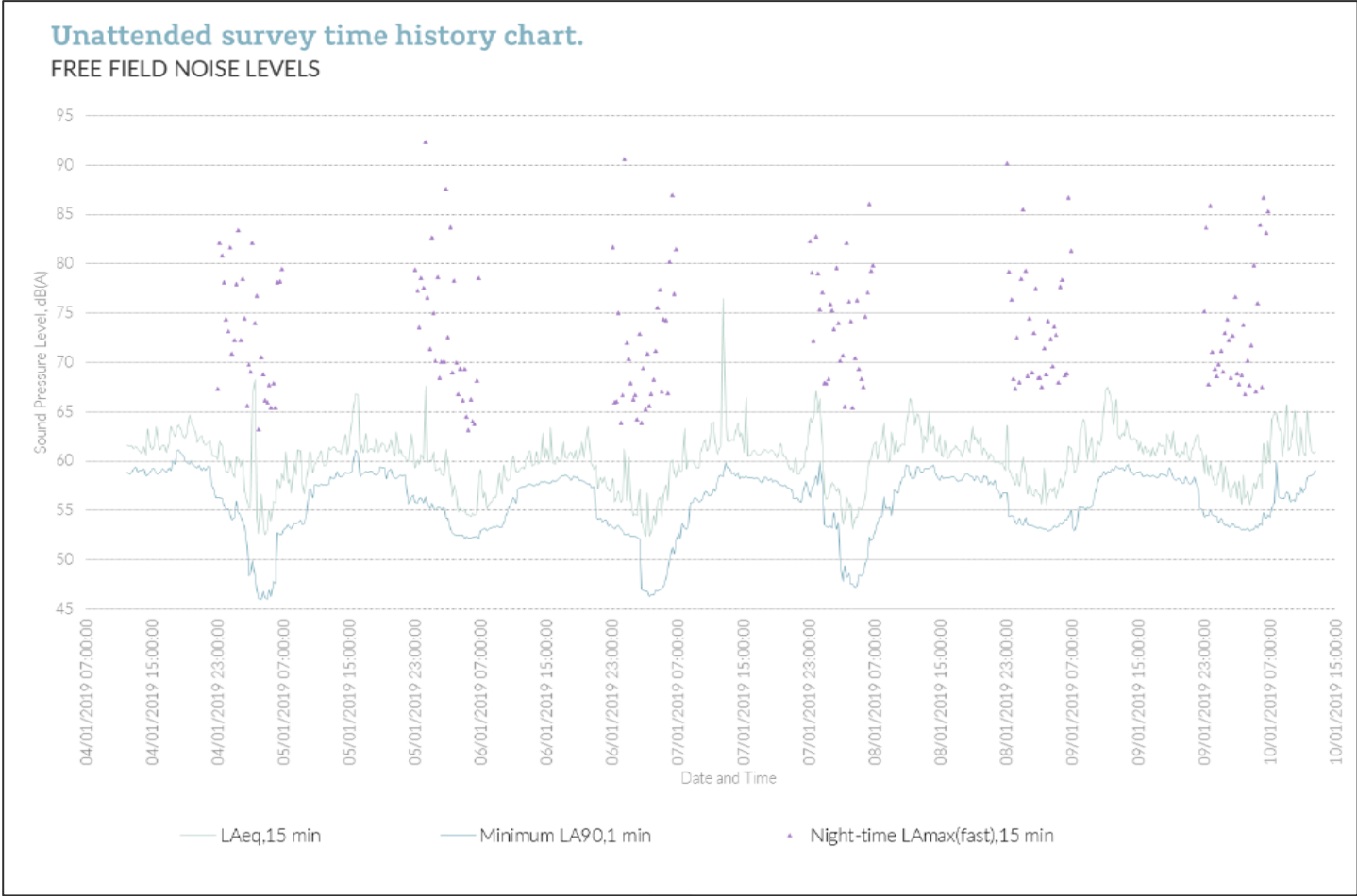


Table A2 Long term noise level data, 4 – 10 January 2019. Taken from Hoare Lea’s Regency House -Noise Assessment Report Feb 2019

Appendix B – Terminology

This appendix provides an explanation of some of the acoustics terms used in this report.

<p>A-weighting L_A or L_{pA}, L_{WA},</p>	<p>The human ear does not sense all frequencies of sound equally. Our sensitivity is at a maximum at around 2 kHz and steadily decreases above and below. Below 20 Hz and above about 20 kHz we can't hear at all.</p> <p>Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would actually hear. The A-weighting is an electronic filter that matches the response of a sound level meter to that of the human ear. When A-weighted the Sound Pressure Level L_p becomes L_{pA} (or L_A) and the Sound Power Level L_W becomes L_{WA}.</p>
<p>L_p</p>	<p>The instantaneous sound pressure level (L_p)</p>
<p>L_{pA} (or L_A)</p>	<p>The A-weighted instantaneous sound pressure level (L_{pA} or L_A)</p> <p>This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125 s (FAST time constant) or the previous 1 s (SLOW time constant).</p>
<p>L_{AF}, L_{AS}</p>	<p>The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.</p>
<p>L_{max}</p>	<p>The maximum instantaneous sound pressure level (L_{max}),</p>
<p>L_{Amax}</p>	<p>The A-weighted maximum instantaneous sound pressure level (L_{Amax})</p>
<p>L_{AFmax}</p>	<p>The A-weighted maximum instantaneous sound pressure level with a FAST time constant (L_{AFmax}).</p>
<p>$L_{N,T}$</p>	<p>The percentage exceedance sound pressure level ($L_{N,T}$),</p>
<p>$L_{AN,T}$ $L_{AFN,T}$ N = %age value, 0-100 T = measurement time eg. L_{A90}, L_{A10}, L_{AF90}, 5 min</p>	<p>The A-weighted percentage exceedance sound pressure level ($L_{AN,T}$), the A-weighted percentage exceedance sound pressure level with a FAST time constant ($L_{AFN,T}$).</p> <p>This is the sound pressure level exceeded for $N\%$ of time period T. eg. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as $L_{A10,1hr} = x$ dB.</p> <p>L_{A0} (the level exceeded for 0 % of the time) is equivalent to the L_{Amax} and L_{A100} (the level exceeded for 100 % of the time) is equivalent to the L_{Amin}.</p> <p>It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.</p>
<p>$L_{eq,T}$</p>	<p>The equivalent continuous sound pressure level over period T ($L_{eq,T}$),</p>
<p>$L_{Aeq,T}$ T = measurement time eg. $L_{Aeq,5min}$</p>	<p>The A-weighted equivalent continuous sound pressure level over period T ($L_{Aeq,T}$).</p> <p>This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the L_{eq} is not a simple arithmetic mean value.</p> <p>The L_{eq} is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation</p>

$D_{nT,w}$	<p>The <i>weighted standardized level difference</i> represents the level difference measured between two rooms, standardised to a reference reverberation time of 0.5s. Measurements are made in accordance with BS EN ISO 16283-1: 2014.</p> <p>The single figure value is obtained from a reference curve adjusted in accordance with the methodology set down in BS EN ISO 717-1: 2013</p>
R_w	<p>The <i>weighted sound reduction index</i> is a single figure rating of the airborne sound insulation performance of an element under laboratory conditions. Measurements are made in accordance with BS EN ISO 16283-1: 2014.</p> <p>The single figure value is obtained from a reference curve adjusted in accordance with the methodology set down in BS EN ISO 717-1: 2013.</p>
C_{tr}	<p>A single figure value in decibels which is to be added to the single figure airborne sound insulation rating of building element. This spectrum adaptation term accounts for the increased low frequency content of traffic noise and is typically a negative value.</p>
$L'_{nT,w}$	<p>The <i>weighted normalised impact sound pressure level</i> is a single figure rating of the impact sound insulation performance of an element. The ' denotes that this is an in-situ performance rather than a laboratory measurement and accounts for flanking constructions. Measurements are made in accordance with BS EN ISO 16283-2: 2014.</p> <p>As with the single figure airborne sound insulation ratings, the single figure value is obtained from a reference curve which is adjusted in accordance with the methodology set down in BS EN ISO 717-2: 2013.</p>

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